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Non-invasive diagnostic tests for Helicobacter pylori infection (Review)

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[Diagnostic Test Accuracy Review]

Non-invasive diagnostic tests for *Helicobacter pylori* infection

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ABSTRACT

Background

Helicobacter pylori (*H pylori*) infection has been implicated in a number of malignancies and non-malignant conditions including peptic ulcers, non-ulcer dyspepsia, recurrent peptic ulcer bleeding, unexplained iron deficiency anaemia, idiopathic thrombocytopaenia purpura, and colorectal adenomas. The confirmatory diagnosis of *H pylori* is by endoscopic biopsy, followed by histopathological examination using haemotoxylin and eosin (H & E) stain or special stains such as Giemsa stain and Warthin-Starry stain. Special stains are more accurate than H & E stain. There is significant uncertainty about the diagnostic accuracy of non-invasive tests for diagnosis of *H pylori*.

Objectives

To compare the diagnostic accuracy of urea breath test, serology, and stool antigen test, used alone or in combination, for diagnosis of *H pylori* infection in symptomatic and asymptomatic people, so that eradication therapy for *H pylori* can be started.

Search methods

We searched MEDLINE, Embase, the Science Citation Index and the National Institute for Health Research Health Technology Assessment Database on 4 March 2016. We screened references in the included studies to identify additional studies. We also conducted citation searches of relevant studies, most recently on 4 December 2016. We did not restrict studies by language or publication status, or whether data were collected prospectively or retrospectively.

Selection criteria

We included diagnostic accuracy studies that evaluated at least one of the index tests (urea breath test using isotopes such as ^{13}C or ^{14}C, serology and stool antigen test) against the reference standard (histopathological examination using H & E stain, special stains or immunohistochemical stain) in people suspected of having *H pylori* infection.

Data collection and analysis

Two review authors independently screened the references to identify relevant studies and independently extracted data. We assessed the methodological quality of studies using the QUADAS-2 tool. We performed meta-analysis by using the hierarchical summary receiver operating characteristic (HSROC) model to estimate and compare SROC curves. Where appropriate, we used bivariate or univariate logistic regression models to estimate summary sensitivities and specificities.

Main results

We included 101 studies involving 11,003 participants, of which 5839 participants (53.1%) had *H pylori* infection. The prevalence of *H pylori* infection in the studies ranged from 15.2% to 94.7%, with a median prevalence of 53.7% (interquartile range 42.0% to 66.5%). Most of the studies (57%) included participants with dyspepsia and 53 studies excluded participants who recently had proton pump inhibitors or antibiotics.There was at least an unclear risk of bias or unclear applicability concern for each study.

Of the 101 studies, 15 compared the accuracy of two index tests and two studies compared the accuracy of three index tests. Thirty-four studies (4242 participants) evaluated serology; 29 studies (2988 participants) evaluated stool antigen test; 34 studies (3139 participants) evaluated urea breath test-^{13}C; 21 studies (1810 participants) evaluated urea breath test-^{14}C; and two studies (127 participants) evaluated urea breath test but did not report the isotope used. The thresholds used to define test positivity and the staining techniques used for histopathological examination (reference standard) varied between studies. Due to sparse data for each threshold reported, it was not possible to identify the best threshold for each test.

Using data from 99 studies in an indirect test comparison, there was statistical evidence of a difference in diagnostic accuracy between urea breath test-^{13}C, urea breath test-^{14}C, serology and stool antigen test (P = 0.024). The diagnostic odds ratios for urea breath test-^{13}C, urea breath test-^{14}C, serology, and stool antigen test were 153 (95% confidence interval (CI) 73.7 to 316), 105 (95% CI 74.0 to 150), 47.4 (95% CI 25.5 to 88.1) and 45.1 (95% CI 24.2 to 84.1). The sensitivity (95% CI) estimated at a fixed specificity of 0.90 (median from studies across the four tests), was 0.94 (95% CI 0.89 to 0.97) for urea breath test-^{13}C, 0.92 (95% CI 0.89 to 0.94) for urea breath test-^{14}C, 0.84 (95% CI 0.74 to 0.91) for serology, and 0.83 (95% CI 0.73 to 0.90) for stool antigen test. This implies that on average, given a specificity of 0.90 and prevalence of 53.7% (median specificity and prevalence in the studies), out of 1000 people tested for *H pylori* infection, there will be 46 false positives (people without *H pylori* infection who will be diagnosed as having *H pylori i*nfection). In this hypothetical cohort, urea breath test-^{13}C, urea breath test-^{14}C, serology, and stool antigen test will give 30 (95% CI 15 to 58), 42 (95% CI 30 to 58), 86 (95% CI 50 to 140), and 89 (95% CI 52 to 146) false negatives respectively (people with *H pylori* infection for whom the diagnosis of *H pylori* will be missed).

Direct comparisons were based on few head-to-head studies. The ratios of diagnostic odds ratios (DORs) were 0.68 (95% CI 0.12 to 3.70; P = 0.56) for urea breath test-^{13}C versus serology (seven studies), and 0.88 (95% CI 0.14 to 5.56; P = 0.84) for urea breath test-^{13}C versus stool antigen test (seven studies). The 95% CIs of these estimates overlap with those of the ratios of DORs from the indirect comparison. Data were limited or unavailable for meta-analysis of other direct comparisons.

Authors' conclusions

In people without a history of gastrectomy and those who have not recently had antibiotics or proton ,pump inhibitors, urea breath tests had high diagnostic accuracy while serology and stool antigen tests were less accurate for diagnosis of *Helicobacter pylori* infection.This is based on an indirect test comparison (with potential for bias due to confounding), as evidence from direct comparisons was limited or unavailable. The thresholds used for these tests were highly variable and we were unable to identify specific thresholds that might be useful in clinical practice.

We need further comparative studies of high methodological quality to obtain more reliable evidence of relative accuracy between the tests. Such studies should be conducted prospectively in a representative spectrum of participants and clearly reported to ensure low risk of bias. Most importantly, studies should prespecify and clearly report thresholds used, and should avoid inappropriate exclusions.

PLAIN LANGUAGE SUMMARY

Accuracy of different non-invasive methods for identifying *Helicobacter pylori*

Why is it important to know whether someone has *Helicobacter pylori?*

Helicobacter pylori (H pylori) is a type of bacteria which may be present in the stomach of some people. *H pylori* is believed to cause a number of cancers, including stomach cancer, pancreatic cancer, and throat cancer. *H pylori* is also linked with other diseases including stomach ulcers, heart burn, and a bloated feeling. If *H pylori* is found in an individual, appropriate treatment can be started.

What is the aim of this review?

To compare the accuracy of three different types of test for *H pylori.* These are: urea breath tests, blood tests (the specific blood test is called serology), and stool tests (in faeces).

What was studied in this review?

There are two types of urea breath test which use two different forms of carbon known as ^{13}C and ^{14}C, as well as multiple versions of serology and stool tests.

What are the main results of the review?

We found 101 studies which included 11,003 people who were tested for *H pylori*. Of these 11,003 participants, 5839 (53.1%) had *H pylori* infection. All the studies used one of the three tests listed above and compared these test results with the diagnosis given by endoscopic biopsy. Endoscopic biopsy involves obtaining tissue from the stomach using a thin flexible tube introduced through the mouth and testing for the presence of *H pylori* under the microscope. It is currently the most accurate available test, however it causes physical discomfort to the patient, with associated risks for harm. This is in contrast to the alternative non-invasive tests in this review which are significantly less uncomfortable and have minimal or no risk of harm, making them desirable alternatives if they can be shown to be as accurate at diagnosing *H pylori* as endoscopic biopsy. Most of the studies included participants with heart burn or similar problems in the stomach and excluded participants who had previously undergone partial removal of the stomach and those having treatment for *H pylori*.

Thirty-four studies (4242 participants) used serology; 29 studies (2988 participants) used stool antigen test; 34 studies (3139 participants) used urea breath test-^{13}C; 21 studies (1810 participants) used urea breath test-^{14}C; and two studies (127 participants) used urea breath test but did not report the type of carbon used. Studies varied in the limit they used before saying a test was positive for *H pylori* infection and the type of stains used to examine the biopsy material. When we looked at all the data we found that urea breath tests were more accurate than blood and stool tests. The results mean that, on average, if 1000 people are tested, there will be 46 people without *H pylori* who will be misdiagnosed as having *H pylori*. Also, there will be 30, 42, 86, and 89 people with *H pylori* infection for whom the diagnosis of *H pylori* infection will be missed by urea breath test-^{13}C, urea breath test-^{14}C, serology, and stool antigen test, respectively. When we looked at the seven studies which compared urea breath test-^{13}C and serology, or urea breath test-^{13}C and stool antigen tests in the same participants, the results were uncertain and we cannot tell which test is more accurate.

How reliable are the results of the studies?

Except for one study, all the studies were of poor methodological quality, which makes their results unreliable.

Who do the results of this review apply to?

These results apply to children and adults with suspected *H pylori* infection, but only in those who have not previously undergone stomach operations and those who have not recently had antibiotics or treatment for *H pylori* infection.

What are the implications of this review?

Urea breath tests, blood tests, and stool tests may be suitable for identifying whether someone has *H pylori* infection. However, the level of the result of urea breath test, blood test, or stool test which should be used to make a diagnosis of *H pylori* infection remains unclear.

How up-to-date is the review?

We performed a thorough literature search for studies reporting the accuracy of these different tests until 4 March 2016.

BACKGROUND

Helicobacter pylori (H pylori) is a gram negative spiral bacterium (NCBI 2014). Approximately 13% to 81% of people have *H pylori* infection (Peleteiro 2014). Prevalence of the bacterium varies according to age (generally increasing with age, although infection rates tend to fall among older age groups in some Latin American and Northeast Asian countries); region (lower infection rates are seen in Australia and the UK, while higher rates are reported in Chile, China, Japan, Korea, and Latvia); race (more prevalent amongst Afrocarribeans compared to white people); and socioeconomic class (more common in poorer settings) (Graham 1991; Laszewicz 2014; Muhsen 2012; Peleteiro 2014).

Based on observational studies, *H pylori* infection has been implicated in a number of malignancies, including gastric cancer, premalignant lesions of the stomach (atrophic gastritis and intestinal metaplasia), gastric lymphoma, pancreatic cancer, colorectal cancer, and laryngeal cancer (Huang 1998; Huang 2003; Wu 2013; Xiao 2013; Xue 2001; Zhuo 2008). However, *H pylori* is associated with a lower incidence of oesophageal adenocarcinomas (Islami 2008). *H pylori* is also associated with a number of non-malignant conditions, including peptic ulcers, non-ulcer dyspepsia, recurrent peptic ulcer bleeding, unexplained iron deficiency anaemia, idiopathic thrombocytopaenia purpura, and colorectal adenomas (DuBois 2005; Franchini 2007; Gisbert 2004b; Huang 2002; Jaakkimainen 1999; Wu 2013).

Although a number of pathogenic factors such as cytotoxin-associated gene A (CagA), vacuolating cytotoxin A (VacA), and blood group antigen binding adhesin (BabA) are associated with increased virulence of *H pylori* (Huang 2003; Malfertheiner 2012), detection of these pathogenic factors currently has no role in the management of *H pylori* infection (Malfertheiner 2012). The recommended initial treatment for *H pylori* infection is with a combination of a proton pump inhibitor, clarithromycin, and amoxicillin or metronidazole (triple therapy) in regions with low resistance to clarithromycin (< 20% resistance rate in the area), and the triple therapy along with bismuth (quadruple therapy) in regions with high resistance to clarithromycin (> 20% resistance rate in the area) (Malfertheiner 2012). If this results in failure of eradication, bismuth-quadruple therapy or levofloxacin-triple therapy (replacement of clarithromycin with levofloxacin in the classical triple therapy) when triple therapy was used as the initial treatment and levofloxacin-triple therapy when bismuth quadruple therapy was used as the initial treatment is recommended (Malfertheiner 2012). If even this treatment fails to eradicate *H pylori*, then further treatment should be based on antibiotic susceptibility (Malfertheiner 2012). Eradication of *H pylori* might lead to a decrease in malignant and non-malignant conditions associated with *H pylori* infection. Adverse events related to *H pylori* treatment include taste disturbance, diarrhoea, nausea, headache, skin rash, abdominal pain, dizziness, bloating, myalgias (muscle pain), and constipation (Ye 2014).

A glossary of terms is included in Appendix 1.

Target condition being diagnosed

Helicobacter pylori infection.

Index test(s)

Urea breath test

The urea breath test is based on the presence of urease enzyme in live *H pylori* which breaks down urea into ammonia and carbon dioxide (McNulty 2005; Ricci 2007). After ingestion of urea labelled with either ^{13}C or ^{14}C, breath samples are collected for up to 30 minutes by exhaling into a carbon dioxide-trapping agent (Ricci 2007). The urea breath test is performed by the clinician or the clinician's assistant. The thresholds used include the percentage of carbon recovered during the collection time or counts per minute (Ferwana 2015). Threshold levels above 4% or 5% are commonly used to diagnose *H pylori* infection (Ferwana 2015). A wide range of threshold counts per minute, ranging from more than 25 counts per minute to 1000 counts per minute, have been used for diagnosis of *H pylori* infection (Ferwana 2015).

Serology

These tests are based on circulating antibodies to *H pylori*. There are three main methods for these tests: the enzyme-linked immunosorbent assay (ELISA) test, latex agglutination tests, and Western blotting (Ricci 2007). Of these, ELISA is the most commonly used method. Total immunoglobulin, immunoglobulin subtypes, and antibody response to specific antigens can all be tested. Since they do not require any special equipment, they can be easily performed (Ricci 2007). However, serology may be positive because of the presence of active infection at the time of the test, previous infection, or because of non-specific cross-reacting antibodies (McNulty 2005). Tests that use whole blood (rather than serum) and other bedside tests (using a bedside centrifuge) are also available, although these whole-blood tests and bedside serum tests are generally considered unreliable (Ricci 2007). Routine serum tests are performed by the laboratory technician and interpreted by the clinician. The bedside serum tests and whole-blood tests are performed by the clinician or the clinician's assistant. Different researchers evaluating the prevalence of *H pylori* have used different thresholds to define the positivity of serology, for example Lindsetmo 2008 used a titre $\geq$ 300 while Granberg 1993 used a titre $\geq$ 500.

Stool antigen tests

These tests use monoclonal and polyclonal antibodies to detect the presence of *H pylori* antigen in stools and active *H pylori* infection can be diagnosed (McNulty 2005; Ricci 2007). Serum tests are performed by the laboratory technician and interpreted by the clinician. Several thresholds have been used for other tests, for example, an optical density of $\geq$ 0.15, $\geq$ 0.16, and $\geq$ 0.19 have all been used as thresholds for diagnosis of *H pylori* using monoclonal antibodies for stool antigen tests.

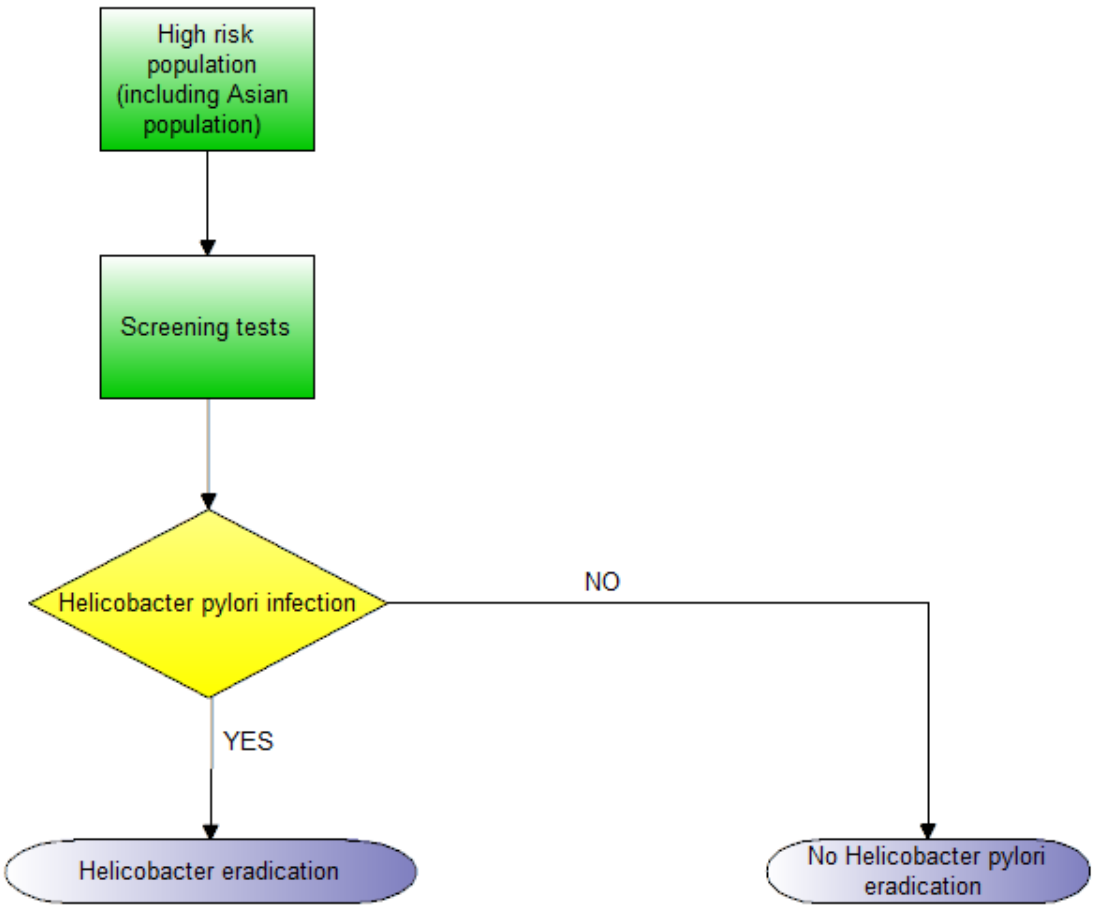
Clinical pathway

Evidence from randomised controlled trials (RCTs) showed that screening and eradication programmes for *H pylori* in populations at high risk of gastric cancer (e.g. East Asians) lowered the incidence of gastric cancer (Ford 2014). The Asia-Pacific Gastric Cancer Consensus conference recommended that screening and eradication of *H pylori* was advisable in populations in countries at high risk of gastric cancer (i.e. Japan and Korea) (Talley 2008). The updated European Helicobacter Study Group (EHSG) Fourth Maastricht/Florence Consensus Conference guidelines suggest that people should be tested for *H pylori,* and eradication of *H pylori* (when present) has been recommended for the following conditions (Malfertheiner 2012):

1. People at high risk of gastric cancer.
2. Adults with dyspepsia with a locally-determined age cut-off point (depending on local incidence of gastric cancer in different age groups), and without 'alarm' symptoms or signs associated with an increased risk of gastric cancer such as weight loss, dysphagia, upper gastrointestinal bleeding, abdominal mass, or iron deficient anaemia.
3. Unexplained iron deficiency anaemia.
4. Idiopathic thrombocytopenic purpura.
5. Uninvestigated young patients with dyspepsia should also be considered for testing for *H pylori* when the prevalence of *H pylori* is high (≥ 20%).

The clinical pathway is shown in Figure 1.

Figure 1. Clinical pathway



Prior test(s)

The index tests can be performed without any prior test.

Role of index test(s)

The index tests are used for screening and diagnosis of *H pylori*.

Alternative test(s)

Other tests used in the screening and diagnosis of *H pylori* infection include non-invasive saliva and urine antigen-based tests (Ricci 2007), and invasive gastric biopsy followed by Campylobacter-like organism (CLO) test, culture, histology, and polymerase chain reaction (PCR) (Van Doorn 2000). We do not include non-invasive saliva and urine antigen-based tests in this review because these tests are not commonly used (Ricci 2007).

Rationale

Testing for *H pylori* and eradication of *H pylori* have been recommended for a number of population groups (Clinical pathway). These tests have to be non-invasive so that a large number of people can be tested. People with undetected *H pylori* continue to be at high risk of gastric cancer or continue to have dyspepsia, anaemia, or purpura. Overdiagnosis (false positive test results) of *H pylori* means that patients are subject to unnecessary adverse events related to eradication therapy (approximately 27% of patients receiving eradication therapy develop mild adverse events such as bitter taste, nausea, diarrhoea, etc.). Comparing the diagnostic accuracy of different index tests will highlight the best test for the diagnosis of *H pylori* infection.

OBJECTIVES

To compare the diagnostic accuracy of urea breath test, serology, and stool antigen test, alone or in combination, for diagnosis of *H pylori* infection in symptomatic and asymptomatic people, so that eradication therapy for *H pylori* can be started.

Secondary objectives

To investigate the following potential sources of heterogeneity: type of reference standard, risk of bias, publication status, prospective versus retrospective studies, symptomatic versus asymptomatic participants, recent or current use of proton pump inhibitors or antibiotics, different subtypes of tests, and the interval between the index test and reference standard.

METHODS

Criteria for considering studies for this review

Types of studies

We include studies that evaluate the accuracy of the index tests in the appropriate patient population (see Participants), regardless of language or publication status, or whether data were collected prospectively or retrospectively. However, we exclude reports that describe how the diagnosis of *H pylori* was made in an individual patient or group of patients, and which do not provide sufficient diagnostic test accuracy data (i.e. the number of true positives, false positives, false negatives, and true negatives). We also exclude case-control studies because these are prone to bias (Whiting 2011).

Participants

Symptomatic and asymptomatic people in whom *H pylori* infection status is sought so that eradication therapy for *H pylori* can be started. We exclude studies that included only people with acute upper gastrointestinal bleeding because such patients are likely to undergo endoscopy and invasive testing can be performed, if required.

Index tests

Urea breath test-^{14}C, urea breath test-^{13}C, serology, and stool antigen test, alone or in combination. We included only initial testing and excluded repeat testing (monitoring success of treatment), since diagnostic accuracy may vary depending on the purpose of testing (Ricci 2007).

Target conditions

H pylori infection.

Reference standards

There is no gold standard for diagnosis of *H pylori* infection and the diagnosis is made by a combination of tests following endoscopic biopsy; endoscopic biopsy followed by histology, endoscopic biopsy followed by polymerase chain reaction (PCR), and endoscopic biopsy followed by rapid urease testing all have excellent sensitivity and specificity (Chey 2007). However, PCR methodology is not standardised across laboratories (Chey 2007); it is an unreliable reference standard. Endoscopic biopsy followed by rapid urease testing has poor sensitivity following treatment with proton pump inhibitors (Chey 2007). Endoscopic biopsy with culture has high specificity but poor sensitivity (Chey 2007). We therefore considered only endoscopic biopsy followed by histology (using haemotoxylin and eosin (H & E) stain, special histological stains such as Giemsa stain and Warthin-Starry stain, or immunohistochemical stain) as the reference standard in this review.

Immunohistochemical stains are more accurate than special stains, while special stains and immunohistochemical stains are thought to have better specificity than H & E stains for diagnosis of *H pylori* infection (Laine 1997; Lee 2015b). For this reason,we considered endoscopic biopsy with histology using immunohistochemical stain as the best reference standard, and endoscopic biopsy with histology using H & E stain as the worst reference standard.

Search methods for identification of studies

We included all studies, irrespective of the language of publication and publication status. If we found articles in languages other than English, we obtained translations.

Electronic searches

We searched the following databases.

1. MEDLINE via OvidSP (January 1946 to 4 March 2016) (Appendix 2).
2. Embase via OvidSP (January 1947 to 4 March 2016) (Appendix 3).
3. Science Citation Index Expanded via Thomson Reuters Web of Science (January 1980 to 4 March 2016) (Appendix 4).
4. National Institute for Health Research (NIHR HTA) via Centre for Reviews and Dissemination, University of York. (www.crd.york.ac.uk/CRDWeb/) (4 March 2016) (Appendix 5).

Searching other resources

To identify additional studies, we examined references in the included studies to see if any might be relevant. We also searched for articles related to the included studies by using the 'related search' function in MEDLINE (OvidSP) and Embase (OvidSP). We conducted a 'citing reference' search (by searching articles which cited the included articles) (Sampson 2008) in MEDLINE (OvidSP) and Embase (OvidSP) on 4 December 2016.

Data collection and analysis

Selection of studies

Two review authors (KG and LB, SS, or AS) independently searched the references to identify relevant studies. We obtained the full text for references considered relevant by at least one of the two review authors. Two review authors independently screened the full-text papers against the inclusion criteria, resolving any differences in study selection by discussion. We attempted to contact study authors if there were doubts about the eligibility of a study.

Data extraction and management

Two review authors (KG and LB, SS, or AS) independently extracted the following data from each included study, using a prepiloted data extraction form, and resolving differences by discussion.

1. First author.
2. Year of publication.
3. Study design (prospective or retrospective cohort studies; cross-sectional studies or randomised controlled trials).
4. Inclusion and exclusion criteria for individual studies.
5. Total number of participants.
6. Number of female participants.
7. Average age of the participants.
8. Initial testing versus testing after eradication.
9. Number of people with bleeding ulcers, gastric atrophy, lymphoma, and recent or current use of proton pump inhibitors or antibiotics.
10. Number of symptomatic participants.
11. Tests carried out prior to the index test.
12. Description of the index test.
13. Threshold used for the index test.
14. Reference standard.
15. Number of true positives, false positives, false negatives, and true negatives (i.e. 2 x 2 data) at each threshold reported.

If a study reported multiple index tests, we extracted the 2 x 2 data for each index test at each threshold. For studies that reported test accuracy for different reference standards, we extracted 2 x 2 data for only one of the reference standards. For this purpose, due to the accuracy of the stains, we preferred the immunohistochemical stain over special stains, which in turn we preferred over the H & E stain.

Although the number of uninterpretable index test results may provide information on the applicability of the tests in clinical practice and may affect the cost effectiveness of a test, we had planned to exclude patients with uninterpretable index test results from the meta-analyses. We made this decision because in clinical practice uninterpretable index test results would result in additional testing. Nevertheless, we would have extracted and reported such data if available from the studies.

If we suspected an overlap of participants between multiple reports due to common study authors and centres, we planned to contact the study authors for clarification; however, this was not required, since we could identify multiple reports of the same study using the information provided in the reports. We sought further information from study authors, if necessary.

Assessment of methodological quality

Two review authors independently assessed study quality using the QUADAS-2 tool (Whiting 2006; Whiting 2011), resolving differences by discussion. The criteria used for the assessment are shown in Appendix 6. We considered studies classified as 'low risk

of bias' and 'low concern' in all the domains of the QUADAS-2 tool as studies with high methodological quality. It must be noted here that 'risk of bias' refers to internal validity (i.e. whether there were systematic errors in performing the study with respect to the particular domain), while 'applicability concern' refers to external validity (i.e. whether there were concerns that the population, index test or reference standard used in the studies matched the review question).

Statistical analysis and data synthesis

We plotted study estimates of sensitivity and specificity on forest plots and in receiver operating characteristic (ROC) space to explore between-study variation in the accuracy of each test. We examined the thresholds reported for each test and the reference standards used. Due to between-study variation in thresholds, we performed meta-analyses by using the hierarchical summary receiver operating characteristics (HSROC) model to estimate SROC curves (Rutter 2001). For these analyses, if a study reported test accuracy at multiple thresholds, we selected the threshold used by the study authors for their primary analysis.

Prior to comparative meta-analyses of the tests, we performed meta-analysis of each test separately for preliminary investigation of the shape of the SROC curve of each test and to assess heterogeneity in test performance. We used this approach to understand the data and to guide modelling assumptions we may need to make in the comparative meta-analysis. These preliminary analyses were done noting the availability of comparative studies. To compare the accuracy of the index tests, we added test type as a covariate to the HSROC model (Macaskill 2013). For the indirect comparison where we used all available data (i.e. not restricted to comparative studies), we assessed the effect of test type on the accuracy, threshold, and shape parameters of the HSROC model. We also explored the effect of test type on the variance of the random effects for accuracy and threshold. To determine the final meta-analytic model, we used likelihood ratio tests to assess model fit. Likelihood ratio tests were also used to determine the statistical significance of differences in test accuracy. When SROC curves are symmetric (i.e. HSROC model without the shape parameter), each curve can be described using the diagnostic odds ratio (DOR) to quantify the accuracy of the test. We used the ratio of DORs as a summary of the relative accuracy of two tests.

Summary sensitivities and specificities can be obtained from a HSROC model but they are not clinically interpretable here because we included studies with different thresholds. We therefore estimated sensitivities at points on the SROC curves that correspond to the lower quartile, median and upper quartile of the specificities from the studies included in the meta-analysis. When comparative studies that had evaluated two tests head-to-head were available, we performed direct comparisons of the tests (Takwoingi 2013). For these analyses, we fitted HSROC models with symmetric SROC curves, as the available data were insufficient for reliable estimation of the shape of the SROC curves (Takwoingi 2017).

If there were at least two studies that reported the accuracy of a test at the same threshold, we considered meta-analysis to obtain summary estimates of sensitivity and specificity. Due to the small number of studies in these analyses, we performed meta-analyses using univariate fixed-effect or random-effects logistic regression models, depending on the extent of heterogeneity observed in forest plots and in ROC space (Takwoingi 2017). When there were only two or three studies at the same threshold, and little or no heterogeneity observed in ROC space, we used univariate fixed-effect logistic regression models to pool sensitivities and specificities separately. When there were two or three studies and we observed heterogeneity, we did not perform meta-analysis, as random-effects models would be more appropriate in such situations. However, random effects cannot be reliably estimated with very few studies.

We performed meta-analyses using the NLMIXED procedure in SAS.

Investigations of heterogeneity

We used forest plots and scatter plots of sensitivity against specificity for preliminary investigation of potential sources of heterogeneity such as:

1. Type of reference standard (different histological stains).
2. Studies at low risk of bias in all the QUADAS-2 domains versus those at unclear or high risk of bias.
3. Full-text publications versus abstracts (may provide insight into publication bias if there is an association between the results of a study and full publication of the study) (Eloubeidi 2001).
4. Prospective versus retrospective studies.
5. Symptomatic versus asymptomatic participants.
6. Recent or current use of proton pump inhibitors or antibiotics, as these patients are at higher risk of false negative results for the urea breath test and stool antigen test, with serology being the only non-invasive test unaffected by the use of proton pump inhibitors or antibiotics (Malfertheiner 2012; Ricci 2007).
7. Different subtypes of tests (ELISA, latex agglutination test, and Western blot methods of serological tests; formal serological tests versus bedside serological tests; and monoclonal versus polyclonal antibodies for stool antigen tests).
8. Interval between index test and reference standard. Resolution of *H pylori* infection in people with *H pylori* infection (usually with treatment) and infection in those without *H pylori* infection may occur if there was a long interval between the index test and reference standard.

We formally investigated heterogeneity for each test by adding a covariate to a HSROC model (meta-regression). We used likelihood ratio tests to assess the statistical significance of differences in test accuracy by comparing models with and without the covariate.

Sensitivity analyses

We planned to examine the impact of data inconsistencies on the meta-analytic findings. For example, if test accuracy data reported in the text of a paper differed from those in the figures, we planned to assess the impact of using different data in sensitivity analyses; however, we did not find such inconsistencies.

Assessment of reporting bias

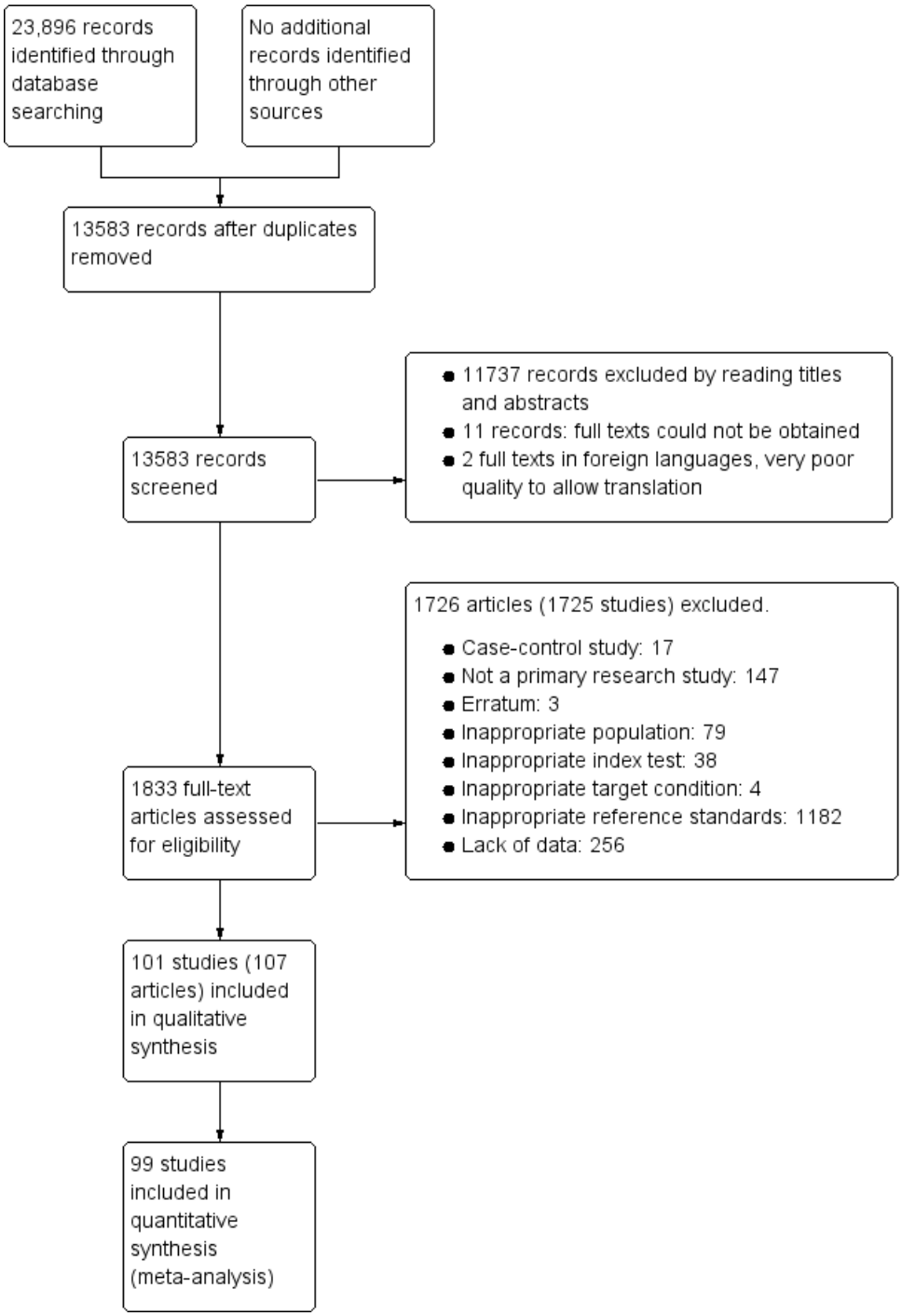
Due to limited data, we were unable to formally investigate whether test accuracy differed between studies that were published as full texts and those available only as abstracts.

RESULTS

Results of the search

We identified 23,896 references through electronic searches of MEDLINE, Embase, Science Citation Index, and NIHR HTA. We did not identify additional references through other searches. The flow of studies through the screening process is shown in Figure 2. After removing 10,313 duplicates, there were 13,583 references. Of these, we dropped 11,737 irrelevant references through reading the titles and abstracts. We could not obtain the full text of 11 references. The quality of copies of two references was too poor to allow translation and we were unable to obtain better copies. We assessed the full text of the remaining 1833 references. We excluded 1728 references (1727 studies) for reasons stated in Appendix 7 (also see Characteristics of excluded studies below). The remaining 107 references (101 studies) met our inclusion criteria. Two references reported diagnostic accuracy data separately for people who underwent gastrectomy and those who did not undergo gastrectomy, and so we considered these subgroups as separate studies (Adamopoulos 2009a; Adamopoulos 2009b; Sheu 1998a; Sheu 1998b).

Figure 2. Study flow diagram.



Characteristics of included studies

We summarise the characteristics of the 101 included studies in the Characteristics of included studies table. The studies included 11,003 participants, of which 5839 participants (53.1%) had *H pylori* infection. The prevalence of *H pylori* infection ranged from 15.2% to 94.7% with a median of 53.7% (interquartile range: 42.0% to 66.5%).

Of the 101 studies, 34 evaluated urea breath test-^{13}C; 21 evaluated urea breath test-^{14}C; two evaluated urea breath test but did not report the isotope used; 34 evaluated serology; and 29 evaluated stool antigen test. Seventeen studies evaluated more than one test. Of these, 15 evaluated two tests (Dede 2015; El-Din 2013; Eltumi 1999; Hafeez 2007; Inelmen 2004; Korstanje 2006; Kuloglu 2008; Lahner 2004; Lottspeich 2007; Mansour-Ghanaei 2011; Ogata 2001; Soomro 2012; Vandenplas 1992; Yoshimura 2001; Yu 2001), and two evaluated three tests (Monteiro 2001a; Salles-Montaudon 2002). Studies used different thresholds, with 15 studies reporting test accuracy at more than one threshold (Chey 1998; Dede 2015; Delvin 1999; Formichella 2013; Ladas 2002a; Mana 2001a; Misawa 1998; Monteiro 2001a; Morales 1995; Noguera 1998; Novis 1991; Ozturk 2003; Trevisani 2005; Weiss 1994; Yu 2001).

Eleven studies were prospective (Adamopoulos 2009a; Adamopoulos 2009b; Al-Fadda 2000; Arikan 2004; Dede 2015; Eltumi 1999; Fallone 1995; Kalach 1998a; Kuloglu 2008; Ogata 2001; Qadeer 2009); six studies were retrospective (Bosso 2000; Czerwionka-Szaflarska 2007; Graham 1996a; Iqbal 2013; Mion 1994; Wardi 2012), while the remaining 84 studies did not state whether they were prospective or retrospective studies. Six studies were published as abstracts only (Han 2012; Mohammadian 2007; Rathbone 1986; Sheu 1998a; Sheu 1998b; Thobani 1995), and the remaining 95 were full-text publications.

Fourteen studies included only children (Argentieri 2007; Behrens 1999; Czerwionka-Szaflarska 2007; Delvin 1999; Dinler 1999; Eltumi 1999; Hafeez 2007; Kalach 1998a; Kuloglu 2008; Lottspeich 2007; Ogata 2001; Rafeey 2007; Vandenplas 1992; Yoshimura 2001). Five studies clearly included only adults (Atli 2012; Chen 1991; Kamel 2011; Safe 1993; Salles-Montaudon 2002). Although not clearly specified in the remaining 82 studies, it appeared that most or all of the participants were adults. The mean or median age of the participants included in these studies ranged between 31 years and 85 years in the 45 studies that reported this information. One study included only participants without symptoms (Wang 2008). Fifty-eight studies included only participants with symptoms, usually abdominal pain or dyspepsia (Adamopoulos 2009a; Adamopoulos 2009b; Aguilar 2007; Al-Fadda 2000; Allardyce 1997; Behrens 1999; Bosso 2000; Ceken 2011; Chen 1991; Czerwionka-Szaflarska 2007; D'Elios 2000; Delvin 1999; Dinler 1999; Ekesbo 2006; El-Din 2013; El-Mekki 2011; El-Nasr 2003; Eltumi 1999; Fanti 1999; Faruqui 2007; Ferrara 1998; Germana 2001; Guo 2011; Gurbuz 2005; Hafeez 2007; Jordaan 2008; Kamel 2011; Kuloglu 2008; Ladas 2002a; Lahner 2004; Lee 1998; Lottspeich 2007; Mansour-Ghanaei 2011; Mion 1994; Misawa 1998; Mohammadian 2007; Morales 1995; Novis 1991; Ogata 2001; Ozturk 2003; Peitz 2001; Qadeer 2009; Rafeey 2007; Rasool 2007; Rathbone 1986; Safe 1993; Scuderi 2000; Segamwenge 2014; Selcukcan 2011; Sharbatdaran 2013; Sheu 1998a; Soomro 2012; Surveyor 1989; Thobani 1995; Vandenplas 1992; Villalobos 1992; Weiss 1994; Yoshimura 2001). The remaining 42 studies did not report the type of participants included. Five studies included only participants who had previously undergone gastrectomy (Adamopoulos 2009b; Lombardo 2003; Schilling 2001; Sheu 1998b; Wardi 2012). Two studies included only participants with atrophic gastritis (Korstanje 2006; Ogata 2001). It was clear that participants who received recent proton pump inhibitors or antibiotics were excluded from 53 studies (Ceken 2011; Chey 1998; Debongnie 1991; D'Elios 2000; Delvin 1999; Duan 1999; El-Mekki 2011; El-Nasr 2003; Eltumi 1999; Fallone 1996; Fanti 1999; Ferrara 1998; Formichella 2013; Germana 2001; Guo 2011; Gurbuz 2005; Jekarl 2013; Jensen 1998; Jordaan 2008; Kalach 1998a; Kim 2016; Kuloglu 2008; Ladas 2002a; Lahner 2004; Lee 1998; Lombardo 2003; Lottspeich 2007; Mana 2001a; Mansour-Ghanaei 2011; Monteiro 2001a; Ogata 2001; Ozturk 2003; Peitz 2001; Peura 1996; Puspok 1999; Qadeer 2009; Rafeey 2007; Rasool 2007; Schilling 2001; Segamwenge 2014; Selcukcan 2011; Sharbatdaran 2013; Shin 2009; Tiwari 2014; Trevisani 2005; Vandenplas 1992; Villalobos 1992; Wang 2008; Weiss 1994; Yan 2003; Yoshimura 2001; Yu 1999; Yu 2001). It was not clear whether such participants were included or excluded in the remaining 48 studies.

Thirty-two studies used H & E stain as a reference standard (Aguilar 2007; Al-Fadda 2000; Arikan 2004; Atli 2012; Behrens 1999; Ceken 2011; Chen 1991; Chey 1998; Czerwionka-Szaflarska 2007; D'Elios 2000; Dinler 1999; Eggers 1990; El-Nasr 2003; Fallone 1996; Faruqui 2007; Graham 1996a; Gramley 1999; Gurbuz 2005; Iqbal 2013; Jordaan 2008; Kalach 1998a; Kamel 2011; Lee 1998; Logan 1991a; Noguera 1998; Puspok 1999; Segamwenge 2014; Selcukcan 2011; Sheu 1998a; Sheu 1998b; Tiwari 2014; Yu 2001); 24 studies used special stains such as Warthin-Starry stain, Giemsa stain, or silver stain (Argentieri 2007; Bosso 2000; El-Din 2013; Fallone 1995; Guo 2011; Hafeez 2007; Han 2012; Ivanova 2010; Kim 2016; Ladas 2002a; Lahner 2004; Mion 1994; Mohammadian 2007; Morales 1995; Novis 1991; Ozturk 2003; Peura 1996; Qadeer 2009; Schilling 2001; Scuderi 2000; Shin 2009; Soomro 2012; Villalobos 1992; Yan 2003); two studies used immunohistochemical staining (Ekesbo 2006; Misawa 1998); and the remaining 43 studies used a combination of different stains.

The interval between the index test and reference standard was reported only in 21 studies. The interval was less than two weeks in 19 of the 21 studies (Adamopoulos 2009a; Adamopoulos 2009b; Bosso 2000; Debongnie 1991; Duan 1999; Fallone 1995; Fallone 1996; Formichella 2013; Gurbuz 2005; Hafeez 2007; Lahner 2004; Lee 1998; Logan 1991a; Lottspeich 2007; Mansour-Ghanaei 2011; Mion 1994; Ozturk 2003; Peura 1996; Safe 1993), and was between 15 days and 23 days in one study (Dede 2015); it was within 30 days in the remaining study (Lombardo 2003).

Characteristics of excluded studies

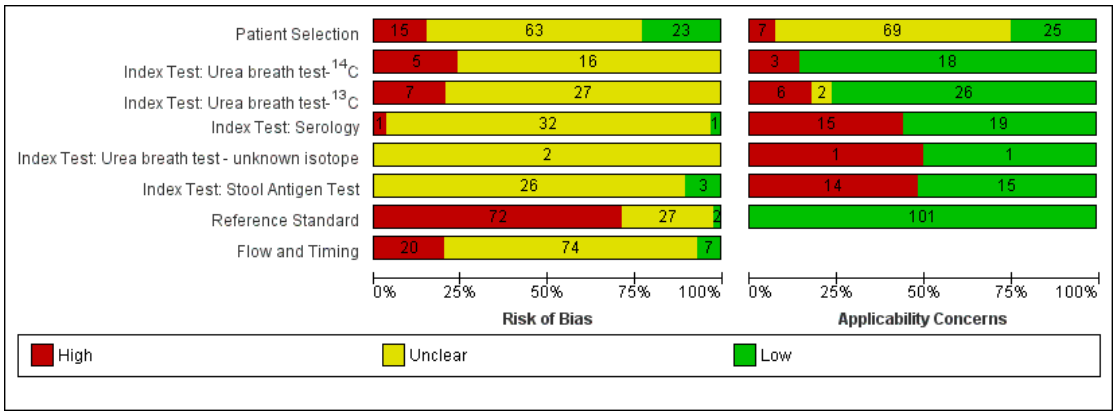
We excluded 1726 references (1725 studies). The reason for exclusion is stated for each study in Appendix 7 and summarised below.

- Case-control study: 17
- Not a primary research study: 147
- Erratum: 3
- Inappropriate population: 79
  - In monitoring: 33
  - Not in humans: 1
  - Only in *H pylori* negative people: 2
  - Only in *H pylori* positive people: 39
  - Only in people with gastrointestinal bleeding: 2
  - Selection of participants was based on the results of other *H pylori* tests: 1
  - Includes people who were being monitored for *H pylori* status: 1
- Inappropriate index test: 38
- Inappropriate target condition: 4
- Inappropriate reference standards: 1182
- Lack of data: 256
  - Insufficient diagnostic test accuracy data: 25
  - No diagnostic accuracy data: 42
  - Not a diagnostic test accuracy study of non-invasive *H pylori* diagnosis: 188
  - Incorrect data (correct information could not be obtained): 1

Methodological quality of included studies

The methodological quality of the included studies is summarised across all studies in Figure 3. None of the included studies was of high methodological quality (i.e. low risk of bias in all the domains). Appendix 8 shows the results for individual studies for urea breath test-^{13}C, urea breath test-^{14}C, serology and the stool antigen test, respectively.

Figure 3. Risk of bias and applicability concerns graph: review authors' judgements about each domain presented as percentages across included studies. For each domain, the numbers shown on the bar represent the number of studies that were scored as high, unclear or low in terms of risk of bias or applicability concern.



Patient selection domain

In the patient selection domain, 23, 15 and 63 studies were at low, high and unclear risk of bias, respectively. All 15 studies were at high risk of bias because they did not include a consecutive or random series of participants.

Twenty-five, seven and 69 studies were of low, high and unclear applicability concern. In the 69 studies of unclear applicability concern it was not clear whether participants similar to those seen

in the clinical setting where the test is used were excluded, while the seven studies of high concern clearly excluded such participants. In these seven studies, only people who had undergone gastrectomy or those with atrophic gastritis were included.

Index test domain

In the index test domain, studies generally had an unclear risk of bias because it was unclear whether the index test results were interpreted without the knowledge of the results of the reference standard, and/or it was unclear whether a threshold was prespecified.

Urea breath test

None of the studies that evaluated the urea breath test (^{13}C, ^{14}C, or unknown isotope) were at low risk of bias. The risk of bias was unclear in the two studies that did not report the type of isotope (Han 2012; Lombardo 2003). Of the 34 studies that evaluated urea breath test-^{13}C, seven (21%) had a high risk of bias while 27 (79%) had unclear risk of bias. There were 21 studies of urea breath test-^{14}C, 16 (76%) of which had unclear risk of bias while five (24%) had high risk of bias.
For the two studies with unknown isotope, applicability concern was high in one study and low in the other. Of the 34 urea breath test-^{13}C studies, applicability concerns were unclear for two (6%) studies, high for six (18%) studies and low for 26 (76%) studies. For urea breath test-^{14}C, applicability concerns were generally low (18/21; 86%) with only three studies having high applicability concerns (Selcukcan 2011; Surveyor 1989; Yu 1999) .

Serology

One study (Ladas 2002a), had a low risk of bias.and another study (Rathbone 1986), had a high risk of bias. The risk of bias for the remaining 32 (94%) studies was unclear. Applicability concerns were low in 19 (56%) studies and high in 15 (44%) studies.

Stool antigen test

None of the 29 studies had a high risk of bias. Most of the studies (26/29; 90%) had an unclear risk of bias; three studies (Islam 2005; Kuloglu 2008; Sharbatdaran 2013), had a low risk of bias. All the studies were of low applicability concern.

Reference standard domain

Two studies were at low risk of bias in the reference standard domain (Fallone 1995; Ladas 2002a). For 27 studies, the risk of bias was unclear because it was not clear whether reference standard results were interpreted without knowledge of the results of the index tests. The remaining 72 studies were at high risk of bias because the reference standard was endoscopic biopsy with H & E stain in some or all participants.
All the studies were of low applicability concern.

Flow and timing domain

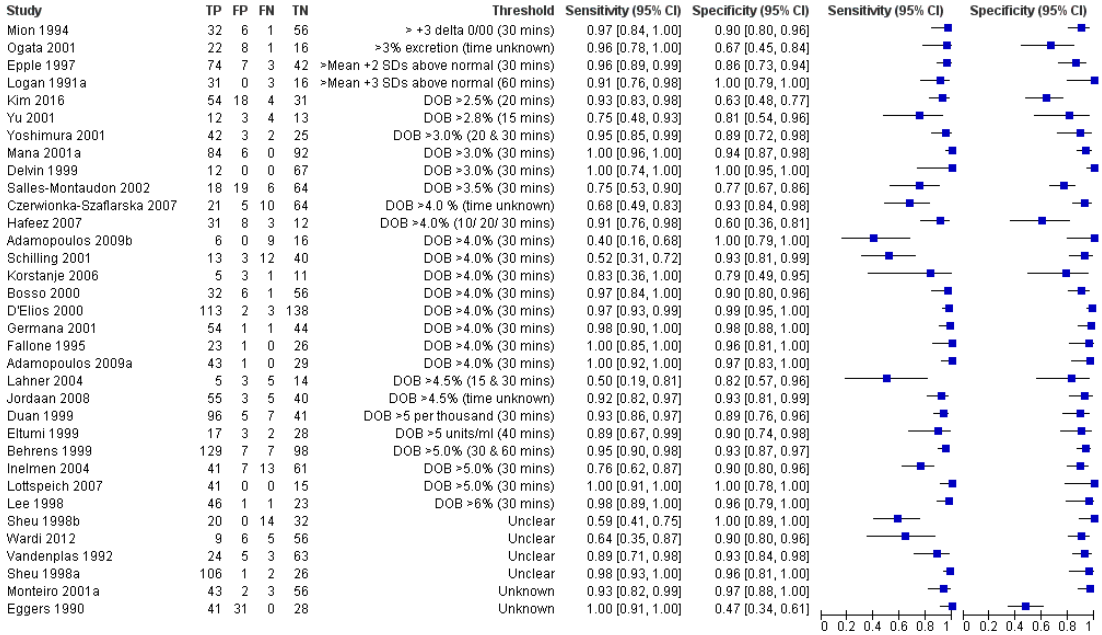
Seven studies were at low risk of bias in the flow and timing domain. The risk of bias was unclear for 74 studies because the interval between the index test and reference standard was unclear or it was unclear whether all participants were included in the analysis. The remaining 20 studies were at high risk of bias because some participants were clearly excluded from the analysis. These studies did not report the reference standard results for the excluded participants. None of the studies reported indeterminate results (i.e. there were no indeterminate index test results in studies which provided a clear participant flow and none of the exclusions were due to indeterminate index test results).

Findings

Urea breath test-^{13}C

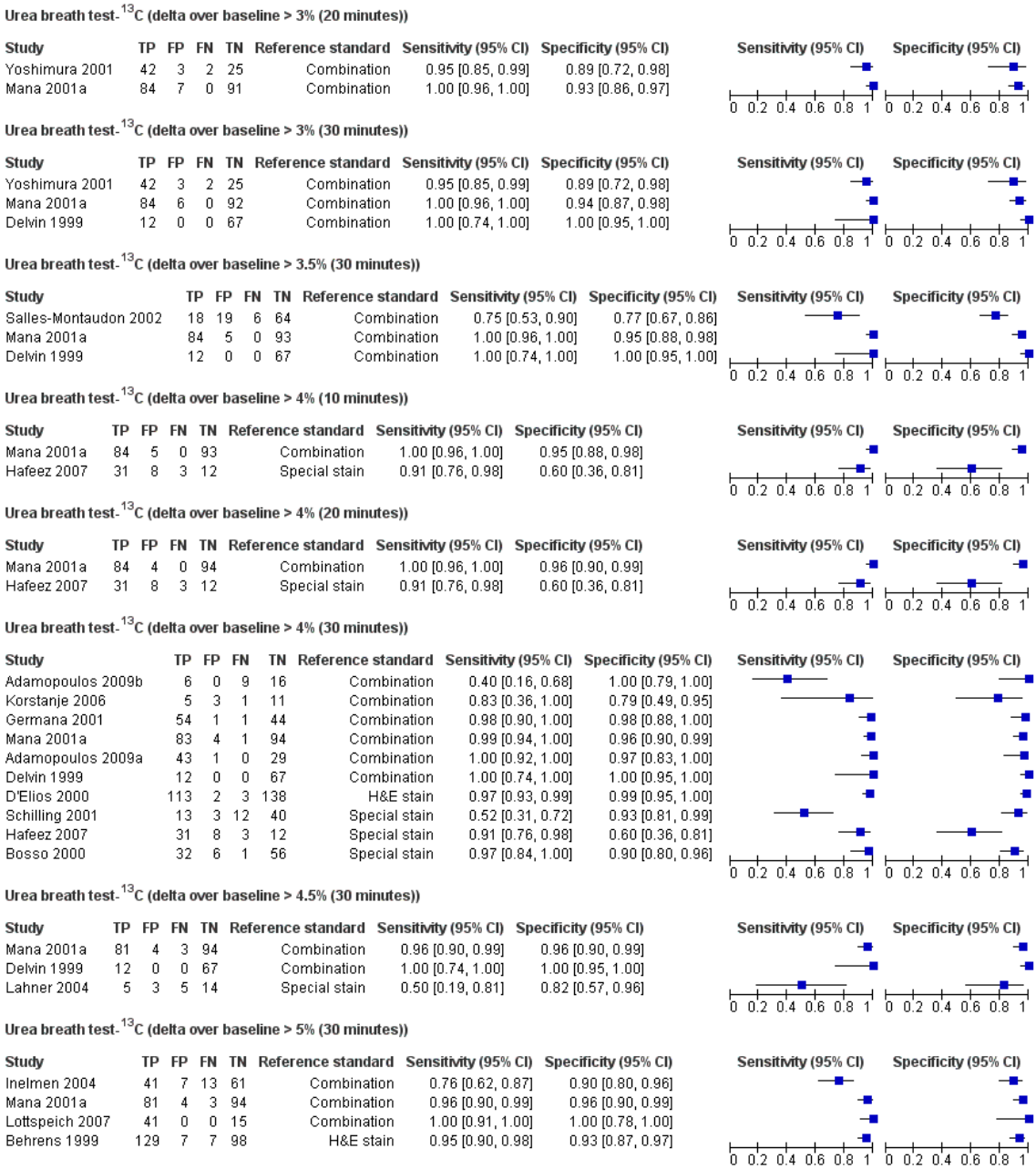
The 34 studies of urea breath test-^{13}C included 3139 participants, of whom 1526 had *H pylori* infection (Figure 4). The threshold used in six studies was either unknown (Eggers 1990; Monteiro 2001a), or unclear (Sheu 1998a; Sheu 1998b; Vandenplas 1992; Wardi 2012). At the most commonly reported threshold of delta over baseline > 4% (30 minutes after administration of urea), the summary sensitivity (95% confidence interval (CI)) and specificity (95% CI) from 10 studies (958 participants) were 0.95 (95% CI 0.79 to 0.99) and 0.95 (95% CI 0.87 to 0.98). Other thresholds were used by a limited number of studies (Figure 5; Appendix 9). When possible we performed meta-analysis to estimate summary sensitivities and specificities at these common thresholds. The results are presented in Table 1.

Figure 4. Forest plot of urea breath test-13C.FN = false negative; FP = false positive; TN = true negative; TP = true positive. The forest plot shows an estimate of sensitivity and specificity from each study and the threshold used. Studies are sorted by threshold, sensitivity and specificity. For threshold, the number of minutes in brackets is the time after administration of urea.



Study	TP	FP	FN	TN	Threshold	Sensitivity (95% CI)	Specificity (95% CI)
Mion 1994	32	6	1	56	> +3 delta 0/00 (30 mins)	0.97 [0.84, 1.00]	0.90 [0.80, 0.96]
Ogata 2001	22	8	1	16	>3% excretion (time unknown)	0.96 [0.78, 1.00]	0.67 [0.45, 0.84]
Epple 1997	74	7	3	42	>Mean +2 SDs above normal (30 mins)	0.96 [0.89, 0.99]	0.86 [0.73, 0.94]
Logan 1991a	31	0	3	16	>Mean +3 SDs above normal (60 mins)	0.91 [0.76, 0.98]	1.00 [0.79, 1.00]
Kim 2016	54	18	4	31	DOB >2.5% (20 mins)	0.93 [0.83, 0.98]	0.63 [0.48, 0.77]
Yu 2001	12	3	4	13	DOB >2.8% (15 mins)	0.75 [0.48, 0.93]	0.81 [0.54, 0.96]
Yoshimura 2001	42	3	2	25	DOB >3.0% (20 & 30 mins)	0.95 [0.85, 0.99]	0.89 [0.72, 0.98]
Mana 2001a	84	6	0	92	DOB >3.0% (30 mins)	1.00 [0.96, 1.00]	0.94 [0.87, 0.98]
Delvin 1999	12	0	0	67	DOB >3.0% (30 mins)	1.00 [0.74, 1.00]	1.00 [0.95, 1.00]
Salles-Montaudon 2002	18	19	6	64	DOB >3.5% (30 mins)	0.75 [0.53, 0.90]	0.77 [0.67, 0.86]
Czerwionka-Szaflarska 2007	21	5	10	64	DOB >4.0 % (time unknown)	0.68 [0.49, 0.83]	0.93 [0.84, 0.98]
Hafeez 2007	31	8	3	12	DOB >4.0% (10/ 20/ 30 mins)	0.91 [0.76, 0.98]	0.60 [0.36, 0.81]
Adamopoulos 2009b	6	0	9	16	DOB >4.0% (30 mins)	0.40 [0.16, 0.68]	1.00 [0.79, 1.00]
Schilling 2001	13	3	12	40	DOB >4.0% (30 mins)	0.52 [0.31, 0.72]	0.93 [0.81, 0.99]
Korstanje 2006	5	3	1	11	DOB >4.0% (30 mins)	0.83 [0.36, 1.00]	0.79 [0.49, 0.95]
Bosso 2000	32	6	1	56	DOB >4.0% (30 mins)	0.97 [0.84, 1.00]	0.90 [0.80, 0.96]
D'Elios 2000	113	2	3	138	DOB >4.0% (30 mins)	0.97 [0.93, 0.99]	0.99 [0.95, 1.00]
Germana 2001	54	1	1	44	DOB >4.0% (30 mins)	0.98 [0.90, 1.00]	0.98 [0.88, 1.00]
Fallone 1995	23	1	0	26	DOB >4.0% (30 mins)	1.00 [0.85, 1.00]	0.96 [0.81, 1.00]
Adamopoulos 2009a	43	1	0	29	DOB >4.0% (30 mins)	1.00 [0.92, 1.00]	0.97 [0.83, 1.00]
Lahner 2004	5	3	5	14	DOB >4.5% (15 & 30 mins)	0.50 [0.19, 0.81]	0.82 [0.57, 0.96]
Jordaan 2008	55	3	5	40	DOB >4.5% (time unknown)	0.92 [0.82, 0.97]	0.93 [0.81, 0.99]
Duan 1999	96	5	7	41	DOB >5 per thousand (30 mins)	0.93 [0.86, 0.97]	0.89 [0.76, 0.96]
Eltumi 1999	17	3	2	28	DOB >5 units/ml (40 mins)	0.89 [0.67, 0.99]	0.90 [0.74, 0.98]
Behrens 1999	129	7	7	98	DOB >5.0% (30 & 60 mins)	0.95 [0.90, 0.98]	0.93 [0.87, 0.97]
Inelmen 2004	41	7	13	61	DOB >5.0% (30 mins)	0.76 [0.62, 0.87]	0.90 [0.80, 0.96]
Lottspeich 2007	41	0	0	15	DOB >5.0% (30 mins)	1.00 [0.91, 1.00]	1.00 [0.78, 1.00]
Lee 1998	46	1	1	23	DOB >6% (30 mins)	0.98 [0.89, 1.00]	0.96 [0.79, 1.00]
Sheu 1998b	20	0	14	32	Unclear	0.59 [0.41, 0.75]	1.00 [0.89, 1.00]
Wardi 2012	9	6	5	56	Unclear	0.64 [0.35, 0.87]	0.90 [0.80, 0.96]
Vandenplas 1992	24	5	3	63	Unclear	0.89 [0.71, 0.98]	0.93 [0.84, 0.98]
Sheu 1998a	106	1	2	26	Unclear	0.98 [0.93, 1.00]	0.96 [0.81, 1.00]
Monteiro 2001a	43	2	3	56	Unknown	0.93 [0.82, 0.99]	0.97 [0.88, 1.00]
Eggers 1990	41	31	0	28	Unknown	1.00 [0.91, 1.00]	0.47 [0.34, 0.61]

Figure 5. Forest plot of urea breath test-13C at commonly reported thresholds. FN = false negative; FP = false positive; TN = true negative; TP = true positive. Thresholds are shown in brackets and the number of minutes in brackets is the time after administration of urea.

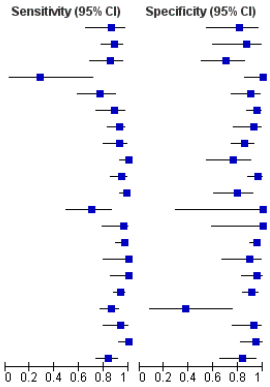


Urea breath test-^{14}C

Figure 6 shows the 21 studies of urea breath test-^{14}C. The studies included 1810 participants (involving 1018 *H pylori* cases). Three studies did not state the thresholds used (Selcukcan 2011; Surveyor 1989; Yu 1999). The two most commonly used thresholds were counts per minute > 50 (10 minutes after administration of urea) in six studies (471 participants) and disintegrations per minute > 200 (10 minutes) in four studies (296 participants) (Table 1). Test accuracy results for other thresholds are shown in Appendix 9. The summary sensitivity (95% CI) and specificity (95% CI) at the counts per minute > 50 threshold were 0.89 (95% CI 0.55 to 0.98) and 0.91 (95% CI 0.79 to 0.96). For the disintegrations per minute > 200 threshold, the summary sensitivity (95% CI) and specificity (95% CI) were 0.95 (95% CI 0.33 to 1.00) and 0.95 (95% CI 0.80 to 0.99).

Figure 6. Forest plot of urea breath test-14C. FN = false negative; FP = false positive; TN = true negative; TP = true positive. The forest plot shows an estimate of sensitivity and specificity from each study and the threshold used. Studies are sorted by threshold, sensitivity and specificity. For threshold, the number of minutes in brackets is the time after administration of urea.

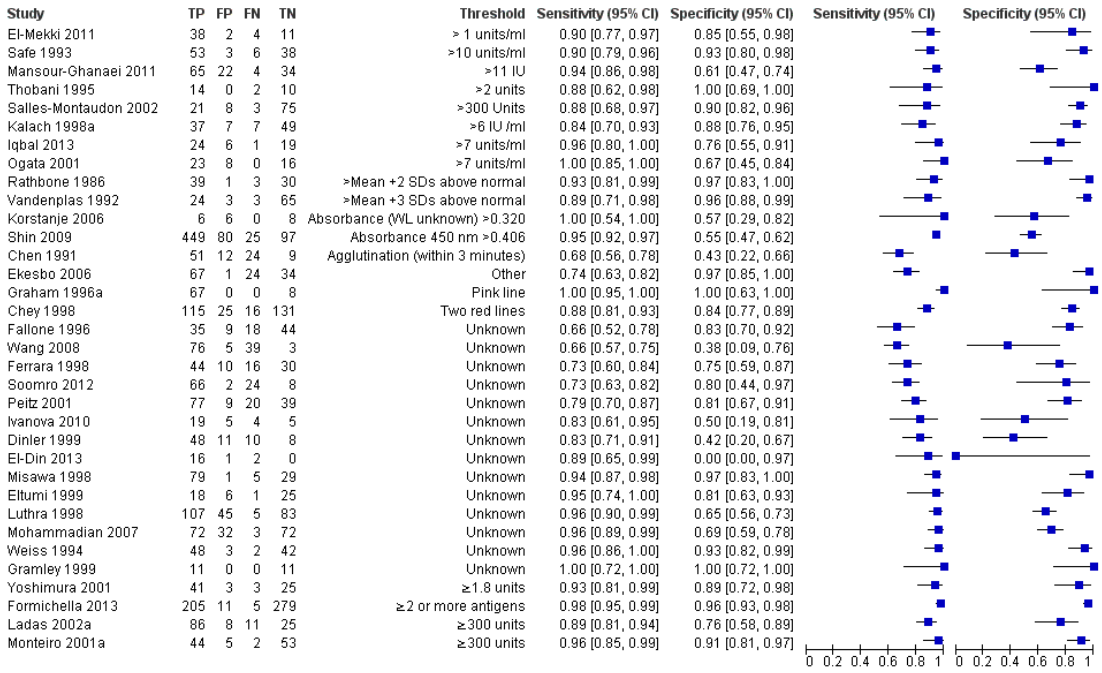
Study	TP	FP	FN	TN	Threshold	Reference standard	Sensitivity (95% CI)	Specificity (95% CI)
Noguera 1998	19	3	3	13	>1% excretion (10 mins)	H&E stain	0.86 [0.65, 0.97]	0.81 [0.54, 0.96]
Novis 1991	54	2	7	13	>4.7% excretion (15 mins)	Special stain	0.89 [0.78, 0.95]	0.87 [0.60, 0.98]
Al-Fadda 2000	29	9	5	21	CO2 recovery >0.55 (20 mins)	H&E stain	0.85 [0.69, 0.95]	0.70 [0.51, 0.85]
Dede 2015	2	0	5	23	CPM >50 (10 mins)	Combination	0.29 [0.04, 0.71]	1.00 [0.85, 1.00]
Gurbuz 2005	26	3	8	28	CPM >50 (10 mins)	H&E stain	0.76 [0.59, 0.89]	0.90 [0.74, 0.98]
Atli 2012	32	3	4	61	CPM >50 (10 mins)	H&E stain	0.89 [0.74, 0.97]	0.95 [0.87, 0.99]
Rasool 2007	61	2	5	26	CPM >50 (10 mins)	Combination	0.92 [0.83, 0.97]	0.93 [0.76, 0.99]
Kuloglu 2008	37	10	3	59	CPM >50 (10 mins)	Combination	0.93 [0.80, 0.98]	0.86 [0.75, 0.93]
Ozturk 2003	48	6	0	19	CPM >50 (10 mins)	Special stain	1.00 [0.93, 1.00]	0.76 [0.55, 0.91]
Mansour-Ghanaei 2011	65	2	4	54	CPM >50 (15 mins)	Combination	0.94 [0.86, 0.98]	0.96 [0.88, 1.00]
Villalobos 1992	75	6	1	23	DPM >1.6% (60 mins)	Special stain	0.99 [0.93, 1.00]	0.79 [0.60, 0.92]
Tiwari 2014	19	0	8	3	DPM >200 (10 mins)	H&E stain	0.70 [0.50, 0.86]	1.00 [0.29, 1.00]
Aguilar 2007	23	0	1	7	DPM >200 (10 mins)	H&E stain	0.96 [0.79, 1.00]	1.00 [0.59, 1.00]
Peura 1996	63	7	2	128	DPM >200 (10 mins)	Special stain	0.97 [0.89, 1.00]	0.95 [0.90, 0.98]
Jensen 1998	16	2	0	17	DPM >200 (10 mins)	Combination	1.00 [0.79, 1.00]	0.89 [0.67, 0.99]
Allardyce 1997	24	2	0	37	DPM >49 (time unknown)	Combination	1.00 [0.86, 1.00]	0.95 [0.83, 0.99]
Debongnie 1991	119	9	8	92	Specific activity >0.3% (10 mins)	Combination	0.94 [0.88, 0.97]	0.91 [0.84, 0.96]
Selcukcan 2011	79	5	13	3	Unknown	H&E stain	0.86 [0.77, 0.92]	0.38 [0.09, 0.76]
Surveyor 1989	30	2	2	25	Unknown	Combination	0.94 [0.79, 0.99]	0.93 [0.76, 0.99]
Yu 1999	44	2	0	35	Unknown	Combination	1.00 [0.92, 1.00]	0.95 [0.82, 0.99]
Morales 1995	62	5	12	25	≥1.6% excretion (time unknown)	Special stain	0.84 [0.73, 0.91]	0.83 [0.65, 0.94]



Serology

Serology was evaluated in 34 studies with a total of 4242 participants, of whom 2477 had *H pylori* infection (Figure 7). There was considerable variation in the thresholds used but 14 (41%) studies did not state the thresholds used. A threshold of > 7 units/ml was used in two studies (Iqbal 2013; Ogata 2001), involving 97 participants, and two studies involving 234 participants (Ladas 2002a; Monteiro 2001a) used a threshold of ≥ 300 units (Table 1). The summary sensitivity (95% CI) and specificity (95% CI) at the > 7 units/mL threshold were 0.98 (95% CI 0.74 to 1.00) and 0.71 (95% CI 0.51 to 0.86), and 0.91 (95% CI 0.82 to 0.96) and 0.86 (95% CI 0.72 to 0.93) for the ≥ 300 units threshold.

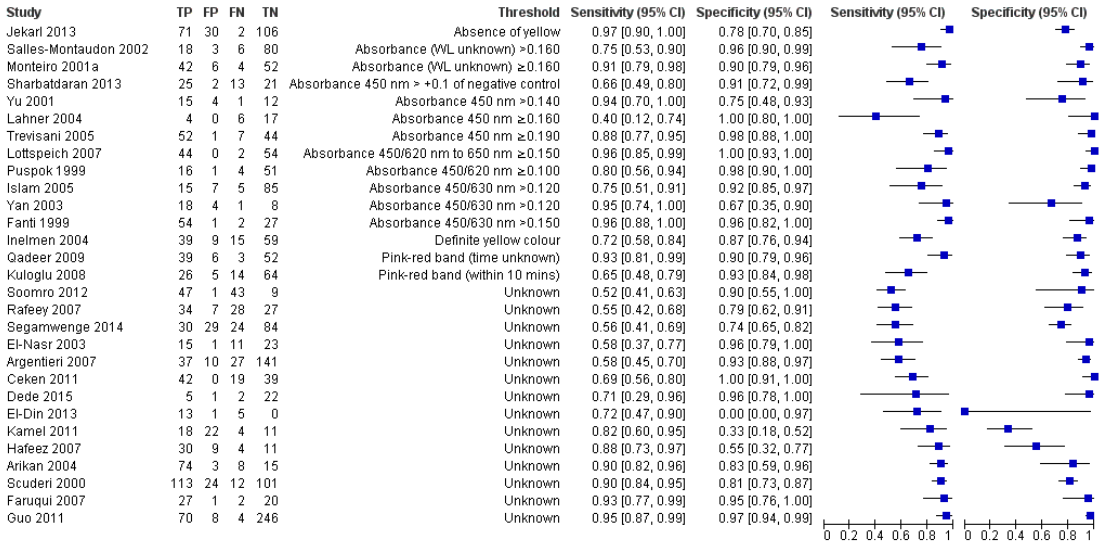
Figure 7. Forest plot of serology. FN = false negative; FP = false positive; SD = standard deviation; TN = true negative; TP = true positive. The forest plot shows an estimate of sensitivity and specificity from each study and the threshold used. Studies are sorted by threshold, sensitivity and specificity. Other threshold is staining of a 120kDa protein (CagA) gel band and/or at least two of five proteins between 28-33 kDa.



Stool antigen test

Twenty-nine studies assessed the stool antigen test in 2988 participants (including 1311 *H pylori* cases) (Figure 8). The threshold used was unknown in almost half of the studies (14/29, 48%). None of the thresholds reported were used by more than one study. Summary estimates of sensitivity and specificity were therefore not obtained at a common threshold.

Figure 8. Forest plot of stool antigen test. FN = false negative; FP = false positive; TN = true negative; TP = true positive; WL = wavelength. The forest plot shows an estimate of sensitivity and specificity from each study and the threshold used. Studies are sorted by threshold, sensitivity and specificity.



Study	TP	FP	FN	TN	Threshold	Sensitivity (95% CI)	Specificity (95% CI)
Jekarl 2013	71	30	2	106	Absence of yellow	0.97 [0.90, 1.00]	0.78 [0.70, 0.85]
Salles-Montaudon 2002	18	3	6	80	Absorbance (WL unknown) >0.160	0.75 [0.53, 0.90]	0.96 [0.90, 0.99]
Monteiro 2001a	42	6	4	52	Absorbance (WL unknown) ≥0.160	0.91 [0.79, 0.98]	0.90 [0.79, 0.96]
Sharbatdaran 2013	25	2	13	21	Absorbance 450 nm > +0.1 of negative control	0.66 [0.49, 0.80]	0.91 [0.72, 0.99]
Yu 2001	15	4	1	12	Absorbance 450 nm >0.140	0.94 [0.70, 1.00]	0.75 [0.48, 0.93]
Lahner 2004	4	0	6	17	Absorbance 450 nm ≥0.160	0.40 [0.12, 0.74]	1.00 [0.80, 1.00]
Trevisani 2005	52	1	7	44	Absorbance 450 nm ≥0.190	0.88 [0.77, 0.95]	0.98 [0.88, 1.00]
Lottspeich 2007	44	0	2	54	Absorbance 450/620 nm to 650 nm ≥0.150	0.96 [0.85, 0.99]	1.00 [0.93, 1.00]
Puspok 1999	16	1	4	51	Absorbance 450/620 nm ≥0.100	0.80 [0.56, 0.94]	0.98 [0.90, 1.00]
Islam 2005	15	7	5	85	Absorbance 450/630 nm >0.120	0.75 [0.51, 0.91]	0.92 [0.85, 0.97]
Yan 2003	18	4	1	8	Absorbance 450/630 nm >0.120	0.95 [0.74, 1.00]	0.67 [0.35, 0.90]
Fanti 1999	54	1	2	27	Absorbance 450/630 nm >0.150	0.96 [0.88, 1.00]	0.96 [0.82, 1.00]
Inelmen 2004	39	9	15	59	Definite yellow colour	0.72 [0.58, 0.84]	0.87 [0.76, 0.94]
Qadeer 2009	39	6	3	52	Pink-red band (time unknown)	0.93 [0.81, 0.99]	0.90 [0.79, 0.96]
Kuloglu 2008	26	5	14	64	Pink-red band (within 10 mins)	0.65 [0.48, 0.79]	0.93 [0.84, 0.98]
Soomro 2012	47	1	43	9	Unknown	0.52 [0.41, 0.63]	0.90 [0.55, 1.00]
Rafeey 2007	34	7	28	27	Unknown	0.55 [0.42, 0.68]	0.79 [0.62, 0.91]
Segamwenge 2014	30	29	24	84	Unknown	0.56 [0.41, 0.69]	0.74 [0.65, 0.82]
El-Nasr 2003	15	1	11	23	Unknown	0.58 [0.37, 0.77]	0.96 [0.79, 1.00]
Argentieri 2007	37	10	27	141	Unknown	0.58 [0.45, 0.70]	0.93 [0.88, 0.97]
Ceken 2011	42	0	19	39	Unknown	0.69 [0.56, 0.80]	1.00 [0.91, 1.00]
Dede 2015	5	1	2	22	Unknown	0.71 [0.29, 0.96]	0.96 [0.78, 1.00]
El-Din 2013	13	1	5	0	Unknown	0.72 [0.47, 0.90]	0.00 [0.00, 0.97]
Kamel 2011	18	22	4	11	Unknown	0.82 [0.60, 0.95]	0.33 [0.18, 0.52]
Hafeez 2007	30	9	4	11	Unknown	0.88 [0.73, 0.97]	0.55 [0.32, 0.77]
Arikan 2004	74	3	8	15	Unknown	0.90 [0.82, 0.96]	0.83 [0.59, 0.96]
Scuderi 2000	113	24	12	101	Unknown	0.90 [0.84, 0.95]	0.81 [0.73, 0.87]
Faruqui 2007	27	1	2	20	Unknown	0.93 [0.77, 0.99]	0.95 [0.76, 1.00]
Guo 2011	70	8	4	246	Unknown	0.95 [0.87, 0.99]	0.97 [0.94, 0.99]

Comparative accuracy of non-invasive tests for H pylori infection

Comparison based on all studies (Indirect test comparison)

Across the four tests (urea breath test-^{13}C, urea breath test-^{14}C, serology and stool antigen test) 99 studies (5694 cases; 10799 participants) were included in this comparative meta-analysis (Figure 9). Preliminary assessment of each test separately indicated there was no significant association between test accuracy and threshold, and so a symmetric SROC curve is plausible for each test. Based on these preliminary assessments, and likelihood ratio tests comparing different HSROC meta-regression models with covariate terms for test type and examination of the variance parameters in these models, the final model we fitted allowed for differences in accuracy and threshold as random effects (i.e. unequal variances for the random effects) with symmetric SROC curves for the tests. Overall, there was statistical evidence of a difference in accuracy (P = 0.024). The DORs (95% CI) for urea breath test-^{13}C, urea breath test-^{14}C, serology and stool antigen test were 153 (95% CI 73.7 to 316), 105 (95% CI 74.0 to 150), 47.4 (95% CI 25.5 to 88.1) and 45.1 (95% CI 24.2 to 84.1) respectively (Table 2). The accuracy of urea breath tests (^{13}C and ^{14}C) was significantly higher than that of serology and stool antigen test. For example, the ratio of DORs (95%) for urea breath test-^{13}C compared to serology was 3.22 (95% CI 1.24 to 8.37), P = 0.017.

Figure 9. Summary ROC plot of non-invasive tests for H pylori infection. The SROC curves for the four tests are parallel. The curve for each test is drawn within the range of estimates of specificity from the studies included for the test.

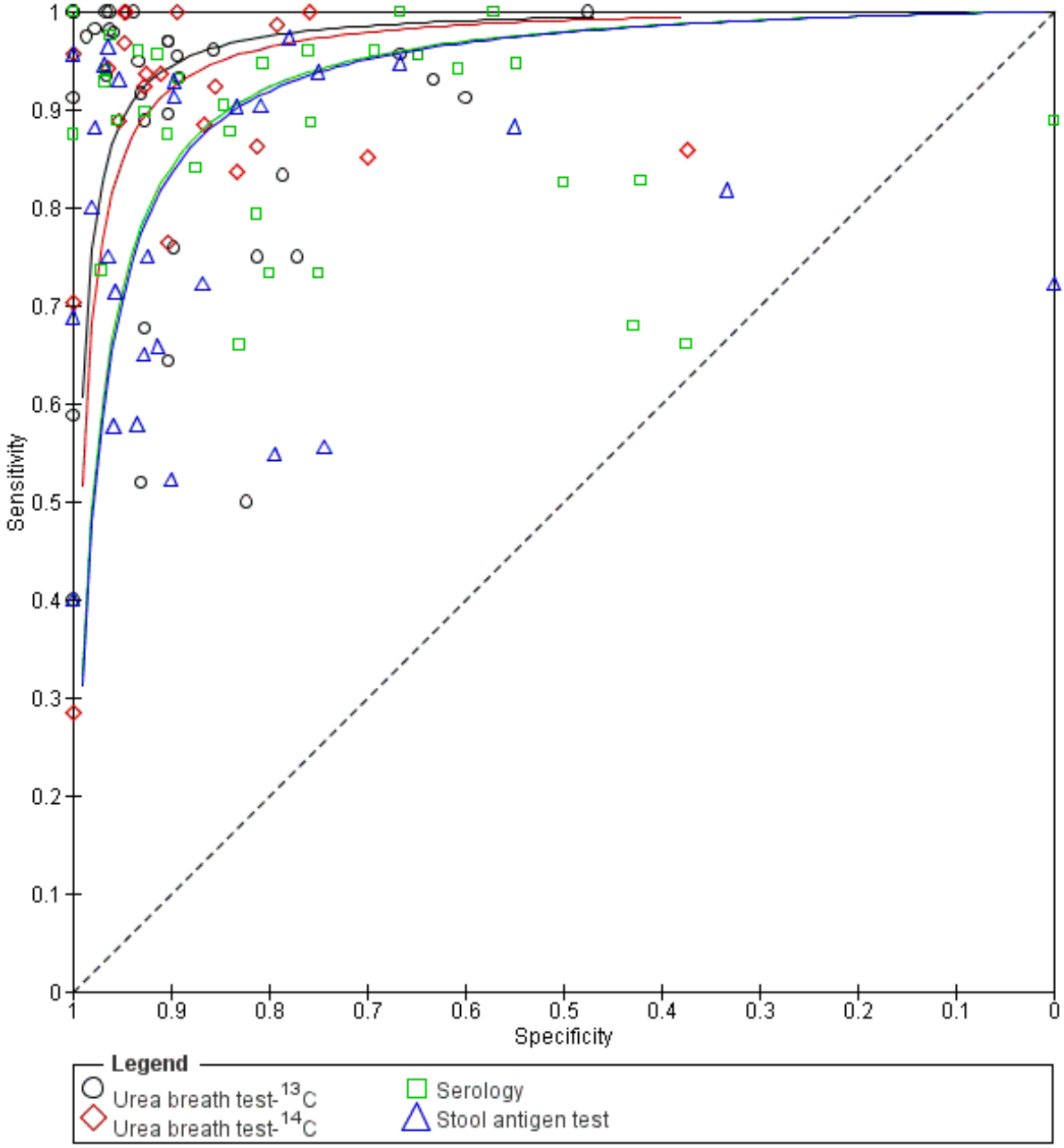


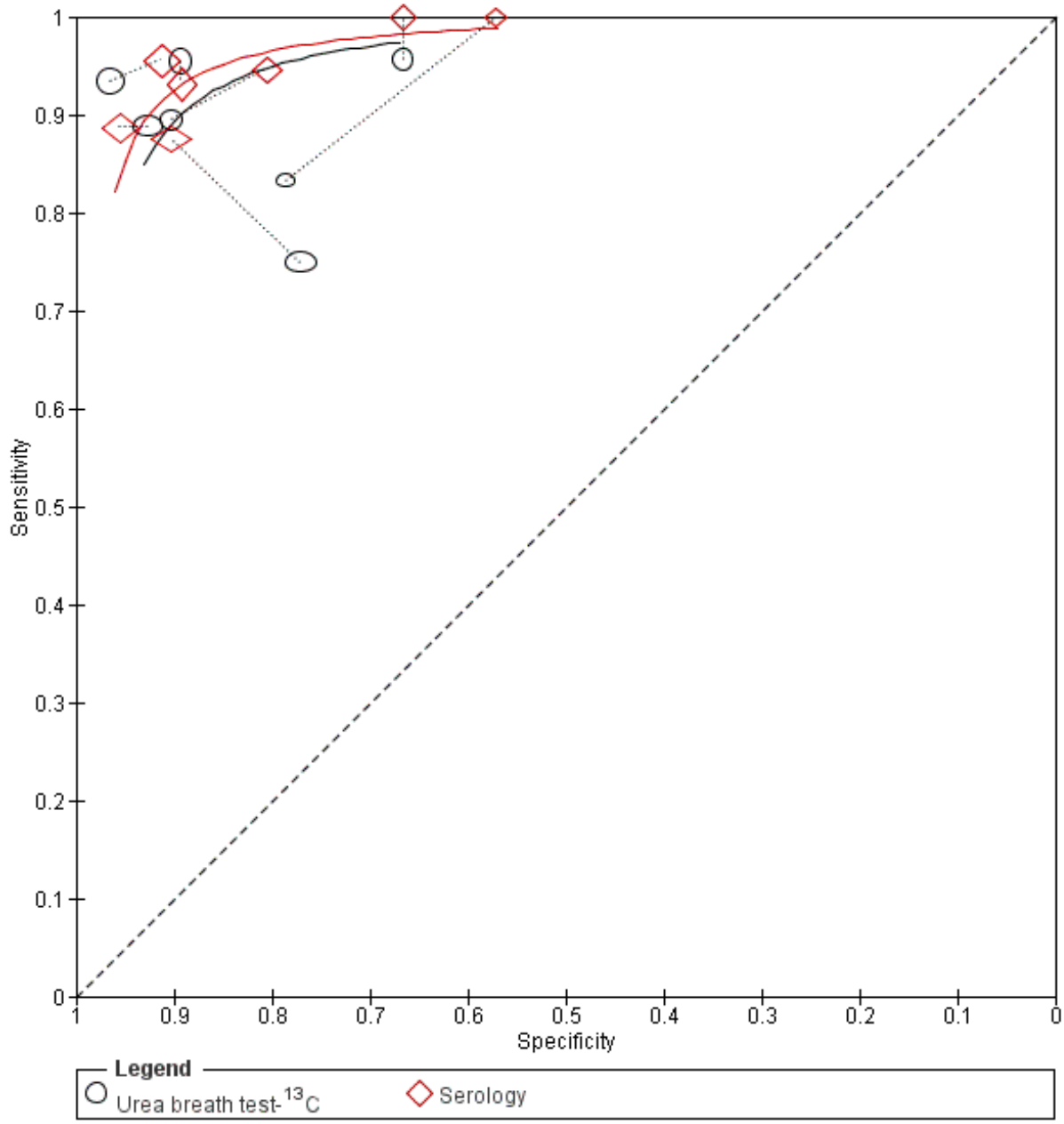
Table 3 shows the clinical implications of using each of the four tests in a hypothetical cohort of 1000 people with different levels of prevalence of *H pylori* infection. For example, given a prevalence of 53.7% and a specificity of 0.90, 46 people who do not have *H pylori* infection will be treated and urea breath test-^{13}C, urea breath test-^{14}C, serology and stool antigen test will miss 30, 42, 86 and 89 people respectively who have *H pylori* infection.

Direct comparisons (restricted to comparative studies)

Direct comparisons were based on few studies. Table 4 shows the number of studies (*N*) for each pairwise comparison and, where meta-analysis was possible, the ratio of DORs with 95% CIs and P value. There were no comparative studies of urea breath test-^{13}C and urea breath test-^{14}C. All other comparisons were based on seven or fewer studies. Each pair of tests were evaluated as follows:

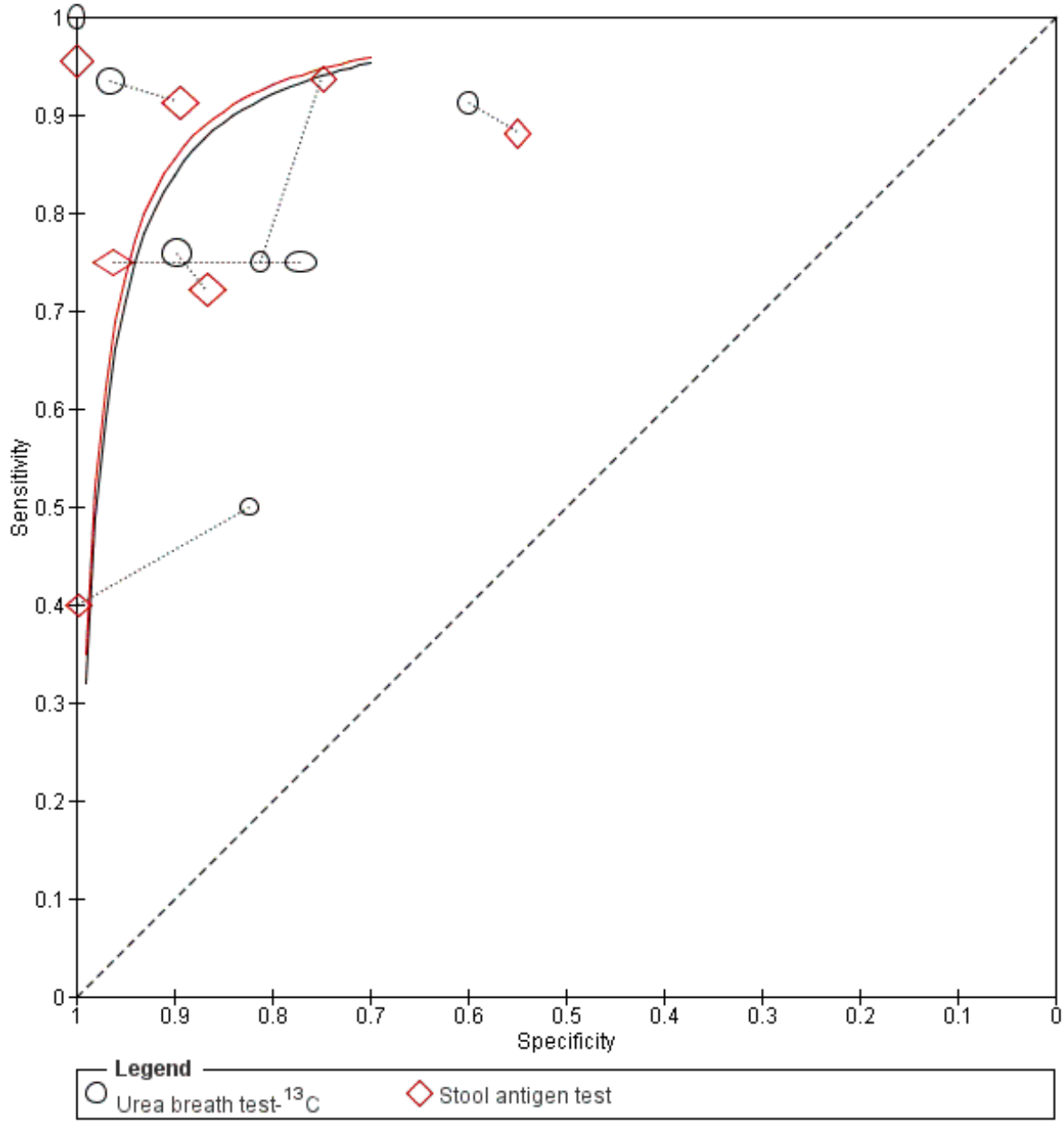
- Urea breath test-^{13}C versus serology (Figure 10): seven studies (Eltumi 1999; Korstanje 2006; Monteiro 2001a; Ogata 2001; Salles-Montaudon 2002; Vandenplas 1992; Yoshimura 2001).

Figure 10. Summary ROC plot of direct comparisons of urea breath test-13C and serology. Each summary curve was drawn restricted to the range of specificities for each test. The size of each symbol was scaled according to the precision of sensitivity and specificity in the study. A dotted line joins the pair of points for the two tests from each study.



- Urea breath test-^{13}C versus stool antigen test (Figure 11): seven studies (Hafeez 2007; Inelmen 2004; Lahner 2004; Lottspeich 2007; Monteiro 2001a; Salles-Montaudon 2002; Yu 2001).

Figure 11. Summary ROC plot of direct comparisons of urea breath test-13C and stool antigen test. Each summary curve was drawn restricted to the range of specificities for each test. The size of each symbol was scaled according to the precision of sensitivity and specificity in the study. A dotted line joins the pair of points for the two tests from each study.



- Urea breath test-^{14}C versus serology: two studies (Dede 2015; Kuloglu 2008).
- Urea breath test-^{14}C versus serology: one study (Mansour-Ghanaei 2011).
- Serology versus stool antigen test: four studies (El-Din 2013; Monteiro 2001a; Salles-Montaudon 2002; Soomro 2012).

The ratios of DORs (95% CI; P value) were 0.68 (95% CI 0.12 to 3.70; P = 0.56) for urea breath test-^{13}C versus serology, and 0.88 (95% CI 0.14 to 5.56; P = 0.84) for urea breath test-^{13}C versus stool antigen test. Due to paucity of data and substantial heterogeneity observed in ROC space which precluded the use of simpler meta-analytic models, meta-analyses were not possible for the other two test comparisons that had more than one study. For the single study of urea breath test-^{14}C versus serology (Mansour-Ghanaei 2011), both tests had similar sensitivity, but specificity was higher for urea breath test-^{14}C than for serology.

Investigation of heterogeneity

We were unable to investigate subtype of tests because most of the serological tests were ELISA (17/20 (85%) studies that provided the type of serology test) and most studies (24/29 (83%) studies) did not report whether monoclonal or polyclonal antibodies were used for stool antigen tests. Studies did not report the precise interval between index test and reference standard (unless they were performed on the same day), i.e. many studies did not report the interval at all, while some reported that the tests were performed within a few days of each other without stating the exact time interval. Of those that reported the interval, only two studies had an interval of more than two weeks (Dede 2015; Lombardo 2003). For each of the four tests, Appendix 10 shows the number of studies in each subgroup of other factors we had planned to investigate. Given the availability of data, we were only able to perform meta-regression to investigate the effect of reference standard on the accuracy of each test. Of the 99 studies, 42 (42%) used a combination of stains and there were few data for Immunohistochemical stains (2/99; 2%). The analyses were therefore limited to comparisons of H & E stain versus special stain for each test (Appendix 11). Although the effect of reference standard was not consistent across tests, there was no statistical evidence of a difference in test accuracy for any of the tests. For urea breath test-^{14}C, the DOR for special stain was higher than for H & E stain, while for the other tests the DOR of both types of stain were similar or higher for H & E (Appendix 11).

Summary of findings

What is the best non-invasive test for diagnosis of *H pylori* infection?				
Population	Children and adults with gastrointestinal symptoms			
Setting	Primary care setting			
Index tests	Urea breath test-^{13}C, Urea breath test-^{14}C, serology, and stool antigen test			
Threshold	Various thresholds were used for each test			
Role and purpose of test	Screening and diagnosis of *H pylori*			
Reference standard	Endoscopic biopsy with Haemotoxylin & Eosin stain, special stains, or combination of Haemotoxylin & Eosin and special stains			
Quality of evidence	Risk of bias was generally high or unclear with respect to the selection of participants, and the conduct and interpretation of the index tests and reference standard. Applicability concerns were also generally high or unclear with respect to selection of participants			
Limitations	There was heterogeneity in thresholds and reference standards. Studies did not often prespecify or clearly report thresholds used			
Pre-test probability (prevalence of *Helicobacter pylori*)	Median (interquartile range) = 53.7% (42.0% to 66.5%)			
Index test	**Number of participants (studies)**	**Diagnostic odds ratio (95% CI)**	**Sensitivity (95% CI) at fixed specificity of 0.90**[1]	**Missed *H pylori* cases per 1000 people tested (95% CI)**[2]
Urea breath test-^{13}C	3139 participants (34 studies)	153 (95% CI 73.7 to 316)	0.94 (0.89 to 0.97)	30 (15 to 58)
Urea breath test-^{14}C	1810 participants (21 studies)	105 (95% CI 74.0 to 150)	0.92 (0.89 to 0.94)	42 (30 to 58)
Serology	4242 participants (34 studies)	47.4 (95% CI 25.5 to 88.1)	0.84 (0.74 to 0.91)	86 (50 to 140)

Stool antigen test	2988 participants (29 studies)	45.1 (95% CI 24.2 to 84.1)	0.83 (0.73 to 0.90)	89 (52 to 146)

Comparison of non-invasive tests for *H pylori* infection

Based on an indirect comparison of the four tests using all the studies, there was statistical evidence of a difference in diagnostic accuracy (P = 0.024). Direct comparisons were based on few head-to-head studies. The ratios of diagnostic odds ratios (95% CI; P value) were 0.68 (95% CI 0.12 to 3.70; P = 0.56) for urea breath test-^{13}C versus serology (seven studies), and 0.88 (95% CI 0.14 to 5.56; P = 0.84) for urea breath test-^{13}C versus stool antigen test (seven studies). The 95% confidence intervals of these estimates overlap with those of the ratios of diagnostic odds ratios from the indirect comparison. Data were limited or unavailable for meta-analysis of other direct comparisons

Conclusions

In people with no history of gastrectomy and those who have not recently had antibiotics or proton pump inhibitors, urea breath tests had high diagnostic accuracy while serology and stool antigen tests had lower accuracy to detect *H pylori* infection. Although susceptible to bias due to confounding, this conclusion is based on evidence from indirect test comparisons as evidence from direct comparisons was based on few studies or was unavailable. It should be noted that studies were generally of poor methodological quality. The thresholds used for the tests were highly variable and there is currently insufficient evidence to recommend specific thresholds for use in clinical practice

[1]The sensitivities were estimated along the SROC curves at the median specificity across the studies included for the four tests.

[2]Based on the sensitivity estimated at the median specificity of 0.90, and the median prevalence of 53.7% from the included studies, the numbers of missed *H pylori* cases were calculated using a hypothetical cohort of 1000 people suspected of having *H pylori* infection. The 95% CI for the number of missed cases is from the 95% CI for sensitivity. For a specificity of 0.90 and prevalence of 53.7%, there will be 46 false positives. See Table 3 for results for other values of specificity and prevalence.

DISCUSSION

Summary of main results

We included 101 studies (11,003 participants) that evaluated the diagnostic accuracy of different non-invasive methods for the diagnosis of *H pylori*. Of these 11,003 participants, 5839 participants (53.1%) had *H pylori* infection. The prevalence of *H pylori* infection ranged from 15.2% to 94.7%. The median prevalence was 53.7% (lower quartile: 42.0% and upper quartile: 66.5%).

The summary of results for urea breath test-^{13}C, urea breath test-^{14}C, serology and stool antigen test is given in Summary of findings. The studies used different thresholds and reference standards. As a result, there were few data for pooling sensitivities and specificities at specific thresholds, and we mainly estimated and compared SROC curves. The test comparison based on all available data (99 studies) for the four tests showed a statistically significant difference in diagnostic accuracy between the test (P = 0.024). There was no statistical evidence of a difference in diagnostic accuracy between urea breath test-^{13}C and urea breath test-^{14}C, while serology and stool antigen test were inferior to both urea breath tests. Direct comparisons are more reliable than indirect comparisons, due to the potential for confounding in indirect comparisons (Takwoingi 2013). However, we found few head-to-head studies and meta-analysis was possible for only two pairwise comparisons (urea breath test-^{13}C versus serology, seven studies; and urea breath test-^{13}C versus stool antigen test, seven studies).

Most of the tests that used visual assessment (for example, appearance of a pink-red line) were stool antigen tests, although some serology tests also used visual assessment. Some serology and stool antigen tests are therefore easy to use (stool antigen test is easier to use as described below), but low diagnostic accuracy is a disadvantage when compared to urea breath tests. Urea breath test is a cumbersome test and involves the use of radioisotopes; however, urea breath test-^{13}C may be the most accurate test among the non-invasive tests. This has implications in the screening of individuals for *H pylori* as a decision has to be made regarding the use of a cumbersome and relatively costly test but with good diagnostic accuracy versus cheap tests that can be performed easily but with lower diagnostic accuracy. A further decision to make if one opts for easy-to-use tests is the threshold at which the test should be used. For example, one can use a threshold that provides higher sensitivity (at the cost of lower specificity, necessitating endoscopic biopsy confirmation or treatment) or a threshold that provides higher specificity (at the cost of lower sensitivity, resulting in people with *H pylori* not being treated). Although at first sight it appears that the treatment for *H pylori* is relatively harmless and one would prefer a threshold at which the test has higher sensitivity rather than higher specificity, the decision to give antibiotics is not a straightforward one, because of the association between unnecessary antibiotic use and development of antimicrobial resistance (Llor 2014). Serology and stool antigen test have similar diagnostic test accuracy and the choice between the two may be made based on ease of carrying out the tests. Only one study included in this review used whole blood for performing serology (Chey 1998). Even this test required a laboratory technician to interpret the test result (Chey 1998). So, there are no bedside tests available for serology testing. On the other hand, bedside kits with easy interpretation by colour changes are available for stool antigen tests, making them easy to administer (Inelmen 2004; Jekarl 2013; Kuloglu 2008; Qadeer 2009; Trevisani 2005). A cost-effectiveness study may clarify the most cost-effective non-invasive test in people with suspected *H pylori*, but it is difficult to factor in the price of antimicrobial resistance to an individual as the price of antimicrobial resistance is paid by future generations (through increased mortality and decreased productivity), rather than the individual for whom the treatment decision has to be made (Taylor 2014).

Strengths and weaknesses of the review

We conducted a thorough literature search and included full-text publications and abstracts without any language restrictions. There are currently no reliable search strategies to identify diagnostic test accuracy studies (Beynon 2013). We did not use any diagnostic filter in our search strategy, thereby ensuring that studies on the topic were identified. Two review authors independently identified and extracted data from the studies, potentially decreasing errors related to single data extraction. PCR methodology is not standardised across laboratories and it is an unreliable reference standard (Chey 2007). Endoscopic biopsy followed by rapid urease testing has poor sensitivity following treatment with proton pump inhibitors, and endoscopic biopsy with culture has high specificity but poor sensitivity (Chey 2007). We used a strict reference standard (histology) which is likely to diagnose the target condition with a high degree of accuracy. These are the major strengths of the review.

A major limitation was the diversity of thresholds used in the studies. As a result, data were sparse for each threshold, which limited estimation of summary sensitivities and specificities. Therefore there is insufficient evidence to recommend specific thresholds for each of the tests. Nonetheless, we were able to estimate and compare SROC curves by including studies with different thresholds. There was a high proportion of studies at high risk of bias and with high concern regarding applicability in all the four domains of the QUADAS-2 tool. This makes the validity and applicability of the results questionable. The major concerns were lack of reporting of the threshold used or when the thresholds were reported, there was no information to judge whether the thresholds were prespecified. Despite the lack of statistical evidence of an effect of type of reference standard on test accuracy, as there were few studies for each subgroup and other differences between studies, we cannot

conclude that diagnostic accuracy does not depend on type of reference standard.

Comparison with other systematic reviews

We identified several relevant systematic reviews (Ferwana 2015; Gisbert 2001; Gisbert 2004a; Loy 1996; Zhou 2014; Zhou 2017). The findings from this review support those of Zhou 2017, and Ferwana 2015, that urea breath test has high diagnostic accuracy and that there was significant heterogeneity in the diagnostic accuracy of the urea breath test (Zhou 2017). Our findings agree with those of Zhou 2014 that stool antigen test has only modest diagnostic test accuracy. The review findings are contrary to those of Gisbert 2001, and Gisbert 2004a, which suggested that stool antigen tests are highly accurate. This difference may be due to the strict reference standards that we used in this review and how we handled the issue of heterogeneity in thresholds. In agreement with the findings of Loy 1996, the role of serology in clinical practice is uncertain, as stool antigen tests provide equivalent diagnostic accuracy to serology and are easier to interpret.

Applicability of findings to the review question

This review included adults and children who underwent non-invasive tests for the diagnosis of *H pylori*. Most of the studies included only symptomatic people and so the findings of this review are applicable only to people with symptoms. Most studies excluded people who had previous gastrectomy and those who had recent antibiotics or proton pump inhibitors. Hence, the findings of this review are not applicable in these populations.

AUTHORS' CONCLUSIONS

Implications for practice

In people with no history of gastrectomy and those who have not recently had antibiotics or proton pump inhibitors, urea breath tests had high diagnostic accuracy while serology and stool antigen tests had lower accuracy to detect *H pylori* infection. Although susceptible to bias due to confounding, this conclusion is based on evidence from indirect test comparisons, as evidence from direct comparisons was based on few studies or was unavailable. There was high or unclear risk of bias for many studies with respect to the selection of participants, and the conduct and interpretation of the index tests and reference standard. The thresholds used for these tests were highly variable, thus there is insufficient evidence to identify specific thresholds that might be useful in clinical practice.

Implications for research

Further comparative studies of high methodological quality are necessary to obtain more reliable evidence of accuracy between the tests (urea breath tests, serology, and stool antigen tests) in people with upper gastrointestinal symptoms and people without any symptoms suggestive of *H pylori*. Such studies should be conducted prospectively in a representative spectrum of participants, and be clearly reported to ensure low risk of bias. Most importantly, studies should pre-specify and clearly report the thresholds used, should apply appropriate reference standards such as endoscopic biopsy with special stains, and should avoid inappropriate exclusions.

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REFERENCES

References to studies included in this review

Adamopoulos 2009a *{published data only}*
Adamopoulos AB, Stergiou GS, Saklzlis GN, Tiniakos DG, Nasothimiou EG, Sioutis DK, et al. Diagnostic value of rapid urease test and urea breath test for Helicobacter pylori detection in patients with Billroth ii gastrectomy: A prospective controlled trial. *Digestive and Liver Disease* 2009;**41**(1):4–8.

Adamopoulos 2009b *{published data only}*
Adamopoulos AB, Stergiou GS, Saklzlis GN, Tiniakos DG, Nasothimiou EG, Sioutis DK, et al. Diagnostic value of rapid urease test and urea breath test for Helicobacter pylori detection in patients with Billroth ii gastrectomy: A prospective controlled trial. *Digestive and Liver Disease* 2009;**41**(1):4–8.

Aguilar 2007 *{published data only}*
Aguilar RC, Saavedra SP, Mendoza PG, Bussalleu RA, Cok GJ, Martinez MF, et al. Study of urease test or breath test (BT) and correlation with gastric biopsy to detect Helicobacter pylori (hp) in dyspeptic patients at "Hospital Nacional Cayetano Heredia hospital" (HNCH)--Lima. *Revista de Gastroenterologia del Peru* 2007;**27**(2):172–6.

Al-Fadda 2000 *{published data only}*
Al-Fadda M, Powe J, Rezeig M, Al Nazer M, Alrajhi AA, Baynton R. Comparison of carbon-14-urea breath test and rapid urease test with gastric biopsy for identification of

Helicobacter pylori. *Annals of Saudi Medicine* 2000;**20**(2): 170–2.

Allardyce 1997 *{published data only}*
Allardyce RA, Chapman BA, Tie ABM, Burt MJ, Yeo KJ, Keenan JI, et al. 37 KBQ C-14-urea breath test and gastric biopsy analyses of H-pylori infection. *Australian and New Zealand Journal of Surgery* 1997;**67**(1):31–4.

Argentieri 2007 *{published data only}*
Argentieri M, Sabbi T, Pansani L, Torroni F, Francalanci P, De Angelis P, et al. Helicobacter pylori infection in children: Utility of culture in diagnosis and study of resistance to metronidazole, clarithromycin and amoxicillin. *Journal of Pediatric Infectious Diseases* 2007;**2**(3):135–9.

Arikan 2004 *{published data only}*
Arikan S, Kocakusak A, Barut G, Sengoz G, Yucel AF, Gokturk K. Helicobacter pylori stool antigen test: Results of a prospective study. *Surgery Today* 2004;**34**(4):318–22.

Atli 2012 *{published data only}*
Atli T, Sahin S, Arslan BU, Varli M, Yalcin AE, Aras S. Comparison of the C14 urea breath test and histopathology in the diagnosis of Helicobacter pylori in the elderly. *Journal of the Pakistan Medical Association* 2012;**62**(10):1061–5.

Behrens 1999 *{published data only}*
* Behrens R, Lang T, Keller KM, Bindl L, Becker M, Rodeck B, et al. Dual versus triple therapy of Helicobacter pylori infection: Results of a multicentre trial. *Archives of Disease in Childhood* 1999;**81**(1):68–70.
Behrens R, Lang T, Keller KM, Bindl L, Becker M, Rodeck B, et al. Helicobacter pylori infection in children and adolescents. Diagnosis and treatment. [German]. *Tagliche Praxis* 2001;**42**(3):473–83.

Bosso 2000 *{published data only}*
Bosso S, Balbo L, Lerro P, Kuvidi M, Musso A, Ansaldi N. Antigen detection in stools as a first choice for laboratory diagnosis of Helicobacter pylori disease. *Minerva Gastroenterologica e Dietologica* 2000;**46**(1):15–8.

Ceken 2011 *{published data only}*
Ceken N, Yurtsever SG, Baran N, Alper E, Buyrac Z, Unsal B. Comparison of Helicobacter pylori antibody detection in stool with other diagnostic tests for infection. *Asian Pacific Journal of Cancer Prevention* 2011;**12**(4):1077–81.

Chen 1991 *{published data only}*
Chen CF, Lee MH, Ng JL, Lin CY, Yeh HW, Huang TW. A rapid latex test for the serological diagnosis of Helicobacter pylori. *Chinese Journal of Gastroenterology* 1991;**8**(4): 266–70.

Chey 1998 *{published data only}*
Chey WD, Murthy UK, Linscheer W, Barish C, Riff D, Rubin H, et al. The ChemTrak Hp Chek fingerstick whole blood serology test for the detection of Helicobacter pylori infection. *American Journal of Gastroenterology* 1998;**93**(1): 16–9.

Czerwionka-Szaflarska 2007 *{published data only}*
Czerwionka-Szaflarska M, Brazowski J, Kupczyk W. Value of urease breath test in Helicobacter pylori infection diagnostics among children and youth. *Medycyna Wieku Rozwojowego* 2007;**11**(2 Pt 1):97–101.

D'Elios 2000 *{published data only}*
D'Elios MM, Amedei A, Benagiano M, Azzurri A, Del Prete G. Usefulness of 13C-urea breath test in the diagnosis of gastric Helicobacter pylori infection. *International Journal of Immunopathology and Pharmacology* 2000;**13**(1):27–30.

Debongnie 1991 *{published data only}*
Debongnie JC, Pauwels S, Raat A, De Meeus Y, Haot J, Mainguet P. Quantification of Helicobacter pylori infection in gastritis and ulcer disease using a simple and rapid carbon-14-urea breath test. *Journal of Nuclear Medicine* 1991;**32**(6):1192–8.

Dede 2015 *{published data only}*
Dede F, Civen H, Dane F, Aliustaoglu M, Turhal S, Turoglu HT, et al. Carbon-14 urea breath test: Does it work in patients with partial gastric resection?. *Annals of Nuclear Medicine* 2015;**29**(9):786–91.

Delvin 1999 *{published data only}*
Delvin EE, Brazier JL, Deslandres C, Alvarez F, Russo P, Seidman E. Accuracy of the [13C]-urea breath test in diagnosing Helicobacter pylori gastritis in pediatric patients. *Journal of Pediatric Gastroenterology and Nutrition* 1999;**28** (1):59–62.

Dinler 1999 *{published data only}*
Dinler G, Ozen H, Kocak N, Yuce A, Gurakan F. Detection of Helicobacter pylori infection. *American Journal of Gastroenterology* 1999;**94**(4):1118.

Duan 1999 *{published data only}*
Duan L, Duan X, Ye S, Wang J, Jin Z, Wang Z. The diagnostic value of 13C-urea breath test in Helicobacter pylori colonization density and the severity of gastritis. *Zhonghua Nei Ke za Zhi [Chinese Journal of Internal Medicine]* 1999;**38**(12):824–6.

Eggers 1990 *{published data only}*
Eggers RH, Kulp A, Tegeler R, Ludtke FE, Lepsien G, Meyer B, et al. A methodological analysis of the c-13-urea breath test for detection of Helicobacter-pylori infections - high-sensitivity and specificity within 30-min using 75-mg of c-13-urea. *European Journal of Gastroenterology & Hepatology* 1990;**2**(6):437–44.

Ekesbo 2006 *{published data only}*
Ekesbo R, Toth E, Fork FT, Held M, Nilsson I, Wadstrom T, et al. Chronic Helicobacter pylori infection in a population in southern Sweden analysed by histopathology, immunoblot and ELISA serology. *European Journal of Gastroenterology & Hepatology* 2006;**18**(6):589–93.

El-Din 2013 *{published data only}*
El-Din HMA, Hashem AGM, Ragab YM, Hussein IL, Mohamed DB, Mohamed EB. Evaluation of noninvasive versus invasive techniques for the diagnosis of Helicobacter pylori infection. *Applied Immunohistochemistry & Molecular Morphology* 2013;**21**(4):326–33.

El-Mekki 2011 *{published data only}*

El-Mekki A, Kumar A, Alknawy B, Al-Ammari O, Moosa R, Quli S, et al. Comparison of enzyme immunoassays detecting Helicobacter pylori specific IgG in serum and saliva with endoscopic and biopsy findings in patients with dyspepsia. *Indian Journal of Medical Microbiology* 2011;**29** (2):136–40.

El-Nasr 2003 *{published data only}*

El-Nasr MS, Elibiary SA, Bastawi MB, Hassan A, Shahin Y, Hassan L, et al. Evaluation of a new enzyme immunoassay for the detection of Helicobacter pylori in stool specimens. *Journal of the Egyptian Society of Parasitology* 2003;**33**(3): 905–15.

Eltumi 1999 *{published data only}*

Eltumi M, Brueton MJ, Francis N. Diagnosis of Helicobacter pylori gastritis in children using the 13C urea breath test. *Journal of Clinical Gastroenterology* 1999;**28**(3): 238–40.

Epple 1997 *{published data only}*

Epple HJ, Kirstein FW, Bojarski C, Frege J, Fromm M, Riecken EO, et al. 13C-urea breath test in Helicobacter pylori diagnosis and eradication. Correlation to histology, origin of 'false' results, and influence of food intake. *Scandinavian Journal of Gastroenterology* 1997;**32**(4): 308–14.

Fallone 1995 *{published data only}*

Fallone CA, Mitchell A, Paterson WG. Determination of the test performance of less costly methods of Helicobacter pylori detection. *Clinical and Investigative Medicine. Medecine Clinique et Experimentale* 1995;**18**(3):177–85.

Fallone 1996 *{published data only}*

Fallone CA, Elizov M, Cleland P, Thompson JA, Wild GE, Lough J, et al. Detection of Helicobacter pylori infection by saliva IgG testing. *American Journal of Gastroenterology* 1996;**91**(6):1145–9.

Fanti 1999 *{published data only}*

Fanti L, Mezzi G, Cavallero A, Gesu G, Bonato C, Masci E. A new simple immunoassay for detecting Helicobacter pylori infection: Antigen in stool specimens. *Digestion* 1999;**60**(5):456–60.

Faruqui 2007 *{published data only}*

Faruqui AN, Majid U, Ahmed L, Khalil M, ul Hassan M. Helicobacter pylori stool antigen test (HpSA) for the diagnosis of gastric infection. *Journal of the College of Physicians and Surgeons Pakistan* 2007;**17**(6):316–9.

Ferrara 1998 *{published data only}*

Ferrara M, Apuzzo M, Bazuro ME, Tammaro GF, Pippa G. Serology screening for Helicobacter pylori in dyspeptic patients. *Giornale Italiano di Endoscopia Digestiva* 1998;**21** (1):15–22.

Formichella 2013 *{published data only}*

* Formichella L, Romberg L, Bolz C, Vieth M, Geppert M, Gottner G, et al. A novel line immunoassay based on recombinant virulence factors enables highly specific and sensitive serologic diagnosis of Helicobacter pylori infection. *Clinical & Vaccine Immunology: CVI* 2013;**20** (11):1703–10.

Gholi MK, Kalali B, Formichella L, Gottner G, Shamsipour F, Zarnani AH, et al. Helicobacter pylori FliD protein is a highly sensitive and specific marker for serologic diagnosis of H. pylori infection. *International Journal of Medical Microbiology* 2013;**303**(8):618–23.

Germana 2001 *{published data only}*

* Germana B, Galliani E, Lecis P, Costan F. Diagnosis of Helicobacter pylori infections using isotope-selective non dispersive infrared spectrometry with 13C-urea breath test. *Recenti Progressi in Medicina* 2001;**92**(2):113–6.

Germana B, Galliani EA, Lecis PE, Doglioni C, Costan F. Isotope-selective non dispersive infrared spectrometry for detection of Helicobacter-pylori infection with c-13-urea breath test. *Gut* 1999;**45**(Suppl 3):A130.

Graham 1996a *{published data only}*

Graham DY, Evans DJ Jr, Peacock J, Baker JT, Schrier WH. Comparison of rapid serological tests (Flexsure Hp and Quickvue) with conventional ELISA for detection of Helicobacter pylori infection. *American Journal of Gastroenterology* 1996;**91**(5):942–8.

Gramley 1999 *{published data only}*

Gramley WA, Asghar A, Frierson HF Jr, Powell SM. Detection of Helicobacter pylori DNA in fecal samples from infected individuals. *Journal of Clinical Microbiology* 1999;**37**(7):2236–40.

Guo 2011 *{published data only}*

Guo JX, Han J, Chen L, Xu J, Liu J, Zhao J, et al. Evaluation of the Helicobacter pylori stool antigen test. *Zhonghua Shi Yan He Lin Chuang Bing du Xue za Zhi [Chinese Journal of Experimental and Clinical Virology]* 2011;**25**(6):495–6.

Gurbuz 2005 *{published data only}*

Gurbuz AK, Ozel AM, Narin Y, Yazgan Y, Baloglu H, Demirturk L. Is the remarkable contradiction between histology and c-14 urea breath test in the detection of Helicobacter pylori due to false-negative histology or false-positive c-14 urea breath test?. *Journal of International Medical Research* 2005;**33**(6):632–40.

Hafeez 2007 *{published data only}*

Hafeez A, Bilal R, Haseeb HA, Khan UF, Latif Z, Hassan M. Comparison of diagnostic accuracy of non-invasive tests for Helicobacter pylori infection in children. *Journal of the College of Physicians and Surgeons--Pakistan : JCPSP* 2007; **17**(5):261–4.

Han 2012 *{published data only}*

Han H, Lee S, Hwang T. The significance of positive giemsa stain cases in negative UBT (urea breath test) patients. *Helicobacter* 2012;**17**:117.

Inelmen 2004 *{published data only}*

Inelmen EM, Gasparini G, Sergi G, Enzi G. Evaluation of Helicobacter pylori with a stool antigen assay in frail, elderly patients. *Scandinavian Journal of Gastroenterology* 2005;**40** (7):794–9.

* Inelmen EM, Maccari T, Enzi G, Gasparini G, Fuson F, Davanzo B, et al. Helicobacter pylori infection diagnosis

in hospitalised elderly patients: The stool antigen test (HpSA) in comparison with other methods. *Aging-Clinical & Experimental Research* 2004;**16**(5):349–55.

Iqbal 2013 ***{published data only}***
Iqbal S, Fatima S, Raheem A, Khan AH. Agreement between serology and histology for detection of Helicobacter pylori infection. *Journal of the College of Physicians and Surgeons--Pakistan : JCPSP* 2013;**23**(10):784–6.

Islam 2005 ***{published data only}***
Islam S, Weilert F, Babington R, Dickson G, Smith AC. Stool antigen testing for the diagnosis and confirmation of eradication of Helicobacter pylori infection: A prospective blinded trial. *Internal Medicine Journal* 2005;**35**(9):526–9.

Ivanova 2010 ***{published data only}***
Ivanova K, Marina M, Vladimirov B, Churchev J, Tersiev I. Comparison of different methods for detection of Helicobacter pylori infection. *Problems of Infectious and Parasitic Diseases* 2010;**38**(1):25–7.

Jekarl 2013 ***{published data only}***
Jekarl DW, An YJ, Lee S, Lee J, Kim Y, Park YJ, et al. Evaluation of a newly developed rapid stool antigen test using an immunochromatographic assay to detect Helicobacter pylori. *Japanese Journal of Infectious Diseases* 2013;**66**(1):60–4.

Jensen 1998 ***{published data only}***
Jensen G, Friedenberg F, Levine G, Zaeri N, Braitman LE, Tran HD, et al. Accuracy and clinical utility of the mini-dose c-14-urea breath test in the evaluation of Helicobacter pylori infection. *Nuclear Medicine Communications* 1998; **19**(8):771–5.

Jordaan 2008 ***{published data only}***
Jordaan M, Laurens JB. Diagnosis of Helicobacter pylori infection with the c-13-urea breath test by means of GC-MS analysis. *Journal of Separation Science* 2008;**31**(2):329–35.

Kalach 1998a ***{published data only}***
Kalach N, Briet F, Raymond J, Benhamou PH, Barbet P, Bergeret M, et al. The 13Carbon urea breath test for the noninvasive detection of Helicobacter pylori in children: Comparison with culture and determination of minimum analysis requirements. *Journal of Pediatric Gastroenterology & Nutrition* 1998;**26**(3):291–6.

Kamel 2011 ***{published data only}***
Kamel HY, Abd-Al-Atty MF, El-Banoby MH, El-Baz AA, Sakr MA, Ahmed NS, et al. Stool antigen test in diagnosis of Helicobacter pylori in older adults with dyspepsia. *Journal of the American Geriatrics Society* 2011;**59**(9):1769–70.

Kim 2016 ***{published data only}***
Kim DH, Kim HD, Park H, Choi S, Beom JW, Kim WJ, et al. New monoclonal antibody-based test for Helicobacter pylori urease in gastric tissue. *Korean Journal of Internal Medicine* 2016;**31**(1):40–5.

Korstanje 2006 ***{published data only}***
Korstanje A, Van Eeden S, Offerhaus GJ, Sabbe LJ, Den Hartog G, Biemond I, et al. The 13Carbon urea breath test for the diagnosis of Helicobacter pylori infection in subjects with atrophic gastritis: Evaluation in a primary care setting. *Alimentary Pharmacology & Therapeutics* 2006;**24** (4):643–50.

Kuloglu 2008 ***{published data only}***
Kuloglu Z, Kansu A, Kirsaclioglu CT, Ustundag G, Aysev D, Ensari A, et al. A rapid lateral flow stool antigen immunoassay and (14)C-urea breath test for the diagnosis and eradication of Helicobacter pylori infection in children. *Diagnostic Microbiology & Infectious Disease* 2008;**62**(4): 351–6.

Ladas 2002a ***{published data only}***
Ladas SD, Malamou H, Triantafyllou K, Varzakakos I, Georgopoulos S, Giota G, et al. Performance of two immunosorbent assay kits for the detection of serum immunoglobulin G to Helicobacter pylori in untreated Greek patients. *Scandinavian Journal of Gastroenterology* 2002;**37**(5):512–6.

Lahner 2004 ***{published data only}***
Lahner E, Vaira D, Figura N, Pilozzi E, Pasquali A, Severi C, et al. Role of noninvasive tests (c-13-urea breath test and stool antigen test) as additional tools in diagnosis of Helicobacter pylori infection in patients with atrophic body gastritis. *Helicobacter* 2004;**9**(5):436–42.

Lee 1998 ***{published data only}***
Lee HS, Gwee KA, Teng LY, Kang JY, Yeoh KG, Wee A, et al. Validation of [13C]urea breath test for Helicobacter pylori using a simple gas chromatograph-mass selective detector. *European Journal of Gastroenterology & Hepatology* 1998;**10**(7):569–72.

Logan 1991a ***{published data only}***
Logan RP, Polson RJ, Misiewicz JJ, Rao G, Karim NQ, Newell D, et al. Simplified single sample 13Carbon urea breath test for Helicobacter pylori: Comparison with histology, culture, and ELISA serology. *Gut* 1991;**32**(12): 1461–4.

Lombardo 2003 ***{published data only}***
Lombardo L, Masoero G, Della Monica P, Crocella L, Ruggia O, Ravarino N, et al. Multiple sampling 13C-urea breath test: Improvement of diagnosis in postgastrectomy patients. *Minerva Gastroenterologica e Dietologica* 2003;**49** (3):181–6.

Lottspeich 2007 ***{published data only}***
Lottspeich C, Schwarzer A, Panthel M, Koletzko S, Russmann H. Evaluation of the novel *Helicobacter pylori* ClariRes real-time PCR assay for detection and clarithromycin susceptibility testing of *h.pylori* in stool specimens from symptomatic children. *Journal of Clinical Microbiology* 2007;**45**(6):1718–22.

Luthra 1998 ***{published data only}***
Luthra GK, DiNuzzo AR, Gourley WK, Crowe SE. Comparison of biopsy and serological methods of diagnosis of Helicobacter pylori infection and the potential role of antibiotics. *American Journal of Gastroenterology* 1998;**93** (8):1291–6.

Mana 2001a *{published data only}*

* Mana F, Franken PR, Ham HR, Urbain D. Cut-off point, timing and pitfalls of the c-13-urea breath test as measured by infrared spectrometry. *Digestive and Liver Disease* 2001; **33**(1):30–5.

Mana F, Fried M, Ham HR, Lacor P, Vandenplas Y, Urbain D. Evaluation of a 10 minute c-13-urea breath test for the diagnosis of Helicobacter pylori infection, as measured by infrared spectrometry. *Gastroenterology* 2000;**118**(4 Part 1): A508.

Mansour-Ghanaei 2011 *{published data only}*

Mansour-Ghanaei F, Sanaei O, Joukar F. Clinical validation of an office-based C-14-UBT (Heliprobe) for H. Pylori diagnosis in Iranian dyspeptic patients. Gastroenterology Research and Practice 2011 Jun 22 [Epub ahead of print]. [DOI: 10.1155/2011/930941

Mion 1994 *{published data only}*

Mion F, Delecluse HJ, Rousseau M, Berger F, Brazier JL, Minaire Y. 13C-urea breath test for the diagnosis of Helicobacter infection. Comparison with histology. *Gastroenterologie Clinique et Biologique* 1994;**18**(12): 1106–11.

Misawa 1998 *{published data only}*

Misawa K, Kumagai T, Shimizu T, Furihata K, Ota H, Akamatsu T, et al. A new histological procedure for re-evaluation of the serological test for Helicobacter pylori. *European Journal of Clinical Microbiology & Infectious Diseases* 1998;**17**(1):14–9.

Mohammadian 2007 *{published data only}*

Mohammadian T, Hagh-Zare M, Aria H, Doosti M, Paknejad M, Siavoshi F, et al. Comparison of serologic ELISA and histopathologic findings in diagnosis of Helicobacter pylori infection in Iran. *Helicobacter* 2007;**12** (4):446.

Monteiro 2001a *{published data only}*

Monteiro L, De Mascarel A, Sarrasqueta AM, Bergey B, Barberis C, Talby P, et al. Diagnosis of Helicobacter pylori infection: Noninvasive methods compared to invasive methods and evaluation of two new tests. *American Journal of Gastroenterology* 2001;**96**(2):353–8.

Morales 1995 *{published data only}*

Morales EOS, Vorackova FV, Perez JDV, Alonso SS, Angeles AA, Rivera JE, et al. Optimization of the c-14 urea breath test for the detection of Helicobacter-pylori in dyspeptic patients. *Revista De Investigacion Clinica* 1995;**47**(2): 109–16.

Noguera 1998 *{published data only}*

Noguera ECA, Hames W, Bertola S, Mothe G. Helicobacter pylori: C-14 urea breath test in clinical practice in a general hospital. *Medicina-Buenos Aires* 1998;**58**(1):45–50.

Novis 1991 *{published data only}*

Novis BH, Gabay G, Leichtmann G, Peri M, Bernheim J, Pomeranz IS. Two point analysis 15-minute 14c-urea breath test for diagnosing Helicobacter pylori infection. *Digestion* 1991;**50**(1):16–21.

Ogata 2001 *{published data only}*

Ogata SK, Kawakami E, Patricio FR, Pedroso MZ, Santos AM. Evaluation of invasive and non-invasive methods for the diagnosis of Helicobacter pylori infection in symptomatic children and adolescents. *Sao Paulo Medical Journal* 2001;**119**(2):67–71.

Ozturk 2003 *{published data only}*

Ozturk E, Yesilova Z, Ilgan S, Arslan N, Erdil A, Celasun B, et al. A new, practical, low-dose 14c-urea breath test for the diagnosis of Helicobacter pylori infection: Clinical validation and comparison with the standard method. *European Journal of Nuclear Medicine & Molecular Imaging* 2003;**30**(11):1457–62.

Peitz 2001 *{published data only}*

Peitz U, Baumann M, Tillenburg B, Borsch G, Stolte M, Malfertheiner P, et al. Insufficient validity of a rapid blood test for diagnosis of Helicobacter pylori infection. *Medizinische Klinik* 2001;**96**(12):703–7.

Peura 1996 *{published data only}*

Peura DA, Pambianco DJ, Dye KR, Lind C, Frierson HF, Hoffman SR, et al. Microdose c-14-urea breath test offers diagnosis of Helicobacter pylori in 10 minutes. *American Journal of Gastroenterology* 1996;**91**(2):233–8.

Puspok 1999 *{published data only}*

Puspok A, Bakos S, Oberhuber G. A new, non-invasive method for detection of Helicobacter pylori: Validity in the routine clinical setting. *European Journal of Gastroenterology & Hepatology* 1999;**11**(10):1139–42.

Qadeer 2009 *{published data only}*

Qadeer AS, Kharal SA, Baig MF, Badvi JA, Durrani MA. Detection of Helicobacter pylori antigen in stool. *Journal of the Liaquat University of Medical and Health Sciences* 2009;**8** (2):126–30.

Rafeey 2007 *{published data only}*

Rafeey M, Nikvash S. Detection of Helicobacter pylori antigen in stool samples for diagnosis of infection in children. *Eastern Mediterranean Health Journal* 2007;**13**(5): 1067–72.

Rasool 2007 *{published data only}*

* Rasool S, Abid S, Jafri W. Validity and cost comparison of 14carbon urea breath test for diagnosis of H pylori in dyspeptic patients. *World Journal of Gastroenterology* 2007; **13**(6):925–9.

Rasool S, Abid S, Mumtaz K, Shah HA, Hamid S, Islam M, et al. C-14-urea breath test: A reliable and practical test in office-based diagnosis of Helicobacter pylori infection. *Helicobacter* 2005;**10**(5):525.

Rathbone 1986 *{published data only}*

Rathbone BJ, Wyatt J, Tompkins D, Heatley RV, Losowsky MS. Diagnostic IgG ELISA for gastric *campylobacter-pyloridis* infection using serum samples. *Gut* 1986;**27**(5): A607.

Safe 1993 *{published data only}*

Safe AF, Warren B, Corfield A, McNulty CA, Watson B, Mountford RA, et al. Helicobacter-pylori infection in

elderly people - correlation between histology and serology. *Age and Ageing* 1993;**22**(3):215–20.

Salles-Montaudon 2002 *{published data only}*
Salles-Montaudon N, Dertheil S, Broutet N, Gras N, Monteiro L, De Mascarel A, et al. Detecting Helicobacter pylori infection in hospitalized frail older patients: The challenge. *Journal of the American Geriatrics Society* 2002;**50**(10):1674–80.

Schilling 2001 *{published data only}*
Schilling D, Jakobs R, Peitz U, Sugilla M, Stolte M, Riemann JF, et al. The diagnostic accuracy of (13)C0urea breath test in diagnosis of Helicobacter pylori (hp) infection in patients with partial gastric resection due to peptic ulcer disease. *Gastroenterology* 1999;**116**(4 suppl):A304.
* Schilling D, Jakobs R, Peitz U, Sulliga M, Stolte M, Riemann JF, et al. Diagnostic accuracy of c-13-urea breath test in the diagnosis of Helicobacter pylori infection in patients with partial gastric resection due to peptic ulcer disease - a prospective multicenter study. *Digestion* 2001;**63**(1):8–13.

Scuderi 2000 *{published data only}*
Scuderi G, Celi D, Romagnolo M, Lupi A, Alecci L, Dramissino I, et al. Helicobacter pylori: Use of a stool antigen detection test and a six-day triple therapy [2]. *Digestive and Liver Disease* 2000;**32**(1):71–3.

Segamwenge 2014 *{published data only}*
Segamwenge IL, Kagimu M, Ocama P, Opio K. The utility of the Helicobacter pylori stool antigen test in managing dyspepsia: An experience from a low resource setting. *African Health Sciences* 2014;**14**(4):829–34.

Selcukcan 2011 *{published data only}*
Selcukcan Aydin F, Demirkiran Urganci N, Uzum Yenici FU. Comparison of methods in diagnosis of gastritis originated from Helicobacter pylori in pediatric age, and use of urea breath test as a noninvasive technique in post-treatment follow-up of the patient. *Duzce Medical Journal* 2011;**13**(1):6–14.

Sharbatdaran 2013 *{published data only}*
Sharbatdaran M, Kashifard M, Shefaee S, Siadati S, Jahed B, Asgari S. Comparison of stool antigen test with gastric biopsy for the detection of Helicobacter pylori infection. *Pakistan Journal of Medical Sciences* 2013;**29**(1):68–71.

Sheu 1998a *{published data only}*
Sheu BS, Lee SC, Lin PW, Chang YC, Yang SB, Lin XZ. Diagnostic efficacy of carbon 13 urea breath test to detect *H. pylori* in patients after gastrectomy. *Gut* 1998;**43**(Suppl 2):A57.

Sheu 1998b *{published data only}*
Sheu BS, Lee SC, Lin PW, Chang YC, Yang SB, Lin XZ. Diagnostic efficacy of carbon 13 urea breath test to detect *H. pylori* in patients after gastrectomy. *Gut* 1998;**43**(Suppl 2):A57.

Shin 2009 *{published data only}*
Shin CM, Kim N, Lee HS, Lee HE, Lee SH, Park YS, et al. Validation of diagnostic tests for Helicobacter pylori with regard to grade of atrophic gastritis and/or intestinal metaplasia. *Helicobacter* 2009;**14**(6):512–9.

Soomro 2012 *{published data only}*
* Soomro RA, Abro AK, Ujjan ID, Ibraheem Z, Farooq M. Comparison of two diagnostic methods for detection of H.pylori i.e., gastric biopsy by H&E & Giemsa and serum anti H.pylori antibodies. *Pakistan Journal of Medical and Health Sciences* 2012;**6**(3):552–4.
Soomro RA, Sheikh TA, Memon AI, Pathan NA, Qazi N. Two easy and early methods for the diagnosis of H.pylori i.e.: serum anti H.pylori antibodies and stool antigen. *Journal of the Liaquat University of Medical and Health Sciences* 2013;**12**(2):87–90.

Surveyor 1989 *{published data only}*
Surveyor I, Goodwin CS, Mullan BP, Geelhoed E, Warren JR, Murray RN, et al. The c-14-urea breath-test for the detection of gastric campylobacter-pylori infection. *Medical Journal of Australia* 1989;**151**(8):435–9.

Thobani 1995 *{published data only}*
Thobani S, Jafri SMW, Ferrell L, Perezperez GI, Hasan SH, Blaser MJ, et al. Detection of Helicobacter-pylori gastritis in Pakistan - efficacy of an IgG ELISA based on a United-States population. *Gastroenterology* 1995;**108**(4 suppl):A241.

Tiwari 2014 *{published data only}*
Tiwari BP, Nistala S, Patil SP, Kalgutkar DP, Jaychandran N, Chander H, et al. Evaluation of the c-14-urea breath test using indigenously produced c-14-urea capsules and a modified technique for trapping exhaled breath: A pilot study. *Nuclear Medicine Communications* 2014;**35**(3):325–30.

Trevisani 2005 *{published data only}*
Trevisani L, Sartori S, Rossi MR, Ruina M, Matarese V, Gullini S, et al. Evaluation of a new rapid immunoassay for the detection of Helicobacter pylori in faeces: A prospective pilot study. *Alimentary Pharmacology & Therapeutics* 2005;**21**(4):485–9.

Vandenplas 1992 *{published data only}*
Vandenplas Y, Blecker U, Devreker T, Keppens E, Nijs J, Cadranel S, et al. Contribution of the 13C-urea breath test to the detection of Helicobacter pylori gastritis in children. *Pediatrics* 1992;**90**(4):608–11.

Villalobos 1992 *{published data only}*
Villalobos Perez JJ, Sanchez Morales EO, Vargas Vorackova F, Sixtos Alonso S, Angeles Angeles A, Elizondo Rivera J, et al. Usefulness of the 14c-urea marked test in the detection of Helicobacter pylori in patients with dyspepsia. *Revista de Gastroenterologia de Mexico* 1992;**57**(3):167–71.

Wang 2008 *{published data only}*
Wang XY, Yang Y, Shi RH, Ho B, Wang HD, Zhang GX. An evaluation of a serologic test with a current infection marker of Helicobacter pylori before and after eradication therapy in Chinese. *Helicobacter* 2008;**13**(1):49–55.

Wardi 2012 *{published data only}*
Wardi J, Shalev T, Shevah O, Boaz M, Avni Y, Shirin H. A rapid continuous-real-time c-13-urea breath test for the

detection of Helicobacter pylori in patients after partial gastrectomy. *Journal of Clinical Gastroenterology* 2012;**46** (4):293–6.

Weiss 1994 ***{published data only}***
Weiss J, Mecca J, Da Silva E, Gassner D. Comparison of PCR and other diagnostic techniques for detection of *Helicobacter pylori* infection in dyspeptic patients. *Journal of Clinical Microbiology* 1994;**32**(7):1663–8.

Yan 2003 ***{published data only}***
Yan S, Lin Q, Song Y, Wang S. Detection of Helicobacter pylori stool antigen by non-invasive enzyme immunoassay. *Chinese Medical Sciences Journal* 2003;**18**(4):218–21.

Yoshimura 2001 ***{published data only}***
Yoshimura N, Tajiri H, Sawada A, Kozaiwa K, Ida S, Fujisawa T, et al. A c-13-urea breath test in children with Helicobacter pylori infection: Assessment of eradication therapy and follow-up after treatment. *Journal of Gastroenterology* 2001;**36**(9):606–11.

Yu 1999 ***{published data only}***
Yu WK, Chow PKH, Tan SY, Ng EH, Goh ASW, Soo KC, et al. Five micro-curie urea breath test for the diagnosis of Helicobacter pylori infection: Evaluation in a south-east Asian population. *Australian and New Zealand Journal of Surgery* 1999;**69**(1):37–40.

Yu 2001 ***{published data only}***
Yu FJ, Wu DC, Kuo CH, Lu CY, Su YC, Lee YC, et al. Diagnosis of Helicobacter pylori infection by stool antigen test in southern Taiwan. *Kaohsiung Journal of Medical Sciences* 2001;**17**(7):344–50.

References to studies awaiting assessment

Buhigas-Garcia 2008 ***{published data only}***
Buhigas-Garcia I, Herrero-Alonso MC, Barrio-Merino A. From laboratory to clinic: 13-c urea breath test [Test de urea marcada con carbono 13]. *Anales de Pediatria Continuada* 2008;**6**(3):155–8. appswl.elsevier.es/watermark/ctl˙servlet?˙f=10&pident˙articulo=80000328&pident˙usuario=0&pcontactid=&pident˙revista=51&ty=30&accion=L&origen=apccontinuada&web=www.apcontinuada.com&lan=es&fichero=v6n3a328pdf001.pdf&anuncioPdf=ERROR˙publi˙pdf]

Fazeli 2004 ***{published data only}***
Fazeli A, Safaei HG, Tamizifar H, Rashidi N, Medimond. Diagnosis of Helicobacter pylori infection by salivary immunoglobulin g. Immunology 2004: Immunodeficiency, Infectious Diseases, Immunomodulation, and Vaccines. 12th Annual International Congress of Immunology/ 4th Annual Conference of the Federation-of-Clinical-Immunology-Societies (FOCIS); 2004 Jul 18-23; Montreal. 2004:79–82.

Fuke 2009 ***{published data only}***
Fuke A, Kunita S, Goto K, Sugiyama F, Yagami K. Diagnosis method based on sandwich ELISA using Helicobacter hepaticus-specific monoclonal antibody. *Journal of the American Association for Laboratory Animal Science* 2009;**48** (5):634–5.

Glupczynski 1991 ***{published data only}***
Glupczynski Y, Bourdeaux L, Vantricht L, Depre M, Balegamire B, Devos D, et al. C-14-urea breath test (ubt), an efficacious tool for studying Helicobacter-pylori (hp) epidemiology in developing-countries - a study in Zaire. *Nuclear Medicine* 1991;**27**:253–5.

Karczewska 1997 ***{published data only}***
Karczewska E, Kacka K, Bielanski W, Plonka M, Zarzycki D, Konturek SJ, et al. The seroprevalence of IgG antibodies to h-pylori caga protein in asymptomatic children assessed by helico blot 2.0 and ELISA methods. *Gut* 1997;**41**:A70.

Kushch 2014 ***{published data only}***
Kushch I, Korenev N, Kamarchuk L, Pospelov A, Alexandrov Y, Kamarchuk G, et al. New possibilities in diagnosing Helicobacter pylori infection by the non-urease products of its activity. 8th World Congress of the World Society for Pediatric Infectious Diseases (WSPID); 2013 Nov 20-23; Cape Town. Bologna: MEDIMOND International, 2014:89–92.

Lappas 1997 ***{published data only}***
Lappas A, Bogdanos D, Konstantinou G, Bokolas G, Ioannidis K, Boura P, et al. The value of the saliva-dental plaque urease test in the diagnosis and treatment of Helicobacter pylori infection associated with peptic ulcer disease. *Archives of Hellenic Medicine* 1997;**14**(3):330–4.

Lee 1999a ***{published data only}***
Lee G, Chun HJ, Lee SJ, Kim KH, Jeen YT, Song CW, et al. Significance of c-13-urea breath test results: Delta(co2)-c-13 as a predictor of Helicobacter pylori density and activity of gastritis in gastric body. *Gastrointestinal Endoscopy* 1999; **49**(4):AB191–AB.

Martin-de-Argila 1997 ***{published data only}***
Martin-de-Argila C, Boixeda D, Canton R, Valdezate S, Mir N, De Rafael L, et al. Usefulness of the combined igg and iga antibody determinations for serodiagnosis of Helicobacter pylori infection. *European Journal of Gastroenterology & Hepatology* 1997;**9**(12):1191–6.

Mason 1997 ***{published data only}***
Mason CL, Wong WW. The urea breath test for Helicobacter pylori: A direct application of stable isotope mass spectrometry. *Abstracts of Papers of the American Chemical Society* 1997;**213**:274–CHED.

Thong-Ngam 2011 ***{published data only}***
Thong-Ngam D, Chayanupatkul M, Vongchampa P, Hanvivatvong O. An evaluation of a new in-house serum and urine ELISA test for detection of Helicobacter pylori infection in Thai population. *Journal of the Medical Association of Thailand* 2011;**94**(8):985–90.

Tokunaga 2005a ***{published data only}***
Tokunaga K, Tanaka A, Takahashi S. Evaluation of diagnostic method for Helicobacter pylori infection. *Nippon Rinsho [Japanese Journal of Clinical Medicine]* 2005; **63 Suppl 11**:403–8.

Xu 1995 ***{published data only}***
Xu C, Xu H, Cheng S. 14c-urea breath test in the diagnosis of Helicobacter pylori infection in the stomach. *Zhonghua*

Nei Ke Za Zhi [Chinese Journal of Internal Medicine] 1995; **34**(4):239–42.

Additional references

Abadi 2011
Abadi ATB, Taghvaei T, Wolfram L. Inefficiency of rapid urease test for confirmation of Helicobacter pylori. *Saudi Journal of Gastroenterology* 2011;**17**(1):84–5.

Abdullah 1997a
Abdullah AM, Gad el Rab MO, al Ayed I, Kambal AM, al Sohaibani M, al Mazyad AL. Helicobacter pylori infection in children in Saudi Arabia. *Tropical Gastroenterology* 1997; **18**(2):63–5.

Abdullah 1997b
Abdullah AM, Gad el Rab MO, al Ayed I, al Mazyad AS, al Sanie A. Comparison of Helicobacter pylori antibody levels in children in Riyadh. *Tropical Gastroenterology* 1997;**18**(2): 65–6.

Abdulqawi 2012
Abdulqawi K, El-Mahalaway AM, Abdelhameed A, Abdelwahab AA. Correlation of serum antibody titres with invasive methods for rapid detection of Helicobacter pylori infections in symptomatic children. *International Journal of Experimental Pathology* 2012;**93**(4):295–304.

Abu 2015
Abu Shady MM, Fathy HA, Ali A, Galal EM, Fathy GA, Sibaii H. Comparison of serum IgG antibody test with gastric biopsy for the detection of Helicobacter pylori infection among Egyptian children. *Macedonian Journal of Medical Sciences* 2015;**3**(2):303–6.

Abu-Sbeih 2014
Abu-Sbeih RS, Hawari AD, Hassawi DS, Al-Daghistani HI. Isolation and detection of Helicobacter pylori from patients suffering from peptic ulcer using biochemical tests and molecular techniques. *American Journal of Biochemistry and Biotechnology* 2014;**10**(1):58–68.

Abukhadir 1998
Abukhadir BA, Heneghan MA, Kearns M, Little CL, McCarthy CF. Evaluation of a 20 minute C-14 urea breath test for the diagnosis of Helicobacter pylori infection. *Irish Medical Journal* 1998;**91**(1):23–5.

Abut 2006
Abut E, Guveli H, Kurdas OO. Diagnostic tests used for the detection of *Helicobacter pylori*. *Sendrom* 2006;**18**(3):53–9.

Aceti 1989
Aceti A, Pennica A, Leri O, Caferro M, Grilli A, Celestino D, et al. Time-resolved fluoroimmunoassay for campylobacter pylori antibodies. *Lancet* 1989;**2**(8661):505.

Adachi 2002
Adachi K, Kawamura A, Ono M, Masuzaki K, Takashima T, Yuki M, et al. Comparative evaluation of urine-based and other minimally invasive methods for the diagnosis of Helicobacter pylori infection. *Journal of Gastroenterology* 2002;**37**(9):703–8.

Adamczyk 2013
Adamczyk M, Peczek ŁA, Rudnicki C, Nawrot B, Stec-Michalska K. The clinical significance of GastroPanel in diagnostics of Helicobacter pylori eradication efficiency in patients with dyspepsia with correlation of family history of gastric cancer. *Polski Merkuriusz Lekarski* 2013;**35**(207): 141–7.

Adamek 1994
Adamek RJ, Freitag M, Labenz J, Opferkuch W, Ruhl GH, Aygen S, et al. Modified 13C-urea breath test in the detection of Helicobacter pylori in the gastric mucosa. *Deutsche Medizinische Wochenschrift* 1994;**119** (46):1569–72.

Adamek 1995
Adamek RJ, Wegener M, Labenz J. C-12 urea breath test in Helicobacter-pylori infection of the gastric-mucosa - reply. *Deutsche Medizinische Wochenschrift* 1995;**120**(25-26):941–2.

Adamsson 2000
Adamsson I, Edlund C, Nord CE. Microbial ecology and treatment of Helicobacter pylori infections: Review. *Journal of Chemotherapy* 2000;**12**(1):5–16.

Adiloglu 2003
Adiloglu AK, Nazli C, Cicioglu-Aridogan B, Kinay O, Can R, Ergene O. Gastroduodenal Helicobacter pylori infection diagnosed by Helicobacter pylori stool antigen is related to atherosclerosis. *Acta Cardiologica* 2003;**58**(4):335–9.

Adiloglu 2007
Adiloglu AK, Isler M, Goren I, Candir O, Senol A, Onal S, et al. Quantitative correlation of Helicobacter pylori stool antigen (HpSA) test with the severity of H. pylori-related gastritis. *Tohoku Journal of Experimental Medicine* 2007;**212** (2):159–67.

Agha-Amiri 1999a
Agha-Amiri K, Mainz D, Peitz U, Kahl S, Leodolter A, Malfertheiner P. Evaluation of an enzyme immunoassay for detecting Helicobacter pylori antigens in human stool samples. *Zeitschrift Fur Gastroenterologie* 1999;**37**(12): 1145–9.

Agha-Amiri 1999b
Agha-Amiri K, Leodolter A, Peitz U, Malfertheiner P. How does the Helicobacter pylori antigen concentration in stool correlate with the urease activity in c-13-urea breath test?. *Gut* 1999;**45**(Suppl 3):A132.

Agha-Amiri 2001
Agha-Amiri K, Peitz U, Mainz D, Kahl S, Leodolter A, Malfertheiner P. A novel immunoassay based on monoclonal antibodies for the detection of Helicobacter pylori antigens in human stool. *Zeitschrift Fur Gastroenterologie* 2001;**39** (8):555–60.

Agudo 2009a
Agudo S, Alarcón T, Urruzuno P, Lopez-Brea M. Evaluation of two monoclonal-based antigen in stool enzyme immunoassay for diagnosis of *H.pylori* infection in Spanish children. *Helicobacter* 2009;**14**(4):341–2.

Agudo 2009b

Agudo S, Alarcón T, Urruzuno P, Somodevilla A, Lopez-Brea M. Evaluation of a monoclonal-based antigen in stool enzyme immunoassay for diagnosis of Helicobacter pylori infection in Spanish children. *Clinical Microbiology and Infection* 2009;**15**:S315.

Aguemon 2004

Aguemon B, Struelens M, Deviere J, Denis O, Golstein P, Nagy N, et al. Evaluation of stool antigen detection for diagnosis of Helicobacter pylori infection in adults. *Acta Clinica Belgica* 2004;**59**(5):246–50.

Aguemon 2005

Aguemon B, Struelens M, Deviere J, Denis O, Golstein P, Salmon I, et al. Primary antibiotic resistance and effectiveness of Helicobacter pylori triple therapy in ulcero-inflammatory pathologies of the upper digestive tract. *Acta Gastroenterologica Belgica* 2005;**68**(3):287–93.

Aguilar-Soto 2004

Aguilar-Soto O, Majalca-Martı́ ez C, León-Espinosa F, Avila-Vargas G, Sánchez-Medina R, Figueroa SA, et al. Comparative study between rapid urease test, imprint and histopathological study for Helicobacter pylori diagnosis. *Revista de Gastroenterologia de Mexico* 2004;**69**(3):136–42.

Ahmed 2005

Ahmed F, Murthy UK, Chey WD, Toskes PP, Wagner DA. Evaluation of the Ez-HBT Helicobacter blood test to establish Helicobacter pylori eradication. *Alimentary Pharmacology & Therapeutics* 2005;**22**(9):875–80.

Ahuja 1998

Ahuja V, Bal CS, Sharma MP. Can the c-14 urea breath test replace follow-up endoscopic biopsies in patients treated for Helicobacter pylori infection?. *Clinical Nuclear Medicine* 1998;**23**(12):815–9.

Aje 2010

Aje AO, Otegbayo JA, Odaibo GN, Bojuwoye BJ. Comparative study of stool antigen test and serology for Helicobacter pylori among Nigerian dyspeptic patients: a pilot study. *Nigerian Journal of Clinical Practice* 2010;**13**(2): 120–4.

Aksoy 2003

Aksoy DY, Aybar M, Ozaslan E, Kav T, Engin D, Ercis S, et al. Evaluation of the Helicobacter pylori stool antigen test (HpSA) for the detection of Helicobacter pylori infection and comparison with other methods. *Hepato-Gastroenterology* 2003;**50**(52):1047–9.

Aktepe 2011

Aktepe OC, Ciftci IH, Safak B, Uslan I, Dilek FH. Five methods for detection of Helicobacter pylori in the Turkish population. *World Journal of Gastroenterology* 2011;**17**(47): 5172–6.

Al-Assi 1999

Al-Assi MT, Miki K, Walsh JH, Graham DP, Asaka M, Graham DY. Noninvasive evaluation of Helicobacter pylori therapy: role of fasting or postprandial gastrin, pepsinogen i, pepsinogen ii, or serum IgG antibodies. *American Journal of Gastroenterology* 1999;**94**(9):2367–72.

Al-Humayed 2008

Al-Humayed SM, Ahmed MEK, Bello CS, Tayyar MA. Comparison of 4 laboratory methods for detection of Helicobacter pylori. *Saudi Medical Journal* 2008;**29**(4): 530–2.

Alam 2013

Alam El-Din HM, Hashem AGM, Ragab YM, Hussein IL, Mohamed DB, Mohamed ECB. Evaluation of noninvasive versus invasive techniques for the diagnosis of Helicobacter pylori infection. *Applied Immunohistochemistry and Molecular Morphology* 2013;**21**(4):326–33.

Alan 2014

Alan Selcuk N, Toklu T, Karaaslan I. Evaluation of sensitivity of post-therapeutic i-131 whole body scan on detecting Helicobacter pylori. *European Journal of Nuclear Medicine and Molecular Imaging* 2014;**41**:S594.

Alarcón-Rivera 2011

Alarcón-Rivera G, Vázquez-Jiménez G, De la Cruz-Patiño E, Abarca M, Leyva E, Delgado F, et al. Comparative analysis between breath test, serological immunoassay and rapid-urease test for detection of Helicobacter pylori infection in Mexican patients with non-investigated dyspepsia. *Revista de Gastroenterologia de Mexico* 2011;**76** (4):322–9.

Alavi 1996a

Alavi A, Kroser JA, Faigel DO, Childs M, Furth EE, Alavi A, et al. Can quantitative urea breath test for Helicobacter pylori (hp) replace endoscopic biopsy?. *Journal of Nuclear Medicine* 1996;**37**(5 Suppl):246 (abstract 1104).

Alavi 1996b

Alavi A, Faigel DO, Childs M, Furth EE, Goin J, Metz DC. Comparison of 14-urea breath test for the diagnosis of Helicobacter pylori gastritis with standard techniques. *Journal of Nuclear Medicine* 1996;**37**(5 Suppl):114 (abstract 448).

Albrecht 2012

Albrecht P, Kotowska M, Misko E, lazowska-Przeorek I, Karolewska-Bochenek K, Banaszkiewicz A, et al. Agreement of monoclonal fecal test (amplified IDEA™ hp star™) with the urease breath test, before and after the eradication treatment of H. pylori in children. *Pediatria Wspolczesna* 2012;**14**(2):79–82.

Alcalde 1994

Alcalde M, Perez Garcia JI, Sanchez P, Lancho A, Carpintero P, Pajares JM. Usefulness of the breath test with urea-13C in the diagnosis of Helicobacter pylori infection. *Medicina Clinica* 1994;**103**(10):371–3.

Alem 2002

Alem M, Alem N, Cohen H, England T, Hamedi N, Moussazadeh M, et al. Diagnostic value of detection of IgM antibodies to Helicobacter pylori. *Experimental & Molecular Pathology* 2002;**72**(1):77–83.

Alemohammad 1993
Alemohammad MM, Foley TJ, Cohen H. Detection of immunoglobulin g antibodies to Helicobacter pylori in urine by an enzyme immunoassay method. *Journal of Clinical Microbiology* 1993;**31**(8):2174–7.

Ali 1997
Ali A, Vaira D, Stanghellini V, Menegatti M, Salardi S, Landi F, et al. C-13 urea-breath test (UBT) with and without a citric acid test meal for Helicobacter pylori (hp) detection in adults and children. *Gastroenterology* 1997;**112** (4 suppl):A56.

Ali 1998
Ali A, Vaira D, Stanghellini V, Menegatti M, Landi F, Ricci C, et al. C-13 vs c-14 urea breath test (UBT) for Helicobacter pylori (hp) detection. *Gut* 1998;**43**(Suppl 2): A55–A6.

Allerberger 1996
Allerberger F, Oberhuber G, Wrba F, Puspok A, Dejaco C, Dierich MP. Detection of Helicobacter pylori infection using single serum specimens: Comparison of five commercial serological tests. *Hepato-Gastroenterology* 1996; **43**(12):1656–9.

Alpert 1989
Alpert LC, Graham DY, Evans DJ, Yoshimura HH, Hazell SL, Evans DG, et al. Diagnostic possibilities for campylobacter pylori infection. *European Journal of Gastroenterology & Hepatology* 1989;**1**(1):17–26.

Altindis 2002a
Altindis M, Dilek ON. Usefulness of the Helicobacter pylori stool antigen test for detection Helicobacter pylori infection. *Acta Gastro-Enterologica Belgica* 2002;**65**(2): 74–6.

Altindis 2002b
Altindis M, Dilek ON. Erratum: Usefullness of the Helicobacter pylori stool antigen test for detection Helicobacter pylori infection (Acta Gastro-Enterologica Belgica 2002;65:2:74-6). *Acta Gastro-Enterologica Belgica* 2002;**65**(4):246.

Altindis 2003
Altindis M, Dilek ON. Erratum: Usefullness of the Helicobacter pylori stool antigen test for detection Helicobacter pylori infection (Acta Gastro-Enterologica Beljica 2002;65(2):74-6). *Acta Gastro-Enterologica Belgica* 2003;**66**(2):195.

Amendola 2002
Amendola R, Doweck J, Katz J, Racca J, Menendez G, Schenone L, et al. A new method for detection and eradication of Helicobacter pylori infection by stool antigens test. *Acta Gastroenterologica Latinoamericana* 2002;**32**(2): 83–5.

Anania 2007
Anania C, Labalestra V, Neaga M, Ferrara E, Borrelli O, Cirulli M, et al. Evaluation of a polyclonal Helicobacter pylori stool antigen test (HpSA) for the detection of Helicobacter pylori infection in children. *Digestive and Liver Disease* 2007;**39**(10):A62.

Anania 2008
Anania C, Pacifico L, Olivero G, Osborn JF, Bonaiuto E, Chiesa C. Breath tests in pediatrics. *Clinica Chimica Acta* 2008;**397**(1-2):1–12.

Andersen 1989
Andersen LP. Campylobacter pylori antibodies measured by indirect ELISA using O-antigen. Gastroduodenal pathology and Campylobacter pylori: European Campylobacter Pylori Study Group ICS847. 1989:201–3.

Andersen 1998
Andersen LP, Kiilerick S, Pedersen G, Thoreson AC, Jorgensen F, Rath J, et al. An analysis of seven different methods to diagnose Helicobacter pylori infections. *Scandinavian Journal of Gastroenterology* 1998;**33**(1):24–30.

Anderson 1993
Anderson G, Alemohammad MM, Foley TJ, Colletti A, Patel A, Dooley CP. Rapid test for detection of antibodies to Helicobacter pylori. *Clinical Infectious Diseases* 1993;**16** (SUPPL. 4):S416–S7.

Andrews 2003
Andrews J, Marsden B, Brown D, Wong VS, Wood E, Kelsey M. Comparison of three stool antigen tests for Helicobocter pylori detection. *Journal of Clinical Pathology* 2003;**56**(10):769–71.

Ang 2007a
Ang CW, Krogfelt K, Herbrink P, Keijser J, Van Pelt W, Dalby T, et al. Validation of an enzyme-linked immunosorbent assay for the diagnosis of recent campylobacter infections in guillain-barre and reactive arthritis patients. *Zoonoses and Public Health* 2007;**54**:50.

Ang 2007b
Ang CW, Krogfelt K, Herbrink P, Keijser J, Van Pelt W, Dalby T, et al. Validation of an ELISA for the diagnosis of recent campylobacter infections in guillain-barre and reactive arthritis patients. *Clinical Microbiology & Infection* 2007;**13**(9):915–22.

Anonymous 1989
Anonymous. 14c-urea breath test for *C pylori*. *Gut* 1989;**30** (11):1656–7.

Anonymous 1996
Anonymous. Breath test for Helicobacter pylori. *WHO Drug Information* 1996;**10**(4):187.

Anonymous 1997
Anonymous. Technical annex: Tests used to assess Helicobacter pylori infection. Working party of the European Helicobacter pylori study group. *Gut* 1997;**41 Suppl 2**:S10–8.

Anonymous 2000
Anonymous. A stool test for H. pylori. *Hospital Practice* 2000;**35**(4):140.

Anonymous 2002a
Anonymous. The stool antigen test for detection of Helicobacter pylori after eradication therapy - commentary. *Annals of Internal Medicine* 2002;**136**(4):286–7.

Anonymous 2002b
Anonymous. H. pylori breath test effective. *Pharmaceutical Journal* 2002;**268**(7196):601.

Anonymous 2004
Anonymous. Which test for Helicobacter pylori in primary care?. *Drug and Therapeutics Bulletin* 2004;**42**(9):71–2.

Antico 2010
Antico A, Tozzoli R, Villalta D, Tonutti E, Tampoia M, Bizzaro N. Diagnostic efficacy of a specific serological profile for the diagnosis of chronic autoimmune gastritis. *Rivista Italiana della Medicina di Laboratorio* 2010;**6**(3):198–204.

Antoine 1995
Antoine C, Lozniewski A, De Korwin JD, Conroy MC, Feldmann L, Duprez A, et al. Comparative study of four commercial serological tests for the diagnosis of Helicobacter pylori infection. *Gastroenterologie Clinique et Biologique* 1995;**19**(2):182–8.

Antos 2005
Antos D, Crone J, Konstantopoulos N, Koletzko S. Evaluation of a novel rapid one-step immunochromatographic assay for detection of monoclonal Helicobacter pylori antigen in stool samples from children. *Journal of Clinical Microbiology* 2005;**43**(6):2598–601.

Anwar 2012
Anwar MM, Youssef AI, Sheta MI, Zaki A, Bernaba NR, el-Toukhi MA. Evaluation of specific biochemical indicators of Helicobacter pylori-associated gastric cancer in Egypt. *Eastern Mediterranean Health Journal* 2012;**18**(5):501–7.

Arboleda 2013
Arboleda RN, Schneider BG, Bravo LE, Romero-Gallo J, Peek RM Jr, Mera RM, et al. Use of the noninvasive entero-test in the detection of Helicobacter pylori in children in an endemic area in Colombia. *Journal of Pediatric Gastroenterology & Nutrition* 2013;**57**(2):192–6.

Archimandritis 2001
Archimandritis A, Giontzis A, Kourtesas D, Tzivras M, Smilakou S, Davaris P. Diagnosis of Helicobacter pylori infection with a stool assay: Is it useful after eradication treatment?. *American Journal of Gastroenterology* 2001;**96**(4):1298–9.

Arents 2001
Arents NL, Van Zwet AA, Thijs JC, De Jong A, Pool MO, Kleibeuker JH. The accuracy of the Helicobacter pylori stool antigen test in diagnosing *H. pylori* in treated and untreated patients. *European Journal of Gastroenterology & Hepatology* 2001;**13**(4):383–6.

Arents 2002
Arents NL, Van Zwet AA, Thijs JC, De Jong A, Pool MO, Kleibeuker JH. The accuracy of the Helicobacter pylori stool antigen test in diagnosing *H. pylori* in treated patients - reply. *European Journal of Gastroenterology & Hepatology* 2002;**14**(1):89–90.

Arinton 2011
Arinton IG. Adjustment of cut-off values in ELISA for detection of Helicobacter pylori infection. *Acta Medica Indonesiana* 2011;**43**(2):88–91.

Arita 1982
Arita K, Yamauchi E, Mizuno S, Maki S. Serological response to campylobacter jejuni infection: Enzyme-linked immunosorbent assay (ELISA) for detection of antibodies to campylobacter jejuni. *Kansenshogaku Zasshi [The Journal of the Japanese Association for Infectious Diseases]* 1982;**56**(7):566–73.

Arj 2012
Arj A, Ehteram H, Razavizadeh M. Efficacy of stool ag test for the non-invasive diagnosis of Helicobacter pylori infection in dyspeptic patients. *Journal of Gastroenterology and Hepatology* 2012;**27**:420.

Arora 2003
Arora U, Aggarwal A, Singh K. Comparative evaluation of conventional methods and ELISA based IgG antibodies detection for diagnosis of Helicobacter pylori infection in cases of dyspepsia. *Indian Journal of Medical Microbiology* 2003;**21**(1):46–8.

Artiko 2004
Artiko V, Obradovic V, Petrovic N, Davidovic B, Vlajkovic M, Petrovic M, et al. Breath test (c-14-urea) in the detection of Helicobacter pylori infection. *European Journal of Nuclear Medicine and Molecular Imaging* 2004;**31**:S216–S7.

Asaka 1988
Asaka M, Mitani S, Yoshida J, Saito M, Meguro T. Clinical significance of ELISA for campylobacter pylori. *Nihon Shokakibyo Gakkai Zasshi [Japanese Journal of Gastro-enterology]* 1988;**85**(4):950.

Asaki 1996
Asaki S, Yamagami H, Noda A, Tachikawa T, Osumi T, Hirao Y, et al. Phase i clinical trial of 13C-urea breath test (c-13ubt). *Japanese Journal of Clinical Pharmacology and Therapeutics* 1996;**27**(3):607–16.

Asante 1998
Asante MA, Mendall MA, Finlayson C, Ballam L, Northfield T. Screening dyspeptic patients for Helicobacter pylori prior to endoscopy: Laboratory or near-patient testing?. *European Journal of Gastroenterology & Hepatology* 1998;**10**(10):843–6.

Asfeldt 2004
Asfeldt AM, Lochen ML, Straume B, Steigen SE, Florholmen J, Goll R, et al. Accuracy of a monoclonal antibody-based stool antigen test in the diagnosis of Helicobacter pylori infection. *Scandinavian Journal of Gastroenterology* 2004;**39**(11):1073–7.

Ashraf 1999
Ashraf P, Ul Haq M, Amjad R. Assessment of 13C urea breath test's usefulness in the diagnosis of Helicobacter pylori infection. *Journal of the College of Physicians and Surgeons Pakistan* 1999;**9**(2):75–7.

Atherton 1992
Atherton JC, Hymantaylor P, Hawkey CJ, Spiller RC. Direct comparison of c-13 and low-dose c-14 as isotopic markers in the urea breath test for Helicobacter-pylori. *Gut* 1992;**33**(2):S5–S.

Atherton 1994
Atherton JC, Spiller RC. The urea breath test for Helicobacter pylori. *Gut* 1994;**35**(6):723–5.

Attallah 2004
Attallah AM, Ismail H, Ibrahim GG, Abdel-Raouf M, El-Waseef AM, Abdel-Wahab M. Use of a novel enzyme immunoassay based on detection of circulating antigen in serum for diagnosis of Helicobacter pylori infection. *Clinical & Diagnostic Laboratory Immunology* 2004;**11**(4): 775–9.

Attumi 2011
Attumi TA, Graham DY. Follow-up testing after treatment of Helicobacter pylori infections: Cautions, caveats, and recommendations. *Clinical Gastroenterology and Hepatology* 2011;**9**(5):373–5.

Aucher 1998
Aucher P, Petit ML, Mannant PR, Pezennec L, Babin P, Fauchere JL. Use of immunoblot assay to define serum antibody patterns associated with Helicobacter pylori infection and with h. Pylori-related ulcers. *Journal of Clinical Microbiology* 1998;**36**(4):931–6.

Aulia 2009
Aulia D, Manz GO, Simadibrata M. Pepsinogen i concentration in organic dyspepsia patients at Gastroenterology Division, Department of Internal Medicine, Cipto Mangunkusumo Hospital. *Acta Medica Indonesiana* 2009;**41**(3):107–14.

Auroux 1998
Auroux J, Lamarque D, Tankovic J, Benamouzig R, Mahe S, Chaumette MT, et al. Comparison of Helicobacter pylori gastric density by culture, histology and c-13 urea breath test. *Gastroenterologie Clinique et Biologique* 1998;**22**(4): 407–12.

Aziz 2014
Aziz F, Sherwani SK, Akhtar SS, Kazmi SU. Development of an in-house enzyme-linked immunosorbent assay based on surface whole cell antigen for diagnosis of Helicobacter pylori infection in patients with gastroduodenal ulcer disease. *World Journal of Microbiology & Biotechnology* 2014; **30**(1):305–15.

Bakka 2002
Bakka AS, El-Gariani AB, AbouGhrara FM, Salih BA. Frequency of Helicobacter pylori infection in dyspeptic patients in Libya. *Saudi Medical Journal* 2002;**23**(10): 1261–5.

Balcilar 2012
Balcilar E, Karsidag T, Tuzun S. Relaibility of Helicobacter antigen in stool for screening. *Medical Bulletin of Haseki* 2012;**50**(3):89–92.

Ballam 1998
Ballam L, Mendall MA, Morris J, Strachan D, Whincup P, Cook D. Western blotting (wb) is useful in the salivary diagnosis of h-pylori infection. *Gastroenterology* 1998;**114** (4 suppl):A64.

Ballam 2000a
Ballam LD, Mendall MA, Asante M, Morris J, Strachan DP, Whincup PH, et al. Western blotting is useful in the salivary diagnosis of Helicobacter pylori infection.[Erratum appears in J Clin Pathol 2000;53(9):725]. *Journal of Clinical Pathology* 2000;**53**(4):314–7.

Ballam 2000b
Ballam LD, Mendall MA, Asante. Erratum: Western blotting is useful in the salivary diagnosis of Helicobacter pylori infection (Journal of clinical pathology 2000;53:314-7). *Journal of Clinical Pathology* 2000;**53**(9):725.

Balon 1997
Balon HR, Roff E, Dworkin HJ. Capsule-based c-14 urea breath test for Helicobacter pylori: Early experience and comparison with liquid-based test. *Journal of Nuclear Medicine* 1997;**38**(5 Suppl):Abstract 1092.

Baqai 2003
Baqai R, Qureshi H, Arian G, Mehdi I. Diagnostic efficacy of stool antigen test (HPSA), clo test and serology for the detection of Helicobacter pylori infection. *Journal of Ayub Medical College, Abbottabad: JAMC* 2003;**15**(4):34–6.

Baranskaia 2006
Baranskaia EK, Ivashkin VT, Lapshin AV, Stepanov EV, Zyrianov PV. The diagnostic significance of laser 13C-urea breath test in various Helicobacter pylori-associated diseases. *Klinicheskaia Meditsina* 2006;**84**(8):47–50.

Barbosa 2003
Barbosa J, Dinis-Ribeiro M, Guilherme M, Filipe T, Lomba-Viana R, Guimaraes MA, et al. Use of Helicobacter pylori-specific antibodies in the evaluation of intestinal metaplasia and gastric dysplasia. *British Journal of Biomedical Science* 2003;**60**(4):175–9.

Barthel 1990
Barthel JS, Everett ED. Diagnosis of campylobacter pylori infections: The "gold standard" and the alternatives. *Reviews of Infectious Diseases* 1990;**12 Suppl 1**:S107–14.

Baryshnikova 2009
Baryshnikova NV. Actual problems of Helicobacteriosis diagnostics. *Eksperimental'naia i Klinicheskaia Gastroenterologiia [Experimental & Clinical Gastroenterology]* 2009;**2**:50–6.

Baryshnikova 2012
Baryshnikova NV, Uspenskiy YP, Smirnova AS, Dmitrienko MA, Bykov SE. Helicobacter pylori in oral cavity in patients with chronic gastritis. *Helicobacter* 2012;**17**:90.

Baryshnikova 2013
Baryshnikova NV, Belousova LN, Smirnova AS, Tsopanova EE, Loeva IA, Orlov OY, et al. Breath ammonium test in diagnostic of Helicobacter pylori infection. *Helicobacter* 2013;**18**:124.

Baryshnikova 2014
Baryshnikova NV, Belousova LN, Loeva IA, Kudryavtseva AS, Shehman AV, Yakovleva JS. Comparative analysis of efficacy of noninvasive ammonium "helic-test" and

histological method in diagnostic of Helicobacter pylori infection. *Helicobacter* 2014;**19**:122.

Basinska 2005

Basinska T, Wisniewska M, Chmiela M. Principle of a new immunoassay based on electrophoretic mobility of poly (styrene/alpha-tert-butoxy-omega-vinylbenzyl-polyglycidol) microspheres: Application for the determination of Helicobacter pylori igg in blood serum. *Macromolecular Bioscience* 2005;**5**(1):70–7.

Bassler 1992

Bassler HMS, Dreher RM, Wolf K. Isolation of h. Pylori proteins and their availability in serological tests. *Immunitat und Infektion* 1992;**20**(3):103–6.

Basso 1999

Basso D, Stefani A, Brigato L, Navaglia F, Greco E, Zambon CF, et al. Serum antibodies anti-h. Pylori and anti-caga: A comparison between four different assays. *Journal of Clinical Laboratory Analysis* 1999;**13**(4):194–8.

Bateson 1991

Bateson MC, Ching CK, Loffeld RJLF, Arends JW, Stobberingh E. Screening for Helicobacter pylori in dyspepsia [comment]. *Lancet* 1991;**338**(8763):393–4.

Bateson 2001

Bateson MC. Quadruple therapy for symptomatic spontaneous duodenal ulcer disease. *Postgraduate Medical Journal* 2001;**77**(909):447–50.

Bathe 1996

Bathe OF, Rae AJ, Zetler P, Cleator IGM. Validation of a new saliva test for Helicobacter pylori infection. *Canadian Journal of Gastroenterology* 1996;**10**(2):93–6.

Bauernfeind 1989

Bauernfeind A, Przyklenk B, Horl G, Otto U. Representative campylobacter pylori antigen for IgG-ELISA and diagnostic significance of antibody titres. Gastroduodenal pathology and Campylobacter pylori. The first meeting of the European Campylobacter Pylori Study Group ICS847; 1989. 1989:185–8.

Bazaz 2005

Bazaz RD, Khalaj A, Beiki D, Eftekhari M, Hosein MHAS, Khoshayand MR. Microdose 14c urea breath test for the diagnosis of Helicobacter pylori: A survey in Iranian population. *Daru* 2005;**13**(1):6–10.

Bazzoli 1994

Bazzoli F, Zagari RM, Pozzato P, Fossi S, Alampi G, Sottili S, et al. C-13-urea breath test to quantify Helicobacter-pylori colonization of gastric-mucosa and association with severity of inflammation. *Gastroenterology* 1994;**106**(4 suppl):A48.

Bazzoli 1995

Bazzoli F, Zagari RM, Pozzato P, Fossi S, Simoni P, Roda A, et al. The c-13-urea breath test to evaluate the effect of antisecretory drugs on Helicobacter-pylori. *Gastroenterology* 1995;**108**(4 suppl):A57.

Bazzoli 1996

Bazzoli F, Cecchini L, Corvaglia L, Antonia MD, Libera MD, DeGiacomo C, et al. The c-13-urea breath test for the diagnosis of Helicobacter pylori infection in children. *Gastroenterology* 1996;**110**(4 Suppl):A60.

Bazzoli 1997a

Bazzoli F, Zagari RM, Festi D, Palli D, Pozzato P, Sottili S, et al. A population based study of Helicobacter pylori infection .2. Uprevalence by c-13-urea breath test and association with family history of peptic ulcer and gastric cancer. *Gut* 1997;**41**(Suppl):A106.

Bazzoli 1997b

Bazzoli F, Zagari M, Fossi S, Pozzato P, Ricciardiello L, Mwangemi C, et al. Urea breath tests for the detection of Helicobacter pylori infection. *Helicobacter* 1997;**2 Suppl 1**: S34–7.

Bazzoli 1998

Bazzoli F, Zagari M, Pozzato P, Fossi S, Ricciardiello GL, Nicolini G, et al. Diagnosis of Helicobacter pylori infection: Non-invasive diagnostic tests. *Italian Journal of Gastroenterology & Hepatology* 1998;**30**(suppl 3):S313–4.

Bazzoli 1999

Bazzoli F, Zagari RM, Pozzato P, Fossi S, Ricciardiello L, De Luca L, et al. Helicobacter pylori: Optimum diagnosis and test of cure. *Journal of Chemotherapy* 1999;**11**(6):601–5.

Bazzoli 2000

Bazzoli F, Cecchini L, Corvaglia L, Dall'Antonia M, De Giacomo C, Fossi S, et al. Validation of the 13C-urea breath test for the diagnosis of Helicobacter pylori infection in children: A multicenter study. *American Journal of Gastroenterology* 2000;**95**(3):646–50.

Befrits 1993

Befrits R, Granstrom M, Rylander M, Rubio C. Helicobacter pylori in 205 consecutive endoscopy patients. *Scandinavian Journal of Infectious Diseases* 1993;**25**(2): 185–91.

Beiki 2005

Beiki D, Khalaj A, Dowlatabadi R, Eftekhari M, Hossein MHAS, Fard A, et al. Validation of 13C-urea breath test with non dispersive isotope selective infrared spectroscopy for the diagnosis of *Helicobacter pylori* infection: A survey in Iranian population. *Daru* 2005;**13**(2):52–5.

Bekmen 2008

Bekmen N, Demiray E, Gonen C, Dolek D, Soyturk M, Sagol O, et al. Determination of *H. pylori* antigenic frequency by western blot technique in adult patients with dyspepsia. *Helicobacter* 2008;**13**(5):452.

Bell 1987

Bell GD, Weil J, Harrison G, Morden A, Jones PH, Gant PW, et al. 14c-urea breath analysis, a non-invasive test for campylobacter pylori in the stomach. *Lancet* 1987;**1**(8546): 1367–8.

Bell 1991

Bell GD, Powell K, Weil J, Harrison G, Brookes S, Prosser S. 13C-urea breath test for *Helicobacter pylori* infection. *Gut* 1991;**32**(5):551–2.

Bellon 2004
Bellon M. The urea breath test. *ANZ Nuclear Medicine* 2004;**35**(2):104–7.

Bener 2002
Bener A, Uduman SA, Ameen A, Alwash R, Pasha MA, Usmani MA, et al. Prevalence of *Helicobacter pylori* infection among low socio-economic workers. *Journal of Communicable Diseases* 2002;**34**(3):179–84.

Benito 1999
Benito LM, Sara S, Gisbert JP, Vasquez MA, Jimenez I, Pajares JM. C-13-urea breath test for the diagnosis of *H-pylori* infection: Are basal samples necessary?. *Gut* 1999;**45** (Suppl 3):A125–A6.

Benjamin 2012
Benjamin YC, Feng Z, Ho KY, Christopher K, Lim LG, So JB, et al. Risk stratification for gastric cancer using serum pepsinogen and *Helicobacter pylori* serology in a Chinese population. *Gastroenterology* 2012;**142**(5 (Suppl)):S631.

Bennedsen 1998
Bennedsen M, Lehn N, Morgner A, Bayerdorffer E, Andersen LP. Development of a *Helicobacter heilmanii* specific ELISA. *Gut* 1998;**43**(Suppl 2):A115–A6.

Bennett 2006
Bennett K, Feely J, Thornton O, Dobson M, O'Morain CA, O'Connor HJ. Impact of *Helicobacter pylori* on the management of dyspepsia in primary care. *Alimentary Pharmacology & Therapeutics* 2006;**24**(4):637–41.

Berger 2002
Berger A. *Helicobacter pylori* breath tests. *BMJ* 2002;**324** (7348):1263.

Bergey 2003
Bergey B, Marchildon P, Peacock J, Megraud F. What is the role of serology in assessing *Helicobacter pylori* eradication?. *Alimentary Pharmacology & Therapeutics* 2003;**18**(6):635–9.

Bergmann 1997
Bergmann WL. Diagnosis and therapy of*Helicobacter pylori* infections in adults. *Deutsche Medizinische Wochenschrift* 1997;**122**(11):348–9.

Berker 2003
Berker B, Soylemez F, Cengiz SD, Kose SK. Serologic assay of *Helicobacter pylori* infection - is it useful in hyperemesis gravidarum?. *Journal of Reproductive Medicine* 2003;**48**(10): 809–12.

Bermejo 2000a
Bermejo San Jose F, Boixeda de Miguel D, Gisbert JP, Martin de Argila de Prados C, Sanz Sacristan JM, Defarges Pons V, et al. Efficacy of four widely used techniques of the diagnosis of *Helicobacter pylori* infection in gastric ulcer disease. *Revista Clinica Española* 2000;**200**(9):475–9.

Bermejo 2000b
Bermejo F, Boixeda D, Gisbert JP, Sanz JM, Canton R, Defarges V, et al. Concordance between noninvasive tests in detecting *Helicobacter pylori* and potential use of serology for monitoring eradication in gastric ulcer. *Journal of Clinical Gastroenterology* 2000;**31**(2):137–41.

Bermejo 2002
Bermejo F, Boixeda D, Gisbert JP, Defarges V, Sanz JM, Redondo C, et al. Rapid urease test utility for *Helicobacter pylori* infection diagnosis in gastric ulcer disease. *Hepato-Gastroenterology* 2002;**49**(44):572–5.

Berning 2009
Berning M, Krasz S, Schneider-Brachert W, Madisch A, Laass MW, Knoth H, et al. Randomized multicenter study of esomeprazole, moxifloxacin and amoxicillin for second-line or rescue treatment of *Helicobacter pylori* infection - impact of treatment duration. *Gastroenterology* 2009;**136**(5 (suppl)):A150.

Bertschinger 1992
Bertschinger P, Brunner J, Flury R, Lammer F, Jost R, Hacki WH. Comparison of effectiveness of omeprazole/bismuth subcitrate and triple therapy in *Helicobacter pylori* gastritis. *Schweizerische Medizinische Wochenschrift* 1992;**122**(39): 1446–51.

Besherdas 2000
Besherdas K, Oben JA, Beck ER, Vicary FR, Wong VS. What proportion of dyspeptic patients having *H. pylori* breath test subsequently undergo endoscopy?. *Gut* 2000;**46** (Suppl 2):A52.

Bessede 2011
Bessede E, Delcamp A, Sifre E, Buissonniere A, Megraud F. New methods for detection of campylobacters in stool samples in comparison to culture. *Journal of Clinical Microbiology* 2011;**49**(3):941–4.

Best 1992
Best LM, Van Zanten SJOV, Bezanson GS, Haldane DJM, Malatjalian DA. Serological detection of *Helicobacter pylori* by a flow microsphere immunofluorescence assay. *Journal of Clinical Microbiology* 1992;**30**(9):2311–7.

Best 1994
Best LM, Van Zanten SJOV, Sherman PM, Bezanson GS. Serological detection of *Helicobacter pylori* antibodies in children and their parents. *Journal of Clinical Microbiology* 1994;**32**(5):1193–6.

Beynon 2013
Beynon R, Leeflang MM, McDonald S, Eisinga A, Mitchell RL, Whiting P, et al. Search strategies to identify diagnostic accuracy studies in MEDLINE and EMBASE. *Cochrane Database of Systematic Reviews* 2013, Issue 9. [DOI: 10.1002/14651858.MR000022.pub3

Bhewa 2007
Bhewa Y, Hilmi I, Cheah PL, Navaratnam P, Goh KL. Evaluation of the monoclonal stool antigen test for *Helicobacter pylori* in an asian population with dyspepsia. *Journal of Digestive Diseases* 2007;**8**(4):207–10.

Bielanski 1996a
Bielanski W, Konturek SJ, Dobrzanska MJ, Pytko-Polonczyk J, Sito E, Marshall BJ. Microdose 14c-urea breath test in detection of *Helicobacter pylori*. *Journal of Physiology & Pharmacology* 1996;**47**(1):91–100.

Bielanski 1996b
Bielanski W, Pytko J, Konturek SJ, Sito E, Marshall J. Usefulness of c-14-urea breath test in detection of *Helicobacter pylori* associated gastric diseases. *Gastroenterology* 1996;**110**(4 (suppl)):A65.

Bielanski 1996c
Bielanski W, Konturek SJ. New approach to 13C-urea breath test: Capsule-based modification with low-dose of 13C-urea in the diagnosis of *Helicobacter pylori* infection. *Journal of Physiology & Pharmacology* 1996;**47**(3):545–53.

Bielanski 1997a
Bielanski W, Plonka M, Dobrzanska M, Kaminska A, Konturek SJ. Screening of *H-pylori* (HP) infection in adult population of Krakow, Poland using modified capsulated urea breath test. *Gut* 1997;**41**(Suppl):A37–A8.

Bielanski 1997b
Bielanski W, Dobrzanska J, Kaminska A, Plonka M, Sito E, Konturek SJ. Validation of new low dose and low cost c-13-urea breath test in the diagnosis for *Helicobacter pylori*. *Gastroenterology* 1997;**112**(4 (suppl)):A72.

Bielanski 1998
Bielanski W, Bobrzynski A, Kostarczyk W, Karczewska E, Gedliczka O, Konturek SJ. Usefulness of capsulated low dose c-13-urea breath test in diagnosing h-pylori infection in patients with upper gastrointestinal bleeding. *Gut* 1998; **43**(Suppl 2):A54–A5.

Bielanski 1999
Bielanski W, Dobrzanska M, Jakuszewska B, Kaminska A, Plonka M, Konturek SJ. Ethanol as confounding factor in detection of *Helicobacter pylori* (HP) by c-13-urea breath test. *Gastroenterology* 1999;**116**(4 (suppl)):A123.

Bielanski 2000
Bielanski W, Loster BW, Plonka M, Dobrzanska M, Kaminska A, Majewski S, et al. Incidence of *H-pylori* (HP) infection in Polish endoscopists and dentists: Results of field survey with capsulated c-13-urea breath test (ubt). *Gut* 2000;**47**(Suppl 1):A50.

Biemond 1997
Biemond I, Veenendaal RA, Lamers C. Rapid diagnostic test for antibodies to *Helicobacter pylori* in comparison with the ELISA technique. *Gut* 1997;**41**(suppl):A159.

Bilal 2007
Bilal R, Khaar B, Qureshi TZ, Mirza SA, Ahmad T, Latif Z, et al. Accuracy of non-invasive 13C-urea breath test compared to invasive tests for *Helicobacter pylori* detection. *Journal of the College of Physicians & Surgeons - Pakistan* 2007;**17**(2):84–8.

Bilardi 2002
Bilardi C, Biagini R, Dulbecco P, Iiritano E, Gambaro C, Mele MR, et al. Stool antigen assay (HPSA) is less reliable than urea breath test for post-treatment diagnosis of *Helicobacter pylori* infection. *Alimentary Pharmacology & Therapeutics* 2002;**16**(10):1733–8.

Billaud 1996
Billaud N, Morali A, Conroy MJ, Floquet J. *Helicobacter pylori* infection in pediatric patients. A review of twenty-three cases. *Annales De Pediatrie* 1996;**43**(4):281–7.

Bindayna 2006
Bindayna K, Al Baker W, Botta G. Detection of *Helicobacter pylori* caga gene in gastric biopsies, clinical isolates and faeces. *Indian Journal of Medical Microbiology* 2006;**24**(3): 195–200.

Birkenfeld 2004
Birkenfeld S, Keter D, Dikman R, Shevah O, Shirin H, Niv Y. Prevalence of *Helicobacter pylori* infection in health-care personnel of primary care and gastroenterology clinics. *Journal of Clinical Gastroenterology* 2004;**38**(1):19–23.

Bjorneklett 1989
Bjorneklett A, Fausa O, Nedenskovsorensen P, Bukholm G, Aase S. The c-14 urea breath test in the diagnosis of *Campylobacter-pylori* infection. *Gastroduodenal Pathology and Camphylobacter pylori* 1989;**847**:65–8.

Blairon 2009
Blairon L, Souayah H, Moens C, Dediste A, Vandenberg O. Comparison of 6 rapid assays for detection of *Helicobacter pylori* antigen in stool in children with recurrent abdominal pain - preliminary data. *Clinical Microbiology and Infection* 2009;**15**:S315.

Blancas 2004
Blancas Valencia JM. Importance of *Helicobacter pylori* diagnosis. *Revista de Gastroenterologia de Mexico* 2004;**69** (3):186–7.

Blanco 2008
Blanco S, Forne M, Lacoma A, Prat C, Cuesta MA, Latorre I, et al. Comparison of stool antigen immunoassay methods for detecting *Helicobacter pylori* infection before and after eradication treatment. *Diagnostic Microbiology & Infectious Disease* 2008;**61**(2):150–5.

Blanco 2009
Blanco S, Forne M, Lacoma A, Prat C, Cuesta MA, Fuenzalida L, et al. Evaluation of a latex agglutination test (pylogen) for the detection of *Helicobacter pylori* in stool specimens. *Diagnostic Microbiology & Infectious Disease* 2009;**63**(4):349–53.

Blashenkov 2013
Blashenkov NM, Sheshenya ES, Solov'ev SM, Sachenko VD, Gall LN, Zarutskii IV, et al. A specialized isotope mass spectrometer for noninvasive diagnostics of *Helicobacter pylori* infection in human beings. *Technical Physics Letters* 2013;**39**(5):431–4.

Bleau 1998
Bleau BL, Van Zanten SV, Best L, Hutchison D, Blevins J, Thee D. Determination of eradication of *Helicobacter pylori* (*HP*) by the *HP* stool antigen test (*HP*SAT). *Gut* 1998;**43** (Suppl 2):A50.

Blecker 1992a
Blecker U, Vandenplas Y. *Helicobacter pylori* seropositivity in symptom-free children. *Lancet* 1992;**339**(8808):1537.

Blecker 1992b
Blecker U, Lanciers S, Peeters S, Vandenplas Y. *Helicobacter pylori* infections in children. *Tijdschrift voor Kindergeneeskunde* 1992;**60**(2):35–9.

Blecker 1993a
Blecker U, Keymolen K, Levy J, Vandenplas Y. Low prevalence of *Helicobacter pylori* in the acquired immunodeficiency syndrome. *American Journal of Gastroenterology* 1993;**88**(8):1294.

Blecker 1993b
Blecker U, Lanciers S, Hauser B. Validation of a new serologic test for the detection of *Helicobacter pylori*. *Acta Gastroenterologica Belgica* 1993;**56**(5-6):309–14.

Blecker 1993c
Blecker U, Lanciers S, Hauser B, Vandenplas Y. Diagnosis of *Helicobacter pylori* infection in adults and children by using the malakit *Helicobacter pylori*, a commercially available enzyme-linked immunosorbent assay. *Journal of Clinical Microbiology* 1993;**31**(7):1770–3.

Blecker 1993d
Blecker U, Lanciers S, Hauser B, Vandenplas Y. Positive and negative titres of a new serologic test for the detection of *Helicobacter pylori*. *European Journal of Gastroenterology & Hepatology* 1993;**5**(8):631–4.

Blecker 1993e
Blecker U, Vandenplas Y. *Helicobacter pylori* serology. *Journal of Clinical Microbiology* 1993;**31**(1):173.

Blecker 1993f
Blecker U, Vandenplas Y, Taha AS, Russell RI. Serological diagnosis of *Helicobacter pylori*. *Gut* 1993;**34**(10):1467.

Blecker 1993g
Blecker U, Hauser B, Lanciers S, Peeters S, Suys B, Vandenplas Y. The prevalence of *Helicobacter pylori*-positive serology in asymptomatic children. *Journal of Pediatric Gastroenterology and Nutrition* 1993;**16**(3):252–6.

Blecker 1994a
Blecker U, Lanciers S, Mehta DI, Vandenplas Y. The sensitivity and specificity of a recent generation serum ELISA test for the detection of *Helicobacter-pylori* specific IgG antibodies compared to the c-13-urea breath test. *Gastroenterology* 1994;**106**(4 (suppl)):A54.

Blecker 1994b
Blecker U, Vandenplas Y. Usefulness of specific IgM in the diagnosis of *Helicobacter pylori* infection. *Pediatrics* 1994;**93**(2):342–3.

Blecker 1994c
Blecker U, Vandenplas Y, Blecker U, Lanciers S, Mehta DI. Concordance between serology and 13C-urea breath test in the diagnosis of *Helicobacter pylori* infection. *American Journal of Gastroenterology* 1994;**89**(3):459.

Blecker 1994d
Blecker U, Keymolen K, Lanciers S, Bahwere P, Souayah H, Levy J, et al. The prevalence of *Helicobacter pylori* positivity in human immunodeficiency virus-infected children. *Journal of Pediatric Gastroenterology & Nutrition* 1994;**19**(4):417–20.

Blecker 1995a
Blecker U, Lanciers S, Hauser B, Mehta DI, Vandenplas Y. Serology as a valid screening test for *Helicobacter pylori* infection in asymptomatic subjects. *Archives of Pathology & Laboratory Medicine* 1995;**119**(1):30–2.

Blecker 1995b
Blecker U, Lanciers S, Hauser B, De Pont SM, Vandenplas Y. The contribution of specific immunoglobulin m antibodies to the diagnosis of *Helicobacter pylori* infection in children. *European Journal of Gastroenterology & Hepatology* 1995;**7**(10):979–83.

Blum 1997
Blum AL, Bayerdorffer E, Borsch G, Classen M, Creutzfeldt W, Hotz J, et al. The *Helicobacter* revolution .2. Diagnosis and therapy. *Leber Magen Darm* 1997;**27**(4):241–6.

Bode 1998
Bode G, Rothenbacher D, Brenner H, Adler G. Variation in the 13C-urea breath test value by nationality in *Helicobacter pylori*-infected children. *Scandinavian Journal of Gastroenterology* 1998;**33**(5):468–72.

Bode 2000
Bode G, Hoffmeister A, Koenig W, Brenner H, Rothenbacher D. Extent and determinants of differences in *Helicobacter pylori* serology and c-13-urea breath test in an asymptomatic sample of blood donors. *Gut* 2000;**47**(Suppl 1):A121.

Bode 2001
Bode G, Hoffmeister A, Koenig W, Brenner H, Rothenbacher D. Characteristics of differences in *Helicobacter pylori* serology and c-13-urea breath-testing in an asymptomatic sample of blood donors. *Scandinavian Journal of Clinical & Laboratory Investigation* 2001;**61**(8):603–8.

Bode 2002
Bode G, Marchildon P, Peacock J, Brenner H, Rothenbacher D. Diagnosis of *Helicobacter pylori* infection in children: Comparison of a salivary immunoglobulin g antibody test with the c-13 urea breath test. *Clinical and Diagnostic Laboratory Immunology* 2002;**9**(2):493–5.

Bodger 1999
Bodger K, Wyatt JI, Heatley RV. Serologic screening before endoscopy: The value of *Helicobacter pylori* serology, serum recognition of the caga and vaca proteins, and serum pepsinogen i. *Scandinavian Journal of Gastroenterology* 1999;**34**(9):856–63.

Bodhidatta 1993
Bodhidatta L, Hoge CW, Churnratanakul S, Nirdnoy W, Sampathanukul P, Tungtaem C, et al. Diagnosis of *Helicobacter pylori* infection in a developing country: Comparison of two ELISAs and a seroprevalence study. *Journal of Infectious Diseases* 1993;**168**(6):1549–53.

Bohn 1994
Bohn I, Teufel M, Niessen KH. *Helicobacter pylori* causing chronical stomach-ache in childhood. *Monatsschrift fur Kinderheilkunde* 1994;**142**(4):269–71.

Bojko 1997
Bojko JB, Braden B, Lembcke B, Stolte M, Burlage M, Folsch UR, et al. C-13-urea breath test correlates with the hp corpus colonization score in *Helicobacter pylori* - infected patients. *Gastroenterology* 1997;**112**(4 (suppl)):A75.

Bolton 1989a
Bolton FJ, Hutchinson DN, Hinchiliffe PM, Holt AV. Distribution in various clinical groups of antibody to *C. pylori* detected by enzyme-linked immunosorbent assay, complement fixation and microagglutination tests. *Serodiagnosis and Immunotherapy in Infectious Disease* 1989; **3**(1):41–50.

Bolton 1989b
Bolton FJ, Hutchinson DN. Evaluation of three *Campylobacter pylori* antigen preparations for screening sera from patients undergoing endoscopy. *Journal of Clinical Pathology* 1989;**42**(7):723–6.

Bolton 1997
Bolton FJ, Wareing DRA, Sails AD. Comparison of a novel microaerobic system with three other gas-generating systems for the recovery of *Campylobacter* species from human faecal samples. *European Journal of Clinical Microbiology and Infectious Diseases* 1997;**16**(11):839–42.

Bommelaer 2001
Bommelaer G, Des Varannes SB, Flejou JF, Matysiak T, Poynard T, Richard A, et al. Caga status and virulence of *Helicobacter pylori* strains. Results of a French multicentric prospective study. *Gastroenterologie Clinique et Biologique* 2001;**25**(12):1084–9.

Bonamico 2004
Bonamico M, Strappini PM, Bonci E, Ferri M, Crisogianni M, Guido M, et al. Evaluation of stool antigen test, PCR on oral samples and serology for the noninvasive detection of *Helicobacter pylori* infection in children. *Helicobacter* 2004; **9**(1):69–76.

Bongermino 2010
Bongermino MP, Ruggero V, Cristallo V, Bonfrate L, Santantonio M, Mola A, et al. Evaluation of non-invasive methods for the diagnosis of *Helicobacter pylori* infection. *European Journal of Clinical Investigation* 2010;**40**:67.

Booka 2005
Booka M, Okuda M, Shin K, Miyashiro E, Hayashi H, Yamauchi K, et al. Polymerase chain reaction-restriction fragment length polymorphism analysis of clarithromycin-resistant *Helicobacter pylori* infection in children using stool sample. *Helicobacter* 2005;**10**(3):205–13.

Bordin 2013
Bordin DS, Berezina OI, Kim VA, Orobey YA, Patrushev NB. Diagnosis of *H. pylori* infection in routine clinical practice in Russia. *Helicobacter* 2013;**18**:122.

Bornschein 2011
Bornschein J, Selgrad M, Malfertheiner P. *Helicobacter pylori* - diagnosis and treatment. *MMW-Fortschritte der Medizin* 2011;**153**(38):58–61.

Borody 2012
Borody T, Wettstein A, Finlayson S, Torres M, Campbell J, Nowak A. Diagnostic value of fundic red spots in *Helicobacter pylori* (HP) infection. *American Journal of Gastroenterology* 2012;**107**:S59.

Borody 2013
Borody TJ, Wettstein AR, Benstock S, Nowak A, Finlayson SJ, Campbell J. Superior diagnosis of *H. pylori* infection with 14c-urea helicaptm capsules versus standard pytest capsules. *Gastroenterology* 2013;**144**(5 (suppl 1)):S214–S5.

Boudjella 2009
Boudjella MEA, Matougui N, Tebaibia A, Oumnia N, Lahcene M, Mouffok F, et al. Evaluation of C-13-urea breath test in determining *H. pylori* status after treatment: About 197 cases. *Helicobacter* 2009;**14**(4):343.

Boukthir 2005
Boukthir S, Mazigh S, Fendri C, Kalach N, Barsaoui S. Evaluation of a non-invasive test for detection of *Helicobacter pylori* antigen in stool from children. *Archives de Pediatrie* 2005;**12**(1):85–7.

Boyanova 2003
Boyanova L, Koumanova R, Lazarova E, Jelev C. *Helicobacter pylori* and *Helicobacter heilmannii* in children. A Bulgarian study. *Diagnostic Microbiology & Infectious Disease* 2003;**46**(4):249–52.

Boyanova 2013
Boyanova L, Ilieva Y, Vladimirov B, Gergova G, Nikolov R, Spasova Z, et al. The rate of *Helicobacter pylori* in adult patients with the 13C urea breath test. *General Medicine* 2013;**15**(4):22–5.

Braden 1991
Braden B, Lembcke B, Caspary WF. Stable isotopes in diagnosis and research. *Deutsche Medizinische Wochenschrift* 1991;**116**(45):1721–7.

Braden 1992
Braden B, Lembcke B, Caspary WF. Diagnosis of *Helicobacter-pylori*. *Innere Medizin* 1992;**19**(3):103–7.

Braden 1993
Braden B, Klutz M, Lembcke B, Caspary WF. C-13 urea breath test for *Helicobacter-pylori* - optimal timing of breath sample collection. *Gastroenterology* 1993;**104**(4 (suppl)): A45.

Braden 1994a
Braden B, Haisch M, Duan LP, Lembcke B, Caspary WF, Hering P. Clinically feasible stable isotope technique at a reasonable price: Analysis of 13Co2/12co2-abundance in breath samples with a new isotope selective-nondispersive infrared spectrometer. *Zeitschrift fur Gastroenterologie* 1994; **32**(12):675–8.

Braden 1994b
Braden B, Duan LP, Caspary WF, Lembcke B. More convenient 13C-urea breath test modifications still meet the

criteria for valid diagnosis of *Helicobacter pylori* infection. *Zeitschrift fur Gastroenterologie* 1994;**32**(4):198–202.

Braden 1996
Braden B, Schafer F, Caspary WF, Lembcke B. Nondispersive isotope-selective infrared spectroscopy: A new analytical method for 13C-urea breath tests. *Scandinavian Journal of Gastroenterology* 1996;**31**(5):442–5.

Braden 1997
Braden B, Duan LP, Caspary WF, Lembcke B. Endoscopy is not a risk factor for *Helicobacter pylori* infection - but medical practice is. *Gastrointestinal Endoscopy* 1997;**46**(4): 305–10.

Braden 1999
Braden B, Caspary WF, Lembcke B. Nondispersive infrared spectrometry for (co2)-c-13/(co2)-c-12-measurements: A clinically feasible analyzer for stable isotope breath tests in gastroenterology. *Zeitschrift fur Gastroenterologie* 1999;**37** (6):477–81.

Braden 2000a
Braden B. New faecal antigen test noninvasively detects *Helicobacter pylori* infection. *Biomedicine and Pharmacotherapy* 2000;**54**(7):416–7.

Braden 2000b
Braden B, Posselt HG, Ahrens P, Kitz R, Dietrich CF, Caspary WF. New immunoassay in stool provides an accurate noninvasive diagnostic method for *Helicobacter pylori* screening in children. *Pediatrics* 2000;**106**(1 Pt 1): 115–7.

Braden 2000c
Braden B, Teuber G, Dietrich CF, Caspary WF, Lembcke B. Comparison of new faecal antigen test with c-13-urea breath test for detecting *Helicobacter pylori* infection and monitoring eradication treatment: Prospective clinical evaluation. *BMJ* 2000;**320**(7228):148.

Braden 2001a
Braden B, Gelbmann C, Dietrich CF, Caspary WF, Scholmerich J, Lock G. Qualitative and quantitative clinical evaluation of the laser-assisted ratio analyser for detection of *Helicobacter pylori* infection by c-13-urea breath tests. *European Journal of Gastroenterology & Hepatology* 2001;**13** (7):807–10.

Braden 2001b
Braden B, Caspary WF. Detection of *Helicobacter pylori* infection: When to perform which test?. *Annals of Medicine* 2001;**33**(2):91–7.

Braden 2007
Braden B, Lembcke B, Kuker W, Caspary WF. 13C-breath tests: Current state of the art and future directions. *Digestive & Liver Disease* 2007;**39**(9):795–805.

Braden 2012
Braden B. Diagnosis of *Helicobacter pylori* infection. *BMJ* 2012;**344**:e828.

Brandi 2006
Brandi G, Biavati B, Calabrese C, Granata M, Nannetti A, Mattarelli P, et al. Urease-positive bacteria other than *Helicobacter pylori* in human gastric juice and mucosa. *American Journal of Gastroenterology* 2006;**101**(8):1756–61.

Bravo 1999
Bravo LE, Realpe JL, Campo C, Mera R, Correa P. Effects of acid suppression and bismuth medications on the performance of diagnostic tests for *Helicobacter pylori* infection. *American Journal of Gastroenterology* 1999;**94**(9): 2380–3.

Bravos 2000
Bravos ED, Gilman RH. Accurate diagnosis of *Helicobacter pylori* other tests. *Gastroenterology Clinics of North America* 2000;**29**(4):925–9.

Brennan 1991
Brennan DP, Kennedy NP, Keeling PWN. Serum IgG response to *Campylobacter-pylori* antigens as measured by western blotting. *Irish Journal of Medical Science* 1991;**160** (2):64–5.

Brennan 2015a
Brennan D, Smith SM, Omorogbe JA, Holleran G, Hall B, Hussey M, et al. Detection of *Helicobacter pylori* and antibiotic resistance using a molecular genetics-based approach in human faecal samples. *Gastroenterology* 2015; **148**(4 (suppl)):S420.

Brennan 2015b
Brennan D, Omorogbe J, Holleran G, Hussey M, O'Morain C, Smith S, et al. A comparison of the prevalence of *Helicobacter pylori* infection and rates of antibiotic resistance in patients undergoing gastroscopy versus the urea breath test. *Helicobacter* 2015;**20**:100–1.

Breslin 1997
Breslin NP, Omorain CA. Noninvasive diagnosis of *Helicobacter pylori* infection: A review. *Helicobacter* 1997;**2** (3):111–7.

Breslin 1998
Breslin NP, Lee J, Buckley M, O'Morain C. Screening for *Helicobacter pylori* in young dyspeptic patients referred for investigation - endoscopy for those who test negative. *Alimentary Pharmacology and Therapeutics* 1998;**12**(6): 577–82.

Breslin 2000
Breslin NP, Lee JM, Buckley MJ, Balbirnie E, Rice D, O'Morain CA. Validation of serological tests for *Helicobacter pylori* infection in an Irish population. *Irish Journal of Medical Science* 2000;**169**(3):190–4.

Bretagne 1998
Bretagne JF, Caekaert A, Barthelemy P, Hepysode. Long-term follow-up of *Helicobacter pylori* (HP) serology after successful eradication: A cohort of 203 patients tested by ELISA and heliSAL (TM) rapid blood tests. *Gastroenterology* 1998;**114**(4 (suppl)):A80.

Briedigkeit 1992
Briedigkeit H, Montag T, Spiridonow PS, Sielaff F, Wack R, Held C, et al. Detection of *Helicobacter pylori* infections by antibody determination. *Zeitschrift fur Arztliche Fortbildung (Jena)* 1992;**86**(17):869–72.

Britto 2002
Britto Gomes AT, Coelho LK, Secaf M, Pimenta Modena JL, De Almeida Troncon LE, De Oliveira RB. Accuracy of the 14C-urea breath test for the diagnosis of *Helicobacter pylori*. *Sao Paulo Medical Journal* 2002;**120**(3):68–71.

Brmbolic 1997
Brmbolic B, Zerjav S, Bogdanov M, Dordevic M, Radivojevic M, Stojsic Z, et al. The value of serum IgG and IgA antibodies in the diagnosis of *Helicobacter pylori* infection in dyspeptic patients. *Archives of Gastroenterohepatology* 1997;**16**(1):12–5.

Brown 1993
Brown KE, Peura DA. Diagnosis of *Helicobacter pylori* infection. *Gastroenterology Clinics of North America* 1993;**22**(1):105–15.

Bruce 2005
Bruce M, Parkinson A, Gessner B. Does delayed testing of urea breath test samples effect results?. *Digestion* 2005;**71**(4):261.

Bruden 2011
Bruden DL, Bruce MG, Miernyk KM, Morris J, Hurlburt D, Hennessy TW, et al. Diagnostic accuracy of tests for *Helicobacter pylori* in an Alaska native population. *World Journal of Gastroenterology* 2011;**17**(42):4682–8.

Bruning 2002
Bruning A, Reimann FM, Homann N, Hussein ZE, Konecny E, Ludwig D. A novel continuous 13C-urea breath test for detection of *H. pylori* infection. *Gastrointestinal Endoscopy* 2002;**55**(5):AB190–AB.

Brunner 1989
Brunner H, Markt B, Mittermayer H, Binder L. C-14 urea breath test (UBT) for the detection and follow-up of *Campylobacter-pylori* infection. *Gastroduodenal Pathology and Camphylobacter pylori* 1989;**847**:69–71.

Buchan 2013
Buchan BW, Olson WJ, Pezewski M, Marcon MJ, Novicki T, Uphoff TS, et al. Clinical evaluation of a real-time PCR assay for identification of *Salmonella*, *Shigella*, *Campylobacter* (*Campylobacter jejuni* and *C. coli*), and shiga toxin-producing *Escherichia coli* isolates in stool specimens. *Journal of Clinical Microbiology* 2013;**51**(12):4001–7.

Buchvald 1993
Buchvald D, Buchvaldova D. Antigens for the ELISA test for serodiagnosis of *Helicobacter pylori* infection. *Ceskoslovenska Epidemiologie, Mikrobiologie, Imunologie* 1993;**42**(1):16–21.

Buhling 2004
Buhling F, Koch G, Wex T, Heimburg A, Vieth M, Leodolter A, et al. Simultaneous detection and differentiation of anti-*Helicobacter pylori* antibodies by flow microparticle immunofluorescence assay. *Clinical & Diagnostic Laboratory Immunology* 2004;**11**(1):131–6.

Bures 2000
Bures J, Palicka V, Kopacova M, Vorisek V, Rejchrt S, Zivny P. Diagnosis of *Helicobacter pylori* with the 13C-labeled urea breath test: Study methodology. *Casopis Lekaru Ceskych* 2000;**139**(24):776–8.

Burucoa 2013
Burucoa C, Delchier JC, Courillon-Mallet A, De Korwin JD, Megraud F, Zerbib F, et al. Comparative evaluation of 29 commercial *Helicobacter pylori* serological kits. *Helicobacter* 2013;**18**(3):169–79.

Busro 2013
Busro VO, Bakry F, Farida A, Yuwono. Sensitivity and specificity value of saliva *Helicobacter pylori* examination in chronic gastritis patients. *Hepatology International* 2013;**7**: S753–S4.

Butler 2000
Butler AK, Brennan SA, Neal K, Logan RPH. A multi-centre study of the prevalence of *H-pylori* in urban Nottinghamshire children using the HpSA(r) stool antigen test. *Gut* 2000;**47**(Suppl 1):A45–A6.

Buyukbaba-Boral 2005
Buyukbaba-Boral O, Kucuker-Ang M, Aktas G, Issever H, Ang O. HpSA fecoprevalence in patients suspected to have *Helicobacter pylori* infection in Istanbul, Turkey. *International Journal of Infectious Diseases* 2005;**9**(1):21–6.

Buzas 2001
Buzas GM, Illyes G, Szekely E, Szeles I. Six regimens for the eradication of *Helicobacter pylori* (HP) in duodenal ulcer patients: Three consecutive trials (1995-1999). *Journal of Physiology, Paris* 2001;**95**(1-6):437–41.

Buzas 2008
Buzas GM, Szeles I. Interpretation of the 13C-urea breath test in the choice of second- and third-line eradication of *Helicobacter pylori* infection. *Journal of Gastroenterology* 2008;**43**(2):108–14.

Cacoullis 1991
Cacoullis F, Batten JJ, Logan R, Karim QN, Walker M, Baron JH. Quantifying the extent of *Helicobacter-pylori* infection with the C-13 urea breath test. *Gut* 1991;**32**(5): A565.

Cadranel 1998
Cadranel S, Corvaglia L, Bontems P, Deprez C, Glupczynski Y, Van Riet A, et al. Detection of *Helicobacter pylori* infection in children with a standardized and simplified C-13-urea breath test. *Journal of Pediatric Gastroenterology and Nutrition* 1998;**27**(3):275–80.

Cagdas 2012
Cagdas U, Otag F, Tezcan S, Sezgin O, Aslan G, Emekdas G. Detection of *Helicobacter pylori* and antimicrobial resistance in gastric biopsy specimens. *Mikrobiyoloji Bulteni* 2012;**46**(3):398–409.

Caglar 1999
Caglar M, Belzberg AS, Spruston B, Sexsmith G. Time-optimized carbon-14 breath test for *Helicobacter pylori* contamination of the stomach. *Clinical Nuclear Medicine* 1999;**24**(9):674–7.

Cai 2010
Cai J, Olafsson S. *Helicobacter pylori* breath test in an open access system has a high rate of potentially false negative

results. Negative result should be considered false negative until proven otherwise. *Gastroenterology* 2010;**138**(5 (suppl 1)):S336.

Calam 1994
Calam J. *Helicobacter-pylori*. *European Journal of Clinical Investigation* 1994;**24**(8):501–10.

Calvet 1999
Calvet X, Feu F, Forne M, Montserrat A, Elizalde JI, Viver JM, et al. The evaluation of a new immunoenzyme analysis for the detection of *Helicobacter pylori* infection in stool samples. [Spanish]. *Gastroenterologia Y Hepatologia* 1999; **22**(6):270–2.

Calvet 2002a
Calvet X, Salceda F, Sanfeliu I, Montserrat A, Brullet E, Real J, et al. Testing a new in-office test for determination of faecal *Helicobacter pylori* antigen. *Medicina Clinica* 2002; **118**(4):126–9.

Calvet 2002b
Calvet X, Sanfeliu I, Musulen E, Mas P, Dalmau B, Gil M, et al. Evaluation of *Helicobacter pylori* diagnostic methods in patients with liver cirrhosis. *Alimentary Pharmacology & Therapeutics* 2002;**16**(7):1283–9.

Calvet 2002c
Calvet X, Rosello M, Quesada M, Sanfeliu I, Salcerda F, Montserrat A, et al. Diagnosis of *Helicobacter pylori* infection in dyspectic patients by stool antigen detection. Usefulness of a new monoclonal ELISA test. *Gastroenterology* 2002; **122**(4 (suppl)):A205–A6.

Calvet 2003
Calvet X, Quesada M, Rosello M, Salceda F, Sanfeliu I, Dalmau B, et al. Stool antigen for the diagnosis of *Helicobacter pylori* infection in cirrhosis: Comparative usefulness of three different methods. *Alimentary Pharmacology & Therapeutics* 2003;**17**(5):727–31.

Calvet 2005
Calvet X, Quesada M, Calvet V, Choat T, Sanfeliu I, Segura F. Usefulness of RAPID HP StAR (TM), a new immunochomatographic, monoclonal antigen-based fecal test for diagnosing *Helicobacter pylori* infection in dyspeptic patients. *Helicobacter* 2005;**10**(5):524.

Calvet 2009
Calvet X, SaDelgado J, Montserrat A, Lario S, Ramirez-Lazaro MJ, Quesada M, et al. Accuracy of diagnostic tests for *Helicobacter pylori*: A reappraisal. *Clinical Infectious Diseases* 2009;**48**(10):1385–91.

Calvet 2010a
Calvet X, Lario S, Ramirez-Lazaro MJ, Montserrat A, Quesada M, Reeves L, et al. Comparative accuracy of 3 monoclonal stool tests for diagnosis of *Helicobacter pylori* infection among patients with dyspepsia. *Clinical Infectious Diseases* 2010;**50**(3):323–8.

Calvet 2010b
Calvet X, Lario S, Ramirez-Lazaro MJ, Montserrat A, Quesada M, Reeves L, et al. Accuracy of monoclonal stool tests for determining cure of *Helicobacter pylori* infection after treatment. *Helicobacter* 2010;**15**(3):201–5.

Calvet 2015
Calvet X. Diagnosis of *Helicobacter pylori* infection in the proton pump inhibitor era. *Gastroenterology Clinics of North America* 2015;**44**(3):507–18.

Calvo 2013
Calvo XC, Ramirez-Lazaro M, Lario S, Sanchez-Delgado J, Montserrat A, Casalots A, et al. C13-urea breath test skipping citric acid has low specificity for diagnosing *H. pylori* infection. *Helicobacter* 2013;**18**:119–20.

Camargos 2003
Camargos Rocha AM, Aguiar Rocha G, Santos A, De Oliveira CA, Magalhaes Queiroz DM. Accuracy of a commercial enzyme-linked immunosorbent assay for CagA in patients from Brazil with and without gastric carcinoma. *Journal of Clinical Microbiology* 2003;**41**(1):447–8.

Camorlinga-Ponce 1998
Camorlinga-Ponce M, Torres J, Perez-Perez G, Leal-Herrera Y, Gonzalez-Ortiz B, Madrazo de la Garza A, et al. Validation of a serologic test for the diagnosis of *Helicobacter pylori* infection and the immune response to urease and CagA in children. *American Journal of Gastroenterology* 1998;**93**(8):1264–70.

Campuzano-Maya 2007
Campuzano-Maya G. An optimized C-13-urea breath test for the diagnosis of *H. pylori* infection. *World Journal of Gastroenterology* 2007;**13**(41):5454–64.

Canard 2003
Canard JM, Ponchon T, Napoleon B, Boyer J, Dalbies P, Escourrou J, et al. Specific roles of endoscopy and respiratory test in the diagnosis and eradication control of *Helicobacter pylori*. *Acta Endoscopica* 2003;**33**(5):810–2.

Canete 2002
Canete A, Abunaji Y, Alvarez-Calatayud G, De-Vicente M, Gonzalez-Holguera J, Leralta M, et al. 13C-urea breath test with 50 mg of urea: An accurate method for the diagnosis of *H. pylori* infection in children. *Gastroenterology* 2002; **122**(4 (Suppl)):A207.

Canete 2003
Canete A, Abunaji Y, Alvarez-Calatayud G, DeVicente M, Gonzalez-Holguera JA, Leralta M, et al. Breath test using a single 50-mg dose of C-13-urea to detect *Helicobacter pylori* infection in children. *Journal of Pediatric Gastroenterology and Nutrition* 2003;**36**(1):105–11.

Cao 2012
Cao X, Jiang J, Jia ZF, Jin MS. Serum levels of pepsinogen ii are a useful biomarker of *Helicobacter pylori*-infected gastric cancer than pepsinogen i. *Journal of Gastroenterology and Hepatology* 2012;**27**:24.

Caporali 2003
Caporali R, Epis O, Negrini R, Scire CA, Solcia E, Montecucco C. Salivary gland lymphocytic infiltrates and *Helicobacter pylori* serology in anti-SSA/Ro positive patients

in Italy. *Clinical and Experimental Rheumatology* 2003;**21** (2):266–7.

Capurso 2006

Capurso G, Carnuccio A, Lahner E, Panzuto F, Baccini F, Fave GD, et al. Corpus-predominant gastritis as a risk factor for false-negative C-13-urea breath test results. *Alimentary Pharmacology & Therapeutics* 2006;**24**(10):1453–60.

Cardenas 2006

Cardenas VM, Dominguez DC, Puentes F, Aragaki CC, Goodman KJ, Graham DY, et al. Rapid stool antigen test for diagnosis of *H-pylori* infection in asymptomatic children. *Gastroenterology* 2006;**130**(4 (suppl)):A570.

Cardenas 2008

Cardenas VM, Dominguez DC, Puentes FA, Aragaki CC, Goodman KJ, Graham DY, et al. Evaluation of a novel stool native catalase antigen test for *Helicobacter pylori* infection in asymptomatic North American children. *Journal of Pediatric Gastroenterology & Nutrition* 2008;**46**(4):399–402.

Cardinali 2003

Cardinali LDC, Rocha GA, Rocha AMC, De Moura SB, Soares TD, Esteves AMB, et al. Evaluation of C-13 urea breath test and *Helicobacter pylori* stool antigen test for diagnosis of *H-pylori* infection in children from a developing country. *Journal of Clinical Microbiology* 2003;**41**(7): 3334–5.

Carrasco 1998

Carrasco MAV, Alonso IJ, Canto JLG, Baruque LL, Molini PS, Gisbert JP, et al. Is fasting required to perform C-13-urea breath test in the diagnosis of *H-pylori* infection?. *Gut* 1998;**43**(Suppl 2):A54.

Casellas 1999

Casellas F, Lopez J, Borruel N, Saperas E, Vergara M, De Torres I, et al. The impact of delaying gastric emptying by either meal substrate or drug on the C-13 -urea breath test. *American Journal of Gastroenterology* 1999;**94**(2):369–73.

Caselli 1999

Caselli M, Zaffoni E, Trevisani L, Sartori S, Alvisi V, Plebani M, et al. Diagnosis of *Helicobacter pylori* infection by HPSA test. *Lancet* 1999;**354**(9185):1209–11.

Caspary 1995

Caspary WF. 13C-urea breath test. Patient-friendly gold standard in the diagnosis of *Helicobacter pylori* infection with long term cost control potential. *Deutsche Medizinische Wochenschrift* 1995;**120**(27):976–8.

Casswall 1999

Casswall TH, Nilsson HO, Bergstrom M, Aleljung P, Wadstrom T, Dahlstrom AK, et al. Evaluation of serology, 13C-urea breath test, and polymerase chain reaction of stool samples to detect *Helicobacter pylori* in Bangladeshi children. *Journal of Pediatric Gastroenterology & Nutrition* 1999;**28**(1):31–6.

Castro 2004

Castro Fernández M, Sánchez Muñoz D, García Díaz E, Galán Jurado MV, Rodríguez Alonso C. Diagnosis of *Helicobacter pylori* infection using urease rapid test in patients with bleeding duodenal ulcer: Influence of endoscopic signs and simultaneous corporal and antral biopsies. *Revista Espanola De Enfermedades Digestivas* 2004; **96**(9):599-602; 605.

Castro-Fernandez 2004

Castro-Fernández M, Sanchez-Muñoz D, García-Díaz E, Miralles-Sanchiz J, Vargas-Romero J. Diagnosis of *Helicobacter pylori* infection in patients with bleeding ulcer disease: Rapid urease test and histology. *Revista Espanola De Enfermedades Digestivas* 2004;**96**(6):395-8; 398-401.

Cave 1999

Cave DR, Zanten SV, Carter E, Halpern EF, Klein S, Prather C, et al. A multicentre evaluation of the laser assisted ratio analyser (LARA): A novel device for measurement of 13CO2 in the 13C-urea breath test for the detection of *Helicobacter pylori* infection. *Alimentary Pharmacology & Therapeutics* 1999;**13**(6):747–52.

Cevrioglu 2004

Cevrioglu AS, Altindis M, Yilmazer M, Fenkci IV, Ellidokuz E, Kose S. Efficient and non-invasive method for investigating *Helicobacter pylori* in gravida with hyperemesis gravidarum: *Helicobacter pylori* stool antigen test. *Journal of Obstetrics & Gynaecology Research* 2004;**30**(2):136–41.

Chacon 1995

Chacon EP, Correnti M, Salma N, Serrano N, Pinero R, Cavazza ME, et al. Immunoenzymatic assay for serodiagnosis of *Helicobacter pylori* infections. *GEN* 1995; **49**(3):208–11.

Chalkias 2011

Chalkias A, Nikotian G, Koutsovasilis A, Bramis J, Manouras A, Mystrioti D, et al. Patients with colorectal cancer are characterized by increased concentration of fecal Hb-Hp complex, myeloperoxidase, and secretory IgA. *American Journal of Clinical Oncology: Cancer Clinical Trials* 2011;**34**(6):561–6.

Chang 1999

Chang MC, Wu MS, Wang HH, Wang HP, Lin JT. Helicobacter pylori stool antigen (HPSA) test - a simple, accurate and non-invasive test for detection of *Helicobacter pylori* infection. *Hepato-Gastroenterology* 1999;**46**(25): 299–302.

Chang 2000

Chang YW, Kim KJ, Min SK, Dong SH, Kim HJ, Kim BH, et al. Quantitative result of C-13-urea breath test does not correlate with *Helicobacter pylori* density in the stomach by assessing histopathology and grade of phenol red staining. *Gastroenterology* 2000;**118**(4):A1221.

Chang 2002

Chang MC, Chang YT, Sun CT, Wu MS, Wang HP, Lin JT. Quantitative correlation of Helicobacter pylori stool antigen (HPSA) test with C-13-urea breath test (C-13-UBT) by the updated Sydney Grading System of gastritis. *Hepato-Gastroenterology* 2002;**49**(44):576–9.

Chang 2003

Chang YW, Min SK, Kim KJ, Han YS, Lee JH, Dong SH, et al. Delta (13)C-urea breath test value is a useful indicator

for *Helicobacter pylori* eradication in patients with functional dyspepsia. *Journal of Gastroenterology & Hepatology* 2003; **18**(6):726–31.

Chang 2012
Chang WT, Lin CC, Lin YH, Wang CC, Wang SH, Liu YW, et al. The potential role of using C-13 urea breath test as a routine perioperative evaluation of *Helicobacter pylori* infection in living-related liver donors. *Liver Transplantation* 2012;**18**:S205–S.

Chang 2013
Chang C, Xie H, Ni Y, Ting Q, Bo Z. The clinical studies to the diagnostic value of serum pepsinogen levels in gastric cancer. *Journal of Gastroenterology and Hepatology* 2013;**28**: 742.

Chattopadhyay 2002
Chattopadhyay UK. Coagglutination test for rapid noncultural diagnosis of human campylobacteriosis. *European Review for Medical and Pharmacological Sciences* 2002;**6**(1):9–11.

Chattopadhyay 2004
Chattopadhyay S, Patra R, Ramamurthy T, Chowdhury A, Santra A, Dhali GK, et al. Multiplex PCR assay for rapid detection and genotyping of *Helicobacter pylori* directly from biopsy specimens. *Journal of Clinical Microbiology* 2004;**42** (6):2821–4.

Checchi 2000
Checchi L, Felice P, Acciardi C, Ricci C, Gatta L, Polacci R, et al. Absence of *Helicobacter pylori* in dental plaque assessed by stool test. *American Journal of Gastroenterology* 2000;**95** (10):3005–6.

Chehter 2013
Chehter EZ, Bacci MR, Fonseca FLA, Goncalves JAC, Buchalla G, Shiraichi SAR, et al. Diagnosis of the infection by the *Helicobacter pylori* through stool examination: Method standardization in adults. *Clinical Biochemistry* 2013;**46**(15):1622–4.

Chen 1994
Chen JJ, Changchien CS, Tai DI, Chiou SS, Lee CM, Kuo CH. Role of *Helicobacter pylori* in cirrhotic patients with peptic ulcer. A serological study. *Digestive Diseases & Sciences* 1994;**39**(7):1565–8.

Chen 1996
Chen JJ, Yang ZX, Jiang XG. A comparison of purified urease antigen and whole cell antigen of *Helicobacter pylori* by ELISA test--study on the application and serum diagnoses of *Helicobacter pylori* urease diagnostic reagent. *Zhonghua Liu Xing Bing Xue Za Zhi = Zhonghua Liuxingbingxue Zazhi* 1996;**17**(1):44–6.

Chen 1997
Chen TS, Chang FY, Lee SD. Serodiagnosis of *Helicobacter pylori* infection: Comparison and correlation between enzyme-linked immunosorbent assay and rapid serological test results. *Journal of Clinical Microbiology* 1997;**35**(1): 184–6.

Chen 2000
Chen X, Haruma K, Kamada T, Mihara M, Komoto K, Yoshihara M, et al. Factors that affect results of the C-13 urea breath test in Japanese patients. *Helicobacter* 2000;**5** (2):98–103.

Chen 2001a
Chen X, Haruma K, Kamada T, Hartori N, Yoshihara M, Kitadai Y, et al. A low 13C-urea breath test value is associated with increased risk of gastric cancer. *Journal of Gastroenterology* 2001;**36**(9):601–5.

Chen 2001b
Chen TS, Chang FY, Lee SD. Extending the reading time increases the accuracy of rapid whole blood test for diagnosis of *Helicobacter pylori* infection. *Journal of Gastroenterology & Hepatology* 2001;**16**(12):1341–5.

Chen 2002a
Chen TS, Li FY, Chang FY, Lee SD. Immunoglobulin G antibody against *Helicobacter pylori*: Clinical implications of levels found in serum. *Clinical & Diagnostic Laboratory Immunology* 2002;**9**(5):1044–8.

Chen 2002b
Chen TS, Chang FY, Lee SD. No difference of accuracy between capillary and venous blood in rapid whole blood test for diagnosis of *Helicobacter pylori* infection. *Digestive Diseases & Sciences* 2002;**47**(11):2519–22.

Chen 2003
Chen TS, Chang FY, Chen PC, Huang TW, Ou JT, Tsai MH, et al. Simplified C-13-urea breath test with a new infrared spectrometer for diagnosis of *Helicobacter pylori* infection. *Journal of Gastroenterology and Hepatology* 2003; **18**(11):1237–43.

Chen 2009a
Chen CC, Liou JM, Hsu YC, Fang JY, Wang HP, Wu MS. Rabeprazole therapeutic trial in patients with uninvestigated dyspepsia. *Journal of Gastroenterology and Hepatology* 2009; **24**:A45.

Chen 2009b
Chen LW, Chang JJ, Chiu CJ, Fang KM, Chien RN, Chang LC, et al. 14C urea breath test in patients with peptic ulcer: The correlations with clinical factors, histology, rapid urease test and endoscopic findings. *Journal of Gastroenterology and Hepatology* 2009;**24**:A86.

Cheng 2004
Cheng H, Hu FL. The value of *Helicobacter pylori* stool antigen immunocard stat in diagnosis of HP infection and assessing of eradication of HP. *Zhonghua Yi Xue Za Zhi* 2004;**84**(14):1166–70.

Cherian 2008
Cherian S, Burgner DP, Carson CF, Sanfilippo FM, Cook AG, Forbes DA. Diagnosis of *Helicobacter pylori* infection in a high-prevalence pediatric population: A comparison of 2 fecal antigen testing methods and serology. *Journal of Pediatric Gastroenterology and Nutrition* 2008;**47**(2):130–5.

Chey 1997a
Chey WD, Woods M, Scheiman JM, Nostrant TT, DelValle J. Lansoprazole and ranitidine affect the accuracy of the

C-14-urea breath test by a pH-dependent mechanism. *American Journal of Gastroenterology* 1997;**92**(3):446–50.

Chey 1997b

Chey WD. Proton pump inhibitors and the urea breath test: How long is long enough?. *American Journal of Gastroenterology* 1997;**92**(4):720–1.

Chey 1999a

Chey WD, Shaw S, Montague J, Jones M, Murthy U. Appropriate timing of the C-14-urea breath test to establish eradication of *H-pylori* infection: An interim analysis. *Gastroenterology* 1999;**116**(4 (suppl)):A136.

Chey 1999b

Chey WD, Murthy U, Toskes P, Carpenter S, Laine L. The 13C-urea blood test accurately detects active *Helicobacter pylori* infection: A United States, multicenter trial. *American Journal of Gastroenterology* 1999;**94**(6):1522–4.

Chey 2000a

Chey WD, Metz DC, Shaw S, Kearney D, Montague J, Murthy U. Appropriate timing of the C-14-urea breath test to establish eradication of *Helicobacter pylori* infection. *American Journal of Gastroenterology* 2000;**95**(5):1171–4.

Chey 2000b

Chey WD. Accurate diagnosis of *Helicobacter pylori* - C-14-urea breath test. *Gastroenterology Clinics of North America* 2000;**29**(4):895.

Chey 2007

Chey WD, Wong BC. American College of Gastroenterology guideline on the management of Helicobacter pylori infection. *American Journal of Gastroenterology* 2007;**102** (8):1808–25.

Chiang 2010

Chiang TH, Tu CH, Lee YC, Wu MS. Clinical predictors of significant esophagogastroduodenoscopy findings for asymptomatic subjects with positive immunochemical fecal occult blood test and negative colonoscopy. *Gastrointestinal Endoscopy* 2010;**71 (5)**:AB357.

Chiba 1999

Chiba N, Veldhuyzen Van Zanten SJ. 13C-urea breath tests are the noninvasive method of choice for *Helicobacter pylori* detection. *Canadian Journal of Gastroenterology* 1999;**13**(8): 681–3.

Ching 1991a

Ching CK, Thompson S, Buxton C, Holgate C, Hill P, Freeman JG, et al. Evaluation of the new Helico-G ELISA for serological diagnosis of *Helicobacter-pylori* infection. *Gut* 1991;**32**(5):A570.

Ching 1991b

Ching CK. A simplified diagnostic approach to *Helicobacter pylori* infection--is it adequate?. *American Journal of Gastroenterology* 1991;**86**(9):1276–8.

Ching 1993

Ching CK, Thompson S, Buxton C, Holgate C, Holmes GKT. Evaluation of a commercial enzyme-linked immunosorbent assay (ELISA) kit for serological diagnosis of *Helicobacter pylori* infection in a group of non-ulcer dyspepsia sufferers. *Postgraduate Medical Journal* 1993;**69** (812):456–60.

Chisholm 2004

Chisholm SA, Watson CL, Teare ELS, Saverymuttu S, Owen RJ. Non-invasive diagnosis of *Helicobacter pylori* infection in adult dyspeptic patients by stool antigen detection: Does the rapid immunochromatography test provide a reliable alternative to conventional ELISA kits?. *Journal of Medical Microbiology* 2004;**53**(7):623–7.

Chmiela 2003

Chmiela M, Wisniewska M, Bak-Romaniszyn L, Rechcinski T, Planeta-Malecka I, Bielanski W, et al. Serological differentiation of *Helicobacter pylori* CagA(+) and CagA (-) infections. *Archivum Immunologiae et Therapiae Experimentalis* 2003;**51**(2):131–6.

Cho 2000

Cho HS, Kang DH, Kim EA, Park DK, Park HC, Choi DJ, et al. The usefulness of C-13-urea breath test for the diagnosis of *Helicobacter pylori* infection in operative stomach. *Gastroenterology* 2000;**118**(4):A505.

Cho 2003

Cho YS, Kim SS, Chae HS, Han SW, Lee CD, Chung IS. The correlation between the DOB30 value of 13C-urea breath test and the staining pattern of endoscopic phenol red test in the diagnosis of *Helicobacter pylori* infection. *Gastroenterology* 2003;**124**(4 (Suppl)):A176.

Cho 2008

Cho YS, Chae HS, Jang SN, Kim JS, Son HS, Kim HK, et al. Comparison of the 13C-urea breath test and the endoscopic phenol red mucosal pH test in the quantification of *Helicobacter pylori* infection loading. *Korean Journal of Internal Medicine* 2008;**23**(3):134–9.

Choi 2010

Choi J, Kim D, Park M. A prospective evaluation of new stool antigen test for detection of *H-pylori*, in comparison with histology, rapid urease test, C-13-urea breath test, and serology. *Helicobacter* 2010;**15**(4):359.

Choi 2011

Choi J, Kim CH, Kim D, Chung SJ, Song JH, Kang JM, et al. Prospective evaluation of a new stool antigen test for the detection of *Helicobacter pylori*, in comparison with histology, rapid urease test, 13C-urea breath test, and serology. *Journal of Gastroenterology and Hepatology (Australia)* 2011;**26**(6):1053–9.

Chong 1994

Chong J, Marshall BJ, Barkin JS, McCallum RW, Reiner DK, Hoffman SR, et al. Occupational exposure to *Helicobacter pylori* for the endoscopy professional: A sera epidemiological study. *American Journal of Gastroenterology* 1994;**89**(11):1987–92.

Chong 1995

Chong SK, Lou Q, Asnicar MA, Zimmerman SE, Croffie JM, Lee CH, et al. *Helicobacter pylori* infection in recurrent abdominal pain in childhood: Comparison of diagnostic tests and therapy. *Pediatrics* 1995;**96**(2 Pt 1):211–5.

Chou 1997
Chou CH, Sheu BS, Yang HB, Cheng PN, Shin JS, Chen CY, et al. Clinical assessment of the bacterial load of *Helicobacter pylori* on gastric mucosa by a new multi-scaled rapid urease test. *Journal of Gastroenterology and Hepatology* 1997;**12**(1):1–6.

Christensen 1992
Christensen AH, Gjorup T, Hilden J, Fenger C, Henriksen B, Vyberg M, et al. Observer homogeneity in the histologic diagnosis of *Helicobacter-pylori* - latent class analysis, kappa-coefficient, and repeat frequency. *Scandinavian Journal of Gastroenterology* 1992;**27**(11):933–9.

Christie 1996
Christie JM, McNulty CA, Shepherd NA, Valori RM. Is saliva serology useful for the diagnosis of *Helicobacter pylori*? . *Gut* 1996;**39**(1):27–30.

Chua 2002
Chua TS, Fock KM, Teo EK, Ng TM. Validation of 13C-urea breathtest for the diagnosis of *Helicobacter pylori* infection in the Singapore population. *Singapore Medical Journal* 2002;**43**(8):408–11.

Chung 2001a
Chung IK, Hong SJ, Kim EJ, Cho JY, Kim HS, Park SH, et al. What is the best method to diagnose *Helicobacter* infection in bleeding peptic ulcers?: A prospective trial. *Korean Journal of Internal Medicine* 2001;**16**(3):147–52.

Chung 2001b
Chung AYF, Chow PKH, Yu WK, Ho JMS, Chan HS, Wong WK, et al. Prevalence of *Helicobacter pylori* in gastric cancer in a South-East Asian population by C-14-urea breath test. *ANZ Journal of Surgery* 2001;**71**(10):574–6.

Churchill 1998
Churchill RD, Hill PG, Holmes GK. Management of dyspepsia in primary care. Breath test is better than near patient blood tests. *BMJ* 1998;**316**(7141):1389.

Chvalova 1990
Chvalova M, Sedlackova M, Souckova A, Soucek A, Jirasek A. Assessment of antibodies against *Campylobacter-pylori* in children and adolescents with gastroduodenal complaints. *Sbornik Lekarsky* 1990;**92**(11-12):343–8.

Cinar 2004
Cinar K, Soykan I, Ozden A. The effect of *Helicobacter pylori* eradication in patients with functional dyspepsia: Assessment of different diagnostic tests. *Turkish Journal of Gastroenterology* 2004;**15**(3):159–63.

Ciok 2003
Ciok J, Tacikowski T, Bujko J, Dzieniszewski J. Urea breath test (UBT) in the diagnosis of *Helicobacter pylori* infection. *Gastroenterologia Polska* 2003;**10**(3):241–6.

Cirak 2007
Cirak MY, Akyon Y, Megraud F. Diagnosis of *Helicobacter pylori*. *Helicobacter* 2007;**12 Suppl 1**:4–9.

Clancy 1994
Clancy RL, Cripps AW, Taylor DC, McShane LA, Webster VJ. Detection of antibody against *Helicobacter pylori* in the saliva of patients with dyspepsia. *Canadian Journal of Gastroenterology* 1994;**8**(7):408–12.

Clayton 1992
Clayton CL, Kleanthous H, Coates PJ, Morgan DD, Tabaqchali S. Sensitive detection of *Helicobacter-pylori* by using polymerase chain-reaction. *Journal of Clinical Microbiology* 1992;**30**(1):192–200.

Cockburn 2001
Cockburn M, Collett J, Cox B. Validation of the saliva-based *H. pylori* test, helisal, and its use in prevalence surveys. *Epidemiology & Infection* 2001;**126**(2):191–6.

Coelho 1990
Coelho LGV, Chausson Y, Passos MCF, Sadala RU, Costa EL, Sabino CVS, et al. C-14 urea breath test as a noninvasive method to detect gastric *Helicobacter-pylori* colonization. *Gastroenterologie Clinique et Biologique* 1990; **14**(11):801–5.

Coelho 1997
Coelho LGV, Passos MCF, Chausson Y, Simal CJR, Aguiar ROA, Gallo MA, et al. Standard-dose (5-mu Ci) vs mini-dose (1-mu Ci) 14c-urea breath test for *H-pylori* detection. *Gastroenterology* 1997;**112**(4 (suppl)):A92.

Coelho 1999
Coelho LG, Reber M, Passos MC, Aguiar RO, Casaes PE, Bueno ML, et al. Application of isotope-selective non-dispersive infrared spectrometry for the evaluation of the 13C-urea breath test: Comparison with three concordant methods. *Brazilian Journal of Medical & Biological Research* 1999;**32**(12):1493–7.

Coelho 2003
Coelho LGV, Rocha Z, Boechat LC, Aguiar ROA, Aragao ALA, Dias EES, et al. 13C-urea breath test for *H-pylori* detection in children: Determination of the cutoff value by graphic method, independent of gold standard comparison. *Gastroenterology* 2003;**124**(4 (suppl)):A177.

Coelho 2009a
Coelho LGV, Coelho MCF, Oliveira SM, Santa-Cecilia EV, Moreira MR, Bomfim IM, et al. Does low dosage of 13C-urea keep good accuracy for diagnosis of *H. pylori* infection? . *Helicobacter* 2009;**14 (4)**:340.

Coelho 2009b
Coelho LG, Silva-Junior AE, Coelho MC, Santa-Cecilia EV, Ferreira RO, Bomfim IM, et al. Does low dosage of 13C-urea keep good accuracy for diagnosis of *Helicobacter pylori* infection. *Gastroenterology* 2009;**136**(5 (Suppl)):A345.

Coelho 2011
Coelho LG, Silva AE Jr, Coelho MC, Penna FG, Ferreira RO, Santa-Cecilia EV. Does low dose (13)C-urea breath test maintain a satisfactory accuracy in diagnosing *Helicobacter pylori* infection?. *Arquivos de Gastroenterologia* 2011;**48**(2): 104–8.

Cohen 1999
Cohen H, Rose S, Lewin DN, Retama B, Naritoku W, Johnson C, et al. Accuracy of four commercially available serologic tests, including two office-based tests and a

commercially available C-13 urea breath test, for diagnosis of *Helicobacter pylori*. *Helicobacter* 1999;**4**(1):49–53.

Colaiocco 1999
Colaiocco Ferrante L, Papponetti M, Marcuccitti J, Neri M, Festi D. 13C-urea breath test for *Helicobacter pylori* infection: Stability of samples over time. *Scandinavian Journal of Gastroenterology* 1999;**34**(9):942–3.

Collins 1992
Collins JSA, Bamford KB, Sloan JM, Collins BJ, Moorehead RJ, Love AHG. Screening for *Helicobacter pylori* antibody could reduce endoscopy workload in young dyspeptic patients. *European Journal of Gastroenterology and Hepatology* 1992;**4**(12):991–3.

Con 2007
Con SA, Con-Wong R, Con-Chin GR, Con-Chin VG, Takeuchi H, Valerin AL, et al. Serum pepsinogen levels, *Helicobacter pylori* CagA status, and cytokine gene polymorphisms associated with gastric premalignant lesions in Costa Rica. *Cancer Epidemiology, Biomarkers & Prevention* 2007;**16**(12):2631–6.

Connor 1999
Connor SJ, Seow F, Ngu MC, Katelaris PH. The effect of dosing with omeprazole on the accuracy of the C-13-urea breath test in *Helicobacter pylori*-infected subjects. *Alimentary Pharmacology & Therapeutics* 1999;**13**(10): 1287–93.

Conti-Nibali 1990
Conti-Nibali S, Baldari S, Vitulo F, Sferlazzas C, Russo E, Tedeschi A, et al. The 14CO2 urea breath test for *Helicobacter pylori* infection. *Journal of Pediatric Gastroenterology & Nutrition* 1990;**11**(2):284–5.

Continibali 1991
Continibali S, Sferlazzas C, Fera MT, Saitta G, Tedeschi A, Magazzu G. A simplified diagnostic-approach to *Helicobacter-pylori* infection - is it adequate - reply. *American Journal of Gastroenterology* 1991;**86**(9):1277–8.

Contreras 2006
Contreras M, Amado MAG, Rodriguez MJ, Landaez PB, Zambrano Y, Alvarez M, et al. Validation of a fast immunochroniatographic test for *H. pylori* detection in stool. *Interciencia* 2006;**31**(2):136–9.

Coombs 2001
Coombs GW, Foster NM, Pearman JW, Forbes GM. Detection of *Helicobacter pylori* antigen in faeces by enzyme immunoassay. *Pathology* 2001;**33**(4):496–7.

Cooreman 1990
Cooreman M, Hengels KJ, Krausgrill P, Strohmeyer G. 13C-urea breath test as a noninvasive means of diagnosing the presence of *Helicobacter* (*Campylobacter*) *pylori*. *Deutsche Medizinische Wochenschrift* 1990;**115**(10):367–71.

Corti 2007
Corti RE. The accuracy of the breath test with C-urea to diagnose *Helicobacter pylori* infection. *Salud I Ciencia* 2007; **15**(5):914.

Corvaglia 1997
Corvaglia L, Bontems P, Keppens E, Vandenborre C, DePrez C. HP infection in children: Comparison of results with serology and C-13-urea breath test. *Gut* 1997;**41** (suppl):A68.

Corvaglia 1999
Corvaglia L, Bontems P, Devaster JM, Heimann P, Glupczynski Y, Keppens E, et al. Accuracy of serology and C-13-urea breath test for detection of *Helicobacter pylori* in children. *Pediatric Infectious Disease Journal* 1999;**18**(11): 976–9.

Costa 2001
Costa F, Mumolo MG, Bellini M, Romano MR, Manghetti M, Paci A, et al. Post-treatment diagnostic accuracy of a new enzyme immunoassay to detect *Helicobacter pylori* in stools. *Alimentary Pharmacology & Therapeutics* 2001;**15** (3):395–401.

Couturier 2014
Couturier MR, Marshall BJ, Goodman KJ, Megraud F. *Helicobacter pylori* diagnostics and treatment: Could a lack of universal consensus be the best consensus?. *Clinical Chemistry* 2014;**60**(4):589–94.

Crabtree 1990
Crabtree JE, Shallcross TM, Wyatt JI, Heatley RV. Validation of a commercial ELISA for serodiagnosis of *Helicobacter-pylori* infection. *Gut* 1990;**31**(10):A1176.

Crabtree 1991a
Crabtree JE, Taylor JD, Shallcross TM, Wyatt JI, Rathbone BJ, Heatley RV. Western blotting analysis of mucosal and systemic immune-responses to *Helicobacter-pylori*. *Gut* 1991;**32**(5):A564.

Crabtree 1991b
Crabtree JE, Shallcross TM, Heatley RV, Wyatt JI. Evaluation of a commercial ELISA for serodiagnosis of *Helicobacter pylori* infection. *Journal of Clinical Pathology* 1991;**44**(4):326–8.

Cremonini 2000
Cremonini F, Zocco MA, Armuzzi A, Bartolozzi F, Santarelli L, Ojetti V, et al. C-13 urea breath test for predicting resistance to therapy in *Helicobacter pylori* infection. *Gut* 2000;**47**(Suppl 1):A117.

Cremonini 2005
Cremonini F, Bartolozzi F, Armuzzi A, Zocco MA, Santarelli L, Gabrielli M, et al. Can 13C urea breath test predict resistance to therapy in *Helicobacter pylori* infection?. *Hepato-Gastroenterology* 2005;**52**(64):1119–21.

Crespo 2009
Crespo Medina M, Sanchez Sanchez C, Morales JL, Huber LB, Mendiola I. Valuation of non-invasive tests to detect *Helicobacter pylori* infection in children. *Acta Pediatrica Espanola* 2009;**67**(7):319–24.

Crispino 2013
Crispino P, Colarusso D, Minervini G, Schiava A, Tripodi B, Cimmino G, et al. Diagnosis of *Helicobacter pylori*

infection: Comparison between invasive and non invasive tests. *Italian Journal of Medicine* 2013;**7**(2S):33.

Cullen 1992
Cullen DJ, Cullen KJ, Collins BJ, Christiansen KJ, Epis J. Serological assessment of *Helicobacter pylori* eradication. *Lancet* 1992;**340**(8828):1161–2.

Cullen 2002
Cullen KP, Broderick BM, Jayaram J, Flynn B, O'Connor HJ. Evaluation of the *Helicobacter pylori* stool antigen (HPSA) test in routine clinical practice--is it patient-friendly?. *Irish Medical Journal* 2002;**95**(10):305–6.

Cunningham 2010
Cunningham SA, Sloan LM, Nyre LM, Vetter EA, Mandrekar J, Patel R. Three-hour molecular detection of *Campylobacter*, *Salmonella*, *Yersinia*, and *Shigella* species in feces with accuracy as high as that of culture. *Journal of Clinical Microbiology* 2010;**48**(8):2929–33.

Cutler 1993
Cutler A, Schubert A, Schubert T. Role of *Helicobacter pylori* serology in evaluating treatment success. *Digestive Diseases & Sciences* 1993;**38**(12):2262–6.

Cutler 1995a
Cutler AF, Havstad S, Ma CK, Blaser MJ, Perez-Perez GI, Schubert TT. Accuracy of invasive and noninvasive tests to diagnose *Helicobacter pylori* infection. *Gastroenterology* 1995;**109**(1):136–41.

Cutler 1995b
Cutler AF. Re - C-13 urea breath test - response. *American Journal of Gastroenterology* 1995;**90**(11):2070.

Cutler 1996
Cutler AF, Prasad VM. Long-term follow-up of *Helicobacter pylori* serology after successful eradication. *American Journal of Gastroenterology* 1996;**91**(1):85–8.

Cutler 1997
Cutler AF. Diagnostic tests for *H. pylori*: A prospective evaluation of their accuracy, without selecting a single test as the gold standard. *American Journal of Gastroenterology* 1997;**92**(3):538–9.

Cutler 1998
Cutler AF, Miller S. Comparison of C-13 urea blood test to C-13 urea breath test for diagnosis of *H-pylori*. *Gastroenterology* 1998;**114**(4 (suppl)):A97.

Cutler 1999
Cutler AF, Toskes P. Comparison of 13C-urea blood test to 13C-urea breath test for the diagnosis of *Helicobacter pylori*. *American Journal of Gastroenterology* 1999;**94**(4):959–61.

Czinn 1991
Czinn SJ, Carr HS, Speck WT. Diagnosis of gastritis caused by *Helicobacter pylori* in children by means of an ELISA. *Reviews of Infectious Diseases* 1991;**13 Suppl 8**:S700–3.

Czkwianianc 1997
Czkwianianc E, Chmiela M, Lawnik M, Planeta-Malecka I, Rudnicka W. Serodiagnosis of *Helicobacter pylori* in children with gastroduodenitis. *Central-European Journal of Immunology* 1997;**22**(4):240–7.

Da Silva 2010
Da Silva JMK, Villares CA, Monteiro MS, Colauto C, Dos Santos AF, Mattar R. Validation of a rapid stool antigen test for diagnosis of *Helicobacter pylori* infection. *Revista Do Instituto De Medicina Tropical De Sao Paulo* 2010;**52**(3): 125–8.

Dahlberg 1998
Dahlberg M, Schjonsby H. 13C-urea breath test as diagnostic method in *Helicobacter pylori* infection. *Tidsskrift for Den Norske Laegeforening* 1998;**118**(24):3762–5.

Daino 2015
Daino DF, Soifer L, Pedesta J, Rome J. Pilot test for *Helicobacter pylori* detection with ammonia breath test. *Acta Gastroenterologica Latinoamericana* 2015;**45**(1):12–7.

Dan 2013
Dan W, Jing W, Libo W, Hong X. Detection and analysis of *Helicobacter pylori* antibodies by protein chip technology. *Journal of Gastroenterology and Hepatology* 2013;**28**:541.

Danielli 1993
Danielli E. A fluorometric enzyme-linked-immunosorbent-assay for serological diagnosis of *Helicobacter-pylori* infection. *European Journal of Gastroenterology & Hepatology* 1993;**5**:S57–S59.

Datta 2003
Datta D, Gazzard B, Stebbing J. The diagnostic yield of stool analysis in 525 HIV-1-infected individuals. *Aids* 2003;**17**(11):1711–3.

Datta 2005
Datta S, Chattopadhyay S, Chowdhury A, Santra A, Saha DR, Ramamurthy T, et al. Diagnosis and genotyping of *Helicobacter pylori* by polymerase chain reaction of bacterial DNA from gastric juice. *Journal of Gastroenterology and Hepatology* 2005;**20**(8):1253–9.

Day 2002
Day AS, Sherman PM. Accuracy of office-based immunoassays for the diagnosis of *Helicobacter pylori* infection in children. *Helicobacter* 2002;**7**(3):205–9.

Day 2003
Day AS, Veldhuyzen van Zanten S, Otley AR, Best L, Griffiths A, Sherman PM. Use of LARA-urea breath test in the diagnosis of *Helicobacter pylori* infection in children and adolescents: A preliminary study. *Canadian Journal of Gastroenterology* 2003;**17**(12):701–6.

De Angelis 2007
De Angelis GL, Cavallaro LG, Maffini V, Moussa AM, Fornaroli F, Liatopoulou S, et al. Usefulness of a serological panel test in the assessment of gastritis in symptomatic children. *Digestive Diseases* 2007;**25**(3):206–13.

De Argila 2001
de Argila CM, Boixeda D. Practical considerations for the diagnosis of *Helicobacter pylori* infection. *Medicina Clinica* 2001;**117**(10):386–91.

De Arruda 2001
De Arruda SMB, Passaro DJ, Yang S, Parsonnet J. Variability of serologic testing for *H. pylori* using U.S. and Peruvian antigens. *Gastroenterology* 2001;**120**(1):325–6.

De Boer 1995
De Boer WA. Re: 13C urea breath test. *American Journal of Gastroenterology* 1995;**90**(11):2069–70.

De Bustillo 1998
De Bustillo EM, Tomero JAS, Sanz JC, Moreno JA, Jimenez I, Lopez-Brea M, et al. Eradication and follow-up of *Helicobacter pylori* infection in hemodialysis patients. *Nephron* 1998;**79**(1):55–60.

De Carvalho 2003
De Carvalho Costa Cardinali L, Rocha GA, Rocha AM, De Moura SB, De Figueiredo Soares T, Esteves AM, et al. Evaluation of 13C urea breath test and *Helicobacter pylori* stool antigen test for diagnosis of *H. pylori* infection in children from a developing country. *Journal of Clinical Microbiology* 2003;**41**(7):3334–5.

De Giacomo 1991
De Giacomo C, Lisato L, Negrini R, Licardi G, Maggiore G. Serum immune response to *Helicobacter pylori* in children: Epidemiologic and clinical applications. *Journal of Pediatrics* 1991;**119**(2):205–10.

De Laat 2001
De Laat LE, De Boer WA, Megraud F. The CLO test as a reference method for *Helicobacter pylori* infection. *European Journal of Gastroenterology & Hepatology* 2001;**13**(10): 1269–70.

De Oliveira 1999
De Oliveira AMR, Rocha GA, De Magalhaes Queiroz DM, Mendes EN, De Carvalho AST, Ferrari TCA, et al. Evaluation of enzyme-linked immunosorbent assay for the diagnosis of *Helicobacter pylori* infection in children from different age groups with and without duodenal ulcer. *Journal of Pediatric Gastroenterology and Nutrition* 1999;**28** (2):157–61.

De Pascalis 1999
De Pascalis R, Del Pezzo M, Nardone G, Budillon G, Lavitola A. Performance characteristics of an enzyme-linked immunosorbent assay for determining salivary immunoglobulin G response to *Helicobacter pylori*. *Journal of Clinical Microbiology* 1999;**37**(2):430–2.

Deankanob 2006
Deankanob W, Chomvarin C, Hahnvajanawong C, Intapan PM, Wongwajana S, Mairiang P, et al. Enzyme-linked immunosorbent assay for serodiagnosis of *Helicobacter pylori* in dyspeptic patients and volunteer blood donors. *Southeast Asian Journal of Tropical Medicine & Public Health* 2006;**37** (5):958–65.

Debongnie 1993
Debongnie JC, Durez P, Luyasu V. Validation of a commercial serologic test in the diagnosis of *Helicobacter-pylori* infection - clinical and epidemiologic use. *Gastroenterologie Clinique et Biologique* 1993;**17**(2):98–102.

Dediste 2003
Dediste A, Vandenberg O, Vlaes L, Ebraert A, Douat N, Bahwere P, et al. Evaluation of the prospect microplate assay for detection of *Campylobacter*: A routine laboratory perspective. *Clinical Microbiology & Infection* 2003;**9**(11): 1085–90.

Deguchi 2009
Deguchi R, Matsushima M, Suzuki T, Mine T, Fukuda R, Nishina M, et al. Comparison of a monoclonal with a polyclonal antibody-based enzyme immunoassay stool test in diagnosing *Helicobacter pylori* infection after eradication therapy. *Journal of Gastroenterology* 2009;**44**(7):713–6.

Del Pozo Garcia 2006
Del Pozo Garcia AJ, Gisbert JP. Is the string test a useful alternative to gastroscopy with biopsy for *H. pylori* identification?. *Revista Espanola De Enfermedades Digestivas* 2006;**98**(7):542–9.

Del Zompo 2014
Del Zompo F, Feliciani D, Mangiola F, D'Angelo G, Di Rienzo T, Vanella G, et al. Gas production during lactulose breath test is associated with *Helicobacter pylori* infection. *Helicobacter* 2014;**19**:82.

Delaney 2003
Delaney BC, Holder RL, Allan TF, Kenkre JE, Hobbs FDR. A comparison of Bayesian and maximum likelihood methods to determine the performance of a point of care test for *Helicobacter pylori* in the office setting. *Medical Decision Making* 2003;**23**(1):21–30.

Demir 2001
Demir H, Ercis S, Kocak N, Hascelik G, Ozen H, Yuce A, et al. Detection of *Helicobacter pylori* with stool antigen test in children with gastroesophageal reflux disease. *American Journal of Gastroenterology* 2001;**96**(6):1944.

Demiray 2006
Demiray E, Yilmaz O, Sarkis C, Soyturk M, Simsek I. Comparison of invasive methods and two different stool antigen tests for diagnosis of *H-pylori* infection in patients with gastric bleeding. *World Journal of Gastroenterology* 2006;**12**(26):4206–10.

Demiray 2012
Demiray Gurbuz E, Gonen C, Bekmen N, Dolek D, Soyturk M, Sagol O, et al. The diagnostic accuracy of urine IgG antibody tests for the detection of *Helicobacter pylori* infection in Turkish dyspeptic patients. *Turkish Journal of Gastroenterology* 2012;**23**(6):753–8.

Demiray-Gurbuz 2012
Demiray-Gurbuz E, Bekmen N, Erci T, Dotan Y, Yilmaz O. Evaluation of *Helicobacter pylori* stool antigen test results required from different outpatient clinics at university hospital. *Helicobacter* 2012;**17**:87–8.

Demirturk 2003
Demirturk L, Yazgan Y, Tarcin O, Ozel M, Diler M, Oncul O, et al. Does N-acetyl cysteine affect the sensitivity and specificity of *Helicobacter pylori* stool antigen test?. *Helicobacter* 2003;**8**(2):120–3.

Desroches 1997
Desroches JJ, Lahaie RG, Picard M, Morais J, Dumont A, Gaudreau C, et al. Methodological validation and clinical usefulness of carbon-14-urea breath test for documentation

of presence and eradication of *Helicobacter pylori* infection. *Journal of Nuclear Medicine* 1997;**38**(7):1141–5.

Devenish 2005
Devenish J, Brooks B, Perry K, Milnes D, Burke T, McCabe D, et al. Validation of a monoclonal antibody-based capture enzyme-linked immunosorbent assay for detection of *Campylobacter fetus*. *Clinical and Diagnostic Laboratory Immunology* 2005;**12**(11):1261–8.

Dewan 2000
Dewan R, Sachdev GK. Diagnosis of *Helicobacter pylori* infection in primary and tertiary care centers. *Indian Journal of Gastroenterology* 2000;**19 Suppl 1**:S11-4; discussion S5.

Dhar 1998
Dhar R, Mustafa AS, Dhar PM, Khan MS, Al-Rashidi FJS, Al-Shamali AAA, et al. Evaluation and comparison of two immunodiagnostic assays for *Helicobacter pylori* antibodies with culture results. *Diagnostic Microbiology and Infectious Disease* 1998;**30**(1):1–6.

Dhesi 2015
Dhesi E, White B, Chitembwe A, Alisa A, Musa S, Besherdas K. Is there any value in performing a CLO test at endoscopy in patients previously having a stool antigen test? . *Gut* 2015;**64**:A78.

Di Fulvio 2003
Di Fulvio A, Ierfone N, Standoli M, Trancassini M, Giordano A, Magni A, et al. Study of fecal antigens against *Helicobacter pylori* as non-invasive test compared with the 13C-urea breath-test. Personal experience. *Il Giornale di Chirurgia* 2003;**24**(8-9):312–4.

Di Mario 2009
Di Mario F, Gatta L, Franze A, Rugge M, Scarpignato C, Dal Bo N, et al. Effects of *H. pylori* eradication on serum pepsinogen i, ii, ratio and gastrin-17 in Italian and immigrant patients. *Helicobacter* 2009;**14 (4)**:408.

Di Mario 2010
Di Mario F. Diagnostic accuracy of serum pepsinogens and gastrin to follow-up *H. pylori* infection. *Helicobacter* 2010; **15**(4):350.

Di Rienzo 2013
Di Rienzo TA, D'Angelo G, Ojetti V, Campanale MC, Tortora A, Cesario V, et al. 13C-urea breath test for the diagnosis of *Helicobacter pylori* infection. *European Review for Medical & Pharmacological Sciences* 2013;**17 Suppl 2**: 51–8.

Di Silvio 1998
Di Silvio M, Larisch J, Dibildox M, Almaguer I, Gitler R, Dehesa M, et al. Breath tests as a noninvasive diagnostic method in *Helicobacter pylori* infection. *Revista de Gastroenterologia de Mexico* 1998;**63**(3):135–42.

Dietz 2001
Dietz J, Sekine S, Segal F, Kulczynski JMU, Chaves ALH, Costa JD, et al. "*Helicobacter pylori*" diagnosis: Comparison between invasive methods. *Gastrenterologia Endoscopia Digestiva* 2001;**20**(2):36–40.

Dill 1989
Dill S, Paynejames JJ, McSwiggan D, Scrimgeour CM, Rennie MJ, Misiewicz JJ. Sensitivity and specificity of the C-13 urea breath test in detecting *Campylobacter-pylori*. *Gut* 1989;**30**(5):A752.

Dill 1990
Dill S, Payne-James JJ, Misiewicz JJ, Grimble GK, McSwiggan D, Pathak K, et al. Evaluation of 13C-urea breath test in the detection of *Helicobacter pylori* and in monitoring the effect of tripotassium dicitratobismuthate in non-ulcer dyspepsia. *Gut* 1990;**31**(11):1237–41.

Ding 1993
Ding SZ, Jia BQ, Liu XG. An urease enzyme linked immunosorbent assay for detection of *Helicobacter pylori* infection. *Zhonghua Nei Ke Za Zhi [Chinese Journal of Internal Medicine]* 1993;**32**(5):298–301.

Ding 2000
Ding SL, Ring JA, Hebbard GS, Morcom JM, Young GP. Lansoprazole but not ranitidine interferes with C-13 urea breath test detection of *Helicobacter pylori* infection. *Gastroenterology* 2000;**118**(4):A1228.

Djurasinovic 2014
Djurasinovic MZ, Sokic-Milutinovic A, Filipovic B, Basara S, Krstic M, Milosavljevic T. The role of non-invasive assessment of the secretory function of the gastric mucosa in dyspepsia. *Helicobacter* 2014;**19**:112.

Dmitrienko 2009
Dmitrienko M, Bykov S. Method of breath sampling for noninvasive *H. pylori* analysis. *Helicobacter* 2009;**14 (4)**: 341.

Dmitrienko 2011
Dmitrienko M, Bykov S, Parolova N, Karaseva G. Ammonia breath test - transportation way of ammonia. *Helicobacter* 2011;**16**:115.

Dolek 2007
Dolek D, Soyturk M, Bekmen N, Yilmaz O, Demiray E, Sarioglu S, et al. Urine-based ELISA testing for the diagnosis and confirmation of eradication of *Helicobacter pylori* infection. *Helicobacter* 2007;**12**(4):444.

Dominguez 2006
Dominguez J, Forne M, Blanco S, Prat C, Gali N, Latorre I, et al. Comparison of a monoclonal with a polyclonal antibody-based enzyme immunoassay stool test in diagnosing *Helicobacter pylori* infection before and after eradication therapy. *Alimentary Pharmacology & Therapeutics* 2006;**23**(12):1735–40.

Dominguezmunoz 1995
Dominguezmunoz JE, Linke A, Sauerbruch T, Malfertheiner P. How to improve the C-13-urea breath test (UBT) for the diagnosis of *Helicobacter-pylori* infection. *Gastroenterology* 1995;**108**(4 (suppl)):A84.

Domínguez-Muñoz 1997
Domínguez-Muñoz JE, Leodolter A, Sauerbruch T, Malfertheiner P. A citric acid solution is an optimal test

drink in the 13C-urea breath test for the diagnosis of *Helicobacter pylori* infection. *Gut* 1997;**40**(4):459–62.

Donati 1997
Donati M, Moreno S, Storni E, Tuccia A, Poli L, Sambri V, et al. Study of anti-*Helicobacter pylori* antibodies with use of latex agglutination test. *Microbiologia Medica* 1997;**12**(3): 130–1.

Donati 2000
Donati M, Sambri V, Ranucci L, De Orsi D, Tucci A, Poli L, et al. Recombinant CagA enzyme-linked immunosorbent assay and western immunoblot for the detection of serum antibodies to *Helicobacter pylori*. *Clinical Microbiology & Infection* 2000;**6**(3):164–6.

Dondi 2006
Dondi E, Rapa A, Boldorini R, Fonio P, Zanetta S, Oderda G. High accuracy of noninvasive tests to diagnose *Helicobacter pylori* infection in very young children. *Journal of Pediatrics* 2006;**149**(6):817–21.

Dong 2015
Dong FY, Ji DN, Huang RX, Zhang F, Huang YQ, Xiang P, et al. Multiple genetic analysis system-based antibiotic susceptibility testing in *Helicobacter pylori* and high eradication rate with phenotypic resistance-guided quadruple therapy. Medicine 2015 [Epub ahead of print]; Vol. 94, issue 47. [DOI: 10.1097/MD.0000000000002056

Dore 1997
Dore SP, Krupadas S, Borgonha S, Kurpad AV. The 13C urea breath test to assess *Helicobacter pylori* infection in school children. *National Medical Journal of India* 1997;**10** (2):57–60.

Dore 2003
Dore MP, Realdi G, Sepulveda AR, Graham DY. Detection of genomic *Helicobacter pylori* DNA in the blood of patients positive for the infection. *Digestive and Liver Disease* 2003; **35**(11):839–40.

Dore 2004
Dore MP, Negrini R, Tadeu V, Marras L, Maragkoudakis E, Nieddu S, et al. Novel monoclonal antibody-based *Helicobacter pylori* stool antigen test. *Helicobacter* 2004;**9** (3):228–32.

Dorta 2005
Dorta G. *Helicobacter pylori* detection revisited. *Endoscopy* 2005;**37**(6):579-80; author reply 581-2.

Dou 2008
Dou YC, Wang JB. Detection of *H. pylori* infection in patients with pancreatic cancer and clinical significance. *Journal of Jilin University Medicine Edition* 2008;**34**(2): 317–9.

Douraghi 2013
Douraghi M, Rostami MN, Goudarzi H, Ghalavand Z. Comparison of stool antigen immunoassay and serology for screening for *Helicobacter pylori* infection in intellectually disabled children. *Microbiology and Immunology* 2013;**57** (11):772–7.

Doweck 1997
Doweck J, Quintana C, Barrios A, Monastra L, Lopetegui G, Zerbo O, et al. Evaluation of sensitivity, specificity and predictive value of six qualitative serological methods for the detection of *Helicobacter pylori* antibodies. *Acta Gastroenterologica Latinoamericana* 1997;**27**(4):259–61.

Dowlatshahi 2002
Dowlatshahi S. Effect of gastrointestinal bleeding on the sensitivity of diagnostic tests for *Helicobacter pylori* infection. *Archives of Iranian Medicine* 2002;**5**(3):201–2.

Drew 1988
Drew H, Lafrance ND, Mertz H, Hernandez J, Ravich W, Milligan F, et al. C-14 urea breath test in *Campylobacter pyloridis* gastric disorders - comparison with biopsy with comparison and sensitivity of 20, 40, 60 and 120 minute sampling. *Clinical Nuclear Medicine* 1988;**13**(5):394.

Drumm 1999
Drumm B, Rowland M, Imrie C. Sensitivity of urease-based test on diagnosis of *Helicobacter pylori* in children and the elderly. *Gastroenterology* 1999;**116**(6):1506.

Drzymala-Czy 2014
Drzymala-Czy S, Stawinska-Witoszynska B, Madry E, Krzywinska-Wiewiorowska M, Szczepanik M, Walkowiak J, et al. Non-invasive detection of *Helicobacter pylori* in cystic fibrosis - the fecal test vs. the urea breath test. *European Review for Medical and Pharmacological Sciences* 2014;**18** (16):2343–8.

Du 2004
Du JX, Watkins T, Bravo LE, Fontham ET, Camargo MC, Correa P, et al. 13C-urea breath test for *Helicobacter pylori* in young children: Cut-off point determination by finite mixture model. *Statistics in Medicine* 2004;**23**(13): 2049–60.

Duan 1994
Duan LP, Braden B, Lembcke B, Caspary WF. C-13-urea breath test after breakfast still meets the criteria for valid diagnosis of *Helicobacter-pylori*. *Gastroenterology* 1994;**106** (4 (suppl)):A71.

DuBois 2005
DuBois S, Kearney DJ. Iron-deficiency anemia and Helicobacter pylori infection: a review of the evidence. *American Journal of Gastroenterology* 2005;**100**(2):453–9.

Duggan 1998
Duggan AE, Hardy E, Hawkey CJ. Evaluation of a new near patient test for the detection of *Helicobacter pylori*. *European Journal of Gastroenterology & Hepatology* 1998;**10**(2):133–6.

Duggan 1999
Duggan AE, Elliott C, Logan RFA. Testing for *Helicobacter pylori* infection: Validation and diagnostic yield of a near patient test in primary care. *BMJ* 1999;**319**(7219):1236–9.

Dulbecco 2001
Dulbecco P, Gambaro C, Zentilin P, Bilardi C, Biagini R, Savarino V. The impact of long-term ranitidine and pantoprazole on the precision of C-13-urea breath test

(UBT) in subjects infected with *Helicobacter pylori*. *Gastroenterology* 2001;**120**(5 (suppl)):A578.

Dulbecco 2003
Dulbecco P, Gambaro C, Bilardi C, Zentilin P, Mele MR, Mansi C, et al. Impact of long-term ranitidine and pantoprazole on accuracy of 13C urea breath test. *Digestive Diseases & Sciences* 2003;**48**(2):315–21.

Dumont 1989
Dumont A, Abramovici J, Muller C, Trolin C, Barbier P. Diagnostic efficiency of the 14C-urea breath test in the detection of antral *Campylobacter pylori* infection. Gastroduodenal pathology and Campylobacter pylori: European Campylobacter Pylori Study Group ICS847. 1989:73–5.

Dun 2001
Dun CDR, Blac M, Cowell DC, Penaul C, Ratcliffe NM, Spence R, et al. Ammonia vapour in the mouth as a diagnostic marker for *Helicobacter pylori* infection: Preliminary 'proof of principle' pharmacological investigations. *British Journal of Biomedical Science* 2001;**58**(2):66–75.

Durdal 2002
Durdal US, Engin D, Hascelik G. Evaluation of western blot method for the serological diagnosis of *Helicobacter pylori* infections. *Mikrobiyoloji Bulteni* 2002;**36**(2):153–60.

Dy-Limquiaco 2006
Dy-Limquiaco LA, Florendo WO, Labio ME, Banez V, Daez ML. Validation of the new 14-carbon urea breath test (14-C UBT) in the diagnosis of *Helicobacter pylori* infection. *Journal of Gastroenterology and Hepatology* 2006;**21**:A505.

Dyrla 2015
Dyrla P, Gil J, Wojtun S, Korszun K, Kasinska E, Mackiewicz A. *Helicobacter pylori* infection. Diagnosis and treatment. *Pediatria i Medycyna Rodzinna* 2015;**11**(1):68–74.

Ebara 2000
Ebara S, Aoyama N, Sakai T, Ikemura T, Shirasaka D, Sakashita M, et al. A study of gastric emptying in *H-pylori* negative healthy volunteers using the C-13-octanoic acid breath test. *Gastroenterology* 2000;**118**(4):A1169.

Ebell 1998
Ebell MH. Breath test and serologic testing for *Helicobacter pylori*. *Journal of the American Board of Family Practice* 1998;**11**(2):170–1.

Edwards 1997
Edwards CN, Douglin CP, Prussia PR, Garriques SA, Levett PN. Epidemiology of *Helicobacter pylori* infection in Barbados. *West Indian Medical Journal* 1997;**46**(1):3–7.

El-Nujumi 1996
El-Nujumi A, Hilditch TE, McColl KEL. Effect of omeprazole therapy on determination of *Helicobacter pylori* status by C-14 urea breath test. *Gastroenterology* 1996;**110**(4 (suppl)):A102.

El-Nujumi 1998
El-Nujumi A, Hilditch TE, Williams C, McColl KE. Current or recent proton pump inhibitor therapy markedly impairs the accuracy of the 14C urea breath test. *European Journal of Gastroenterology & Hepatology* 1998;**10**(9):759–64.

El-Zaatari 1995
El-Zaatari FA, Nguyen AM, Genta RM, Klein PD, Graham DY. Determination of *Helicobacter pylori* status by reverse transcription-polymerase chain reaction. Comparison with urea breath test. *Digestive Diseases & Sciences* 1995;**40**(1):109–13.

El-Zimaity 1998
El-Zimaity HMT, Segura AM, Genta RM, Graham DY. Histologic assessment of *Helicobacter pylori* status after therapy: Comparison of Giemsa, Diff-Quik, and Genta stains. *Modern Pathology* 1998;**11**(3):288–91.

Elbast 1999
Elbast W, Brazier JL. Nondispersive infrared spectroscopy, an alternative to isotope ratio mass spectrometry: Case of the C-13 urea breath test. *Analusis* 1999;**27**(3):228–31.

Elitsur 1997
Elitsur Y, Neace C, Triest WE. Comparison between a rapid office-based and ELISA serologic test in screening for *Helicobacter pylori* in children. *Helicobacter* 1997;**2**(4):180–4.

Elitsur 1999a
Elitsur Y, Neace C, Werthammer MC, Triest WE. Prevalence of CagA, VacA antibodies in symptomatic and asymptomatic children with *Helicobacter pylori* infection. *Helicobacter* 1999;**4**(2):100–5.

Elitsur 1999b
Elitsur Y, Neace C. Detection of *Helicobacter pylori* organisms by HP-Fast in children. *Digestive Diseases and Sciences* 1999;**44**(6):1169–72.

Elitsur 2000
Elitsur Y, Aflak R, Neace C, Triest WE. *Helicobacter pylori* serology and the diagnosis of *H. pylori* infection in children. *West Virginia Medical Journal* 2000;**96**(5):564–6.

Elitsur 2004
Elitsur Y, Lawrence Z, Hill I. Stool antigen test for diagnosis of *Helicobacter pylori* infection in children with symptomatic disease: A prospective study. *Journal of Pediatric Gastroenterology & Nutrition* 2004;**39**(1):64–7.

Elitsur 2005
Elitsur Y. *Helicobacter pylori* diagnostic tools: Is it in the stool?. *Journal of Pediatrics* 2005;**146**(2):164–7.

Elitsur 2009
Elitsur Y, Tolia V, Gilger MA, Reeves-Garcia J, Schmidt-Sommerfeld E, Opekun AR, et al. Urea breath test in children: The United States prospective, multicenter study. *Helicobacter* 2009;**14**(2):134–40.

Ellenrieder 1997
Ellenrieder V, Glasbrenner B, Stoffels C, Weiler S, Bode G, Moller P, et al. Qualitative and semi-quantitative value of a modified 13C-urea breath test for identification of *Helicobacter pylori* infection. *European Journal of Gastroenterology & Hepatology* 1997;**9**(11):1085–9.

Elnujumi 1991
Elnujumi AM, Rowe P, Dorrian CA, McColl KEL. Value of C-14 urea breath test and urease slide test (CLO test) to diagnose *Helicobacter-pylori* in uremic patients. *Gut* 1991; **32**(10):A1220.

Eloubeidi 2001
Eloubeidi MA, Wade SB, Provenzale D. Factors associated with acceptance and full publication of GI endoscopic research originally published in abstract form. *Gastrointestinal Endoscopy* 2001;**53**(3):275–82.

Endtz 2000
Endtz HP, Ang CW, Van den Braak N, Luijendijk A, Jacobs BC, De Man P, et al. Evaluation of a new commercial immunoassay for rapid detection of *Campylobacter jejuni* in stool samples. *European Journal of Clinical Microbiology and Infectious Diseases* 2000;**19**(10):794–7.

Engberg 2003
Engberg JH, Strid MA, Molbak K, Krogfelt KA. Antibody response following infection with *Campylobacter* determined by enzyme-linked immunosorbent assay (ELISA). *Ugeskrift for Laeger* 2003;**165**(24):2485–6.

Engstrand 1992
Engstrand L, Nguyen AM, Graham DY, el-Zaatari FA. Reverse transcription and polymerase chain reaction amplification of rRNA for detection of *Helicobacter* species. *Journal of Clinical Microbiology* 1992;**30**(9):2295–301.

Enroth 1997a
Enroth H, Rigo R, Hulten K, Engstrand L. Diagnostic accuracy of a rapid whole-blood test for detection of *Helicobacter pylori*. *Journal of Clinical Microbiology* 1997;**35** (10):2695–7.

Enroth 1997b
Enroth H, Engstrand L. Rapid detection of *Helicobacter pylori* infection in serum and whole-blood samples. *APMIS* 1997;**105**(12):951–5.

Enroth 2002
Enroth H, Kraaz W, Rohan T, Nyren O, Engstrand L. Does the method of *Helicobacter pylori* detection influence the association with gastric cancer risk?. *Scandinavian Journal of Gastroenterology* 2002;**37**(8):884–90.

Erzin 2004
Erzin Y, Altun S, Dobrucali A, Aslan M, Erdamar S, Dirican A, et al. Comparison of two different stool antigen tests for the primary diagnosis of *Helicobacter pylori* infection in Turkish patients with dyspepsia. *Helicobacter* 2004;**9**(6): 657–62.

Erzin 2005
Erzin Y, Altun S, Dobrucali A, Aslan M, Erdamar S, Dirican A, et al. Evaluation of two enzyme immunoassays for detecting *Helicobacter pylori* in stool specimens of dyspeptic patients after eradication therapy. *Journal of Medical Microbiology* 2005;**54**(Pt 9):863–6.

Evans 1989
Evans DJ Jr, Evans DG, Graham DY, Klein PD. A sensitive and specific serologic test for detection of *Campylobacter pylori* infection. *Gastroenterology* 1989;**96**(4):1004–8.

Everts 1996
Everts B, Hamlet A, Pettersson A. A 10 minutes solid dosage C-13-urea breath test for diagnosis of *Helicobacter pylori* infection. *Gastroenterology* 1996;**110**(4 suppl):A105.

Faigel 1996a
Faigel DO, Furth EE, Childs M, Goin J, Metz DC. Histological predictors of active *Helicobacter pylori* infection. *Digestive Diseases & Sciences* 1996;**41**(5):937–43.

Faigel 1996b
Faigel DO, Childs M, Furth EE, Alavi A, Metz DC. New noninvasive tests for *Helicobacter pylori* gastritis - comparison with tissue-based gold standard. *Digestive Diseases and Sciences* 1996;**41**(4):740–8.

Faigel 2000
Faigel DO, Magaret N, Corless C, Lieberman DA, Fennerty MB. Evaluation of rapid antibody tests for the diagnosis of *Helicobacter pylori* infection. *American Journal of Gastroenterology* 2000;**95**(1):72–7.

Faigel 2001
Faigel DO, Hahn M. Urea breath test for the diagnosis of *Helicobacter pylori* - response. *Gastrointestinal Endoscopy* 2001;**53**(6):700–1.

Fakhrjou 2011
Fakhrjou A, Somi MH, Fattahi E, Koohbanani SS, Shadravan S. Rapid urease test, touch cytology and histopathologic assessment in determining infection by *Helicobacter pylori* in outpatient setting. *Pakistan Journal of Biological Sciences* 2011;**14**(12):698–702.

Falaknazi 2010
Falaknazi K, Jalalzadeh M, Vafaeimanesh J. Noninvasive stool antigen assay for screening of *Helicobacter pylori* infection and assessing success of eradication therapy in patients on hemodialysis. *Iranian Journal of Kidney Diseases* 2010;**4**(4):317–21.

Falk 1997
Falk GW. Best tests for detecting *Helicobacter pylori*. *Consultant* 1997;**37**(7):1765.

Fallone 1998
Fallone CA, Loo VG, Barkun AN. Utility of serology in determining *Helicobacter pylori* eradication after therapy. *Canadian Journal of Gastroenterology* 1998;**12**(2):117–24.

Fallone 2000
Fallone CA, Veldhuyzen van Zanten SJ, Chiba N. The urea breath test for *Helicobacter pylori* infection: Taking the wind out of the sails of endoscopy. *CMAJ Canadian Medical Association Journal* 2000;**162**(3):371–2.

Falsafi 2005
Falsafi T, Valizadeh N, Sepehr S, Najafi M. Application of a stool antigen test to evaluate the incidence of *Helicobacter pylori* infection in children and adolescents from Tehran, Iran. *Clinical & Diagnostic Laboratory Immunology* 2005;**12** (9):1094–7.

Falsafi 2009
Falsafi T, Favaedi R, Mahjoub F, Najafi M. Application of stool-PCR test for diagnosis of *Helicobacter pylori* infection

in children. *World Journal of Gastroenterology* 2009;**15**(4): 484–8.

Falsafi 2014

Falsafi T, Lavasani P, Basardeh I, Massarrat S, Landarani Z. Evaluation of an Iranian home *Helicobacter pylori* stool antigen ELISA kit. Jundishapur Journal of Microbiology 2014; Vol. 7, issue 6:e10629. [DOI: 10.5812/jjm.10629

Fanti 2001

Fanti L, Ieri R, Mezzi G, Testoni PA, Passaretti S, Guslandi M. Long-term follow-up and serologic assessment after triple therapy with omeprazole or lansoprazole of *Helicobacter*-associated duodenal ulcer. *Journal of Clinical Gastroenterology* 2001;**32**(1):45–8.

Farkkila 1996

Farkkila M. Active *Campylobacter pylori* infection diagnosed by the urea breath test. *Duodecim; Laaketieteellinen Aikakauskirja* 1996;**112**(5):349–50.

Faulde 1991

Faulde M, Putzker M, Mertes T, Sobe D. Evaluation of an immunofluorescence assay for specific detection of immunoglobulin-G antibodies directed against *Helicobacter-pylori*, and antigenic cross-reactivity between *Helicobacter-pylori* and *Campylobacter-jejuni*. *Journal of Clinical Microbiology* 1991;**29**(2):323–7.

Fayaz 2014

Fayaz F, Gachkar L, Roodsari SR, Pourkaveh B. Prevalence of *Helicobacter pylori* infection in patients with down syndrome and mental retardation. Archives of Clinical Infectious Diseases 2014 Sep 25 [Epub ahead of print]; Vol. 9, issue 4. [10.5812/archcid.22064]

Fayed 2008

Fayed SB, Aref MI, Fathy HM, El Dayem SMA, Emara NA, Maklof A, et al. Prevalence of celiac disease, *Helicobacter pylori* and gastroesophageal reflux in patients with refractory iron deficiency anemia. *Journal of Tropical Pediatrics* 2008; **54**(1):43–53.

Fazulzyanova 2012

Fazulzyanova A, Isaeva G, Ivanovskaya K. Evaluation of effectiveness of different methods of *Helicobacter pylori* detection in patients with chronic HCV-infection. *Helicobacter* 2012;**17**:95.

Fazzio 1995

Fazzio S, Vazquez G, Ardao G, Blanco J, Vivero E, Gualco G, et al. *Helicobacter pylori*: Comparative study of different diagnostic techniques. *Acta Gastroenterologica Latinoamericana* 1995;**25**(5):269–76.

Feldman 1995

Feldman RA, Deeks JJ, Evans SJW. Multilaboratory comparison of 8 commercially available *Helicobacter-pylori* serology kits. *European Journal of Clinical Microbiology & Infectious Diseases* 1995;**14**(5):428–33.

Felz 1997

Felz MW, Burke GJ, Schuman BM. Breath test diagnosis of *Helicobacter pylori* in peptic ulcer disease: A noninvasive primary care option. *Journal of the American Board of Family Practice* 1997;**10**(6):385–9.

Ferrante 1999

Ferrante LC, Papponetti M, Marcuccitti J, Neri M, Festi D. C-13-urea breath test for *Helicobacter pylori* infection: Stability of samples over time. *Scandinavian Journal of Gastroenterology* 1999;**34**(9):942–3.

Ferwana 2015

Ferwana M, Abdulmajeed I, Alhajiahmed A, Madani W, Firwana B, Hasan R, et al. Accuracy of urea breath test in *Helicobacter pylori* infection: Meta-analysis. *World Journal of Gastroenterology* 2015;**21**(4):1305–14.

Festi 1999

Festi D, Marcuccitti J, Papponetti M, Colaiocco-Ferrante L, Bonitatibua A, Di Ilio C, et al. C-13-urea breath test for *Helicobacter pylori* infection: A repeatability study. *Gastroenterology* 1999;**116**(4 (suppl)):A162.

Feteih 2009

Feteih R, Abdel-Salam M, Jamjoom H, Akbar H. Salivary anti-*Helicobacter pylori* positivity among endoscopy patients with chronic liver disease. *Eastern Mediterranean Health Journal* 2009;**15**(6):1371–8.

Feydt-Schmidt 2002

Feydt-Schmidt A, Russmann H, Lehn N, Fischer A, Antoni I, Stork D, et al. Fluorescence in situ hybridization vs. Epsilometer test for detection of clarithromycin-susceptible and clarithromycin-resistant *Helicobacter pylori* strains in gastric biopsies from children. *Alimentary Pharmacology & Therapeutics* 2002;**16**(12):2073–9.

Figura 1994

Figura N, Oderda G, Verdiani S. Evaluation of a commercial ELISA kit for the serological diagnosis of *Helicobacter pylori* infection. *New Microbiologica* 1994;**17**(4):319–25.

Figura 2005

Figura N, Santucci A, Lahner E, Mini R, Bernardini G, Vaira D, et al. Western blotting for the diagnosis of *Helicobacter pylori* infection in patients with atrophic body gastritis. *Helicobacter* 2005;**10**(5):521.

Figura 2014

Figura N, Marini L, Macchiarelli R, Moretti E. Latex agglutination test for detection of *H. pylori* in gastric biopsies. *Helicobacter* 2014;**19**:125.

Finderle 2013

Finderle P, Suhadolc K, Osredkar J. Determination of *Helicobacter pylori* antigen in stool in comparison to breath test. *Biochimica Clinica* 2013;**37**:S665.

Floch 2012

Floch P, Goret J, Bessede E, Lehours P, Megraud F. Evaluation of the positive predictive value of a rapid immunochromatographic test to detect *Campylobacter* in stools. Gut Pathogens 2012 Dec 4; Vol. 4, issue 1:17. [10.1186/1757–4749–4–17]

Foertsch 2010

Foertsch S, Neumann H, Vieth M, Guldi DM, Neurath MF, Kuth R. Development of a new electrochemical device for rapid *Helicobacter pylori* detection. *Gastroenterology* 2010;**138**(5 (suppl 1)):S512.

Folwaczny 1999
Folwaczny C, Reichardt B, Klauser A, Klose J, Blendinger C, Wiebecke B, et al. Accuracy of C-13-urea breath test for diagnosis of *Helicobacter pylori* infection in clinical routine. *Gastroenterology* 1999;**116**(4 (suppl)):A164.

Fontana 2000
Fontana C, Pietroiusti A, Mastino A, Pistoia ES, Marino D, Magrini A, et al. Comparison of an enzyme immunoassay versus a rapid latex test for serodiagnosis of *Helicobacter pylori* infection. *European Journal of Clinical Microbiology & Infectious Diseases* 2000;**19**(3):239–40.

Ford 2014
Ford AC, Forman D, Hunt RH, Yuan Y, Moayyedi P. Helicobacter pylori eradication therapy to prevent gastric cancer in healthy asymptomatic infected individuals: systematic review and meta-analysis of randomised controlled trials. *BMJ* 2014;**348**:g3174.

Formichella 2012
Formichella L, Romberg L, Bolz C, Vieth M, Geppert M, Gottner G, et al. A novel line blot system to detect an infection with pathogenic *H. pylori*. *International Journal of Medical Microbiology* 2012;**302**:6.

Forne 2000
Forne M, Dominguez J, Fernandez-Banares F, Lite J, Esteve M, Gali N, et al. Accuracy of an enzyme immunoassay for the detection of *Helicobacter pylori* in stool specimens in the diagnosis of infection and posttreatment check-up. *American Journal of Gastroenterology* 2000;**95**(9):2200–5.

Fowora 2012
Fowora MA, Breithaupt U, Otegbayo JA, Akere A, Onyekwere CA, Ndububa D, et al. Molecular characterization of *Helicobacter pylori* infections in Nigeria. *Helicobacter* 2012;**17**:88.

Fox 1989
Fox JG, Correa P, Taylor NS, Zavala D, Fontham E, Janney F, et al. *Campylobacter pylori*-associated gastritis and immune response in a population at increased risk of gastric carcinoma. *American Journal of Gastroenterology* 1989;**84**(7):775–81.

Fradkin 1997
Fradkin A, Yahav Y, DiverHaber A, Weisselberg B, Jonas A. The value of anti-*Helicobacter pylori* IgG antibodies in establishing eradication of infection in children. *Israel Journal of Medical Sciences* 1997;**33**(2):87–92.

Franceschi 1999
Franceschi F, Armuzzi A, Maniccia E, Ojetti V, Torre ES, Candelli M, et al. Delta(CO2)-C-13 excretion and prevalence of gastrointestinal symptoms in subjects evaluated for *H-pylori* infection through C-13-urea breath test. *Gastroenterology* 1999;**116**(4 (suppl)):A164.

Franchini 2007
Franchini M, Cruciani M, Mengoli C, Pizzolo G, Veneri D. Effect of Helicobacter pylori eradication on platelet count in idiopathic thrombocytopenic purpura: a systematic review and meta-analysis. *Journal of Antimicrobial Chemotherapy* 2007;**60**(2):237–46.

Fraser 1996a
Fraser AG, Moore L, Rafiq Ali M, Chua LE, Hollis B, Little SV. An audit of low dose triple therapy for eradication of *Helicobacter pylori*. *New Zealand Medical Journal* 1996;**109**(1027):290–2.

Fraser 1996b
Fraser AG, Ali MR, McCullough S, Yeates NJ, Haystead A. Diagnostic tests for *Helicobacter pylori* - can they help select patients for endoscopy. *New Zealand Medical Journal* 1996;**109**(1018):95–8.

Fraser 1997
Fraser AG, McIntosh C, Berry S, Moore L. The urea breath test (UBT) for *H-pylori* (HP) in the initial assessment of dyspepsia in primary care. *Gut* 1997;**41**(suppl):A77–A8.

Fraser 1998
Fraser AG, McIntosh C, Berry S, Moore L. Can the urea breath test for *H. pylori* replace endoscopy for the assessment of dyspepsia in primary care?. *New Zealand Medical Journal* 1998;**111**(1058):11–4.

Fraser 2003
Fraser A, Williamson S, Lane M, Hollis B. Nurse-led dyspepsia clinic using the urea breath test for *Helicobacter pylori*. *New Zealand Medical Journal* 2003;**116**(1176):U479.

Frenck 2006
Frenck RW Jr, Fathy HM, Sherif M, Mohran Z, El Mohammedy H, Francis W, et al. Sensitivity and specificity of various tests for the diagnosis of *Helicobacter pylori* in Egyptian children. *Pediatrics* 2006;**118**(4):e1195–e202.

Fruehauf 2003
Fruehauf H, Lindenmann N, Volkart K, Bauerfeind P, Ben-Oren I, Fried M. The gastroscopic C-13-urea breath test: A new rapid online test for *Helicobacter pylori* (*HP*) detection during routine upper endoscopy. *Gastroenterology* 2003;**124**(4 (suppl)):A176.

Fry 2005
Fry LC, Curioso WH, Rickes S, Horton G, Hirschowitz BI, Monkemuller K. Comparison of 13C- urea blood test to 13C-breath test and rapid urease test for the diagnosis of *Helicobacter pylori* infection. *Acta Gastroenterologica Latinoamericana* 2005;**35**(4):225–9.

Fujisawa 2001
Fujisawa T, Kaneko T, Kumagai T, Akamatsu T, Katsuyama T, Kiyosawa K, et al. Evaluation of urinary rapid test for *Helicobacter pylori* in general practice. *Journal of Clinical Laboratory Analysis* 2001;**15**(3):154–9.

Fukuda 1996
Fukuda Y, Fukuda S, Munakata A, Yoshida Y, Shimoyama T. Validity of various diagnostic tests to evaluate cure of *Helicobacter pylori* infection. *Journal of Gastroenterology* 1996;**31**(2):171–4.

Fukuda 2002
Fukuda Y, Yoshida K, Ezaki H, Tomita T, Kosaka T, Hori K, et al. Diagnosis of *Helicobacter pylori* infection. *Nihon Rinsho [Japanese Journal of Clinical Medicine]* 2002;**60**(8):1543–8.

Fukuda 2003a
Fukuda Y, Tamura K, Tomita T, Hori K, Tanida N, Shimoyama T. Validation of the accuracy of the *H. pylori* stool antigen test (HPSA) in the Japanese population. *Digestive and Liver Disease* 2003;**35**(1):62–3.

Fukuda 2003b
Fukuda Y, Hori K, Sakagami T, Shimoyama T. Suitable diagnostic methods for *H. pylori* infection after eradication therapy. *Nihon Rinsho [Japanese Journal of Clinical Medicine]* 2003;**61**(1):102–8.

Fukuda 2005
Fukuda S, Tanaka M, Shimoyama T, Sato M, Takahashi R, Munakata A. Applicability of a *Helicobacter pylori* stool antigen test to determine the results of eradication therapy. *Helicobacter* 2005;**10**(5):524.

Fukuda 2006
Fukuda S, Shimoyama T, Nishiya D, Munakata A. Applicability of a *Helicobacter pylori* stool antigen test to determine the results of eradication therapy. *Gastroenterology* 2006;**130**(4 (suppl)):A571.

Fukuda 2007
Fukuda Y, Shimoyama T, Takahashi R, Nakabayashi N, Koizuka H, Abe D, et al. Evaluation of a new monoclonal antibody (HRII-51)-antigen capture ELISA with high specificity for *Helicobacter hepaticus* using sera from mice inoculated with *Helicobacter* species. *Helicobacter* 2007;**12**(4):388–9.

Fukuda 2009
Fukuda Y, Shimoyama T, Ohmura T, Sano Y, Nakabayashi N, Takahashi R, et al. Characterization and application of a new monoclonal antibody with high specificity for *Helicobacter hepaticus*. *Helicobacter* 2009;**14**(1):66–71.

Fusconi 1997
Fusconi M, Farinelli S, Menegatti M, Figura N, Landi F, Quan S, et al. Western immunoblotting (WB) and a recombinant immunoblotting assay (RIBA(TM)) for detection of *H-pylori* (HP) anti Cag-A reactivity (anti-HP Cag-A). *Gut* 1997;**41**(suppl):A73–A4.

Fusconi 1999
Fusconi M, Vaira D, Menegatti M, Farinelli S, Figura N, Holton J, et al. Anti-caga reactivity in Helicobacter pylori-negative subjects - a comparison of three different methods. *Digestive Diseases and Sciences* 1999;**44**(8):1691–5.

Galleguillos 1998
Galleguillos C, Gonzalez P, Massardo T, Morales A, Pimentel C, Gil C, et al. Low specificity of carbon-14-urea breath test is the gold standard adequate for *Helicobacter pylori* infection C. *Journal of Nuclear Medicine* 1998;**39**(5 Suppl):57P–8P.

Gallo 2001
Gallo N, Basso D, Zambon CF, Navaglia F, Di Mario F, Rugge M, et al. Diagnosis of *Helicobacter pylori* infection: Comparison of techniques. *Recenti Progressi in Medicina* 2001;**92**(5):332–5.

Ganga-Zandzou 2001
Ganga-Zandzou PS, Vincent P, Michaud L, Guimber D, Turck D, Gottrand F. C-13-urea breath test in children with *Helicobacter pylori* infection: Validity of the use of a mask to collect exhaled breath samples. *Acta Paediatrica* 2001;**90**(2):232–3.

Gangaidzo 1995
Gangaidzo I, Mason PR, Kiire CF, Bak-Jensen E, Willen R, Lelwala-Guruge J, et al. *Helicobacter pylori* in endoscopy patients in Zimbabwe: Value of enzyme-linked immunosorbent assay and a rapid urease test. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 1995;**89**(5):502–5.

Gao 2015
Gao F, Li W. Investigation on causes of false-negative 14-C-urea breath test. *Chinese Journal of Gastroenterology* 2015;**20**(3):151–4.

Garces 2012
Garces HRH, Gonzalez VVC, Fabian LG, Velazquez MI, Pena K, Sierra YA. Chromoendoscopy with red phenol in the diagnosis of Helicobacter pylori infection. *Revista Espanola De Enfermedades Digestivas* 2012;**104**(1):4–9.

Garcia 1996
Garcia JIP, Garcia JMP, Alonso IJ. C13 urea breath test for Helicobacter pylori. Validation of the method. *Revista Espanola De Enfermedades Digestivas* 1996;**88**(3):202–8.

Garcia 2000
Garcia Valriberas R, Gisbert JP, Hermida C, Cabrera MM, Diaz Blasco J, Pajares JM. Antibodies against Helicobacter pylori in saliva. Study of their validity versus breath test and its agreement with serology. *Atencion Primaria / Sociedad Espanola de Medicina de Familia y Comunitaria* 2000;**25**(6):390–4.

Garcia 2006
Garcia AJD, Gisbert JP. Is the string test a useful alternative to gastroscopy with biopsy for h-pylori identification?. *Revista Espanola De Enfermedades Digestivas* 2006;**98**(7):542–6.

Garcia-Diaz 2002
Garcia-Diaz E, Castro-Fernandez M, Romero-Gomez M, Vargas-Romero J. The effectiveness of (IgG-ELISA) serology as an alternative diagnostic method for detecting Helicobacter pylori infection in patients with gastro-intestinal bleeding due to gastro-duodenal ulcer. *Revista Espanola De Enfermedades Digestivas* 2002;**94**(12):725–36.

Garza-Gonzalez 2002
Garza-Gonzalez E, Perez-Perez GI, Tijerina-Menchaca R, Maldonado-Garza HJ, Bosques-Padilla FJ. Helicobacter pylori genotypes and their association with host's immune response. *Revista de Gastroenterologia de Mexico* 2002;**67**(3):155–60.

Garza-Gonzalez 2003
Garza-Gonzalez E, Bosques-Padilla FJ, Tijerina-Menchaca R, Flores-Gutierrez JP, Maldonado-Garza HJ, Perez-Perez GI. Comparison of endoscopy-based and serum-based

methods for the diagnosis of Helicobacter pylori. *Canadian Journal of Gastroenterology* 2003;**17**(2):101–6.

Gatta 2003a
Gatta L, Ricci C, Tampieri A. Noninvasive tests to diagnose Helicobacter pylori infection. *Current Gastroenterology Reports* 2003;**5**(5):351–2.

Gatta 2003b
Gatta L, Vakil N, Ricci C, Osborn JF, Tampieri A, Perna F, et al. A rapid, low-dose, c-13-urea tablet for the detection of Helicobacter pylori infection before and after treatment. *Alimentary Pharmacology & Therapeutics* 2003;**17**(6):793–8.

Gatta 2003c
Gatta L, Vakil N, Tampieri A, Ricci C, Perna F, Miglioli M, et al. Effects of proton pump inhibitor therapy (ppi) on 13C breath test (ubt) & stool antigen test (st) in h pylori (hp): Effects of citric acid & orange juice. *Gastroenterology* 2003;**124**(4 (suppl)):A58.

Gatta 2003d
Gatta L, Ricci C, Stanghellini V, Ali A, Menegatti M, Labate AMM, et al. Best cut-off values for c-14 -urea breath tests for Helicobacter pylori detection. *Scandinavian Journal of Gastroenterology* 2003;**38**(11):1144–8.

Gatta 2004a
Gatta L, Vakil N, Ricci C, Osborn JF, Tampieri A, Perna F, et al. Effect of proton pump inhibitors and antacid therapy on 13C urea breath tests and stool test for Helicobacter pylori infection. *American Journal of Gastroenterology* 2004; **99**(5):823–9.

Gatta 2004b
Gatta L, Perna F, Ricci C, Osborn JF, Tampieri A, Bernabucci V, et al. A rapid immunochromatographic assay for Helicobacter pylori in stool before and after treatment. *Alimentary Pharmacology & Therapeutics* 2004;**20**(4): 469–74.

Gatta 2006
Gatta L, Ricci C, Tampieri A, Osborn J, Perna F, Bernabucci V, et al. Accuracy of breath tests using low doses of 13C-urea to diagnose Helicobacter pylori infection: A randomised controlled trial. *Gut* 2006;**55**(4):457–62.

Gatta 2010a
Gatta L, Vaira D, Scarpignato C, Mario P, Cavestro G, Cavallaro L, et al. Diagnostic accuracy of serum pepsinogens and gastrin in the follow-up of Helicobacter pylori infection: A pilot study. *Digestive and Liver Disease* 2010;**42**:S112.

Gatta 2010b
Gatta L, Di Mario F, Vaira D, Rugge M, Scarpignato C, Malfertheiner P, et al. Diagnostic accuracy of serum pepsinogens and gastrin to follow-up Helicobacter pylori infection: A pilot study. *Gastroenterology* 2010;**138**(5 (suppl 1)):S340.

Gatta 2011
Gatta L, Di Mario F, Vaira D, Rugge M, Franze A, Plebani M, et al. Quantification of serum levels of pepsinogens and gastrin to assess eradication of Helicobacter pylori. *Clinical Gastroenterology & Hepatology* 2011;**9**(5):440–2.

Geletneky 1996
Geletneky JV, Meineke I, Ludtke FE, Schauer A, Bauer FE. Long-term investigation using the 13C-urea breath test (13C-UBT) for the noninvasive semiquantitative assessment of the extent of the mucosal lesion. *Verdauungskrankheiten* 1996;**14**(4):125–32.

Gemignani 2013
Gemignani L, Savarino E, Corbo M, Dulbecco P, Giacchino M, Giambruno E, et al. The diagnostic value of narrow-band imaging with magnifying endoscopy in the detection of gastric intestinal metaplasia: A prospective study in an unselected population. *Digestive and Liver Disease* 2013;**45**: S206.

Gene 2000
Gene E, Calvet X, Azagra R. Diagnosis of Helicobacter pylori after triple therapy in uncomplicated duodenal ulcers--a cost-effectiveness analysis. *Alimentary Pharmacology & Therapeutics* 2000;**14**(4):433–42.

Gerards 1999
Gerards C, Leodolter A, Nilius M, Peitz U, Malfertheiner P. Should we rely on serology or c-13-urea breath test (c-13-ubt) for therapy decision in h. Pylori infection?. *Gut* 1999; **45**(Suppl 3):A129.

Gerstenecker 1992
Gerstenecker B, Eschweiler B, Vogele H, Koch HK, Hellerich U, Kist M. Serodiagnosis of Helicobacter pylori infections with an enzyme immunoassay using the chromatographically purified 120 kilodalton protein. *European Journal of Clinical Microbiology & Infectious Diseases* 1992;**11**(7):595–601.

Ghasemian 2005
Ghasemian Safaei H, Fazeli A, Tamizifar H, Rashidi N. Comparison of salivary anti Helicobacter pylori IgG with serum IgG and bacteriological tests in detecting Helicobacter pylori infections. *Journal of Research in Medical Sciences* 2005;**10**(1):1–5.

Ghosh 2014
Ghosh R, Uppal B, Aggarwal P, Chakravarti A, Jha AK, Dubey AP. A comparative study of conventional and molecular techniques in diagnosis of campylobacter gastroenteritis in children. *Annals of Clinical and Laboratory Science* 2014;**44**(1):42–8.

Ghoshal 2010
Ghoshal UC, Kumar S, Krishnani N, Chourasia D, Tripathi S. Evaluation of utility of pepsinogen (pg)-i, pg-ii and gastrin-17 serum levels in diagnosis of cancer-associated gastric mucosal lesions like intestinal metaplasia in patients with h. Pylori infection in india. *Indian Journal of Gastroenterology* 2010;**29**(1 Suppl):A25–A6.

Gilger 2002
Gilger MA, Tolia V, Johnson A, Rabinowitz S, Jibaly R, Elitsur Y, et al. The use of an oral fluid immunoglobulin g ELISA for the detection of Helicobacter pylori infection in children. *Helicobacter* 2002;**7**(2):105–10.

Gill 2007
Gill P, Amini M, Ghaemi A, Shokouhizadeh L, Abdul-Tehrani H, Karami A, et al. Detection of Helicobacter pylori by enzyme-linked immunosorbent assay of thermophilic helicase-dependent isothermal DNA amplification. *Diagnostic Microbiology & Infectious Disease* 2007;**59**(3): 243–9.

Girdalidze 2013
Girdalidze AM, Elisabedashvili GV, Sharvadze LG, Dzhorbenadze TA. Comparative diagnostic value of Helicobacter pylori infection testing methods. *Georgian Medical News* 2013;**225**:53–60.

Gisbert 1996
Gisbert JP, Boixeda D, Redondo C, Alvarez Baleriola I, Jimenez I, Perez Garcia JI, et al. Breath test in the diagnosis of Helicobacter pylori infection: concordance with histological methods and correlation with anatomopathological lesions of the gastric mucosa. *Revista Espanola de Enfermedades Digestivas* 1996;**88**(4):259–64.

Gisbert 1997
Gisbert JP, Boixeda D, deArgila CM, Barba M, Bermejo F, Plaza AG, et al. Long-term follow-up after h-pylori eradication: Reinfection incidence and evolution of urea breath test. *Gut* 1997;**41**(suppl):A78.

Gisbert 1999a
Gisbert JP, Vazquez MA, Jimenez I, Carpio D, Cruzado AI, Del Castillo E, et al. C-13-urea breath test for the diagnosis of h-pylori infection: Is citric acid necessary?. *Gut* 1999;**45** (Suppl 3):A129.

Gisbert 1999b
Gisbert JP, Vazquez MA, Jimenez I, Del Castillo E, Martin MJ, Morales A, et al. C-13-urea breath test for the diagnosis of h-pylori infection: Is citric acid necessary?. *Gastroenterology* 1999;**116**(4 (suppl)):A171.

Gisbert 1999c
Gisbert JP, Boixeda D, Al-Mostafa A, Vila T, De Rafael L, Baleriola IA, et al. Basal and stimulated gastrin and pepsinogen levels after eradication of Helicobacter pylori: A 1-year follow-up study. *European Journal of Gastroenterology & Hepatology* 1999;**11**(2):189–200.

Gisbert 2000a
Gisbert J, Gonzalez L, De Pedro A, Vaibuena M, Prieto B, Llorca I, et al. C-13-urea breath test for the diagnosis of h-pylori infection: Are basal samples necessary?. *Gastroenterology* 2000;**118**(4):A1238.

Gisbert 2000b
Gisbert JP. Diagnosis of Helicobacter pylori infection. *Revista Clinica Espanola* 2000;**200**(7):370–2.

Gisbert 2000c
Gisbert JP, Benito LM, Lara S, Vazquez A, Jimenez I, Pajares JM. C-13-urea breath test for the diagnosis of Helicobacter pylori infection: Are basal samples necessary?. *European Journal of Gastroenterology & Hepatology* 2000;**12**(11): 1201–5.

Gisbert 2000d
Gisbert JP, Blanco M, Benito LM, Pajares JM. Value of quantitative serology for confirmation of Helicobacter pylori eradication: An 18-month follow-up study. *Clinical Infectious Diseases* 2000;**30**(6):976–80.

Gisbert 2000e
Gisbert JP, Cruzado AI, Cabrera MM, Carpio D, Benito LM, Perez Poveda JJ, et al. "Rapid" serology for the diagnosis of Helicobacter pylori infection. Evaluation of its accuracy compared with a gold-standard and its concordance with "classic" serology. *Gastroenterologia Y Hepatologia* 2000;**23**(4):159–64.

Gisbert 2000f
Gisbert JP, Vazquez MA, Jimenez I, Cruzado AI, Carpio D, Del Castillo E, et al. 13C-urea breath test for the diagnosis of Helicobacter pylori infection before treatment: Is citric acid necessary?. *Digestive & Liver Disease* 2000;**32**(1):20–4.

Gisbert 2000g
Gisbert J, Cruzado A, Cabrera M, Carpio D, Benito L, Perez-Poveda J, et al. Rapid whole blood test for diagnosing *H. pylori* infection. Validation against a gold standard and study of its concordance with ELISA serology. *Gastroenterology* 2000;**118**(4):A1238.

Gisbert 2001
Gisbert JP, Pajares JM. Diagnosis of Helicobacter pylori infection by stool antigen determination: A systematic review. *American Journal of Gastroenterology* 2001;**96**(10): 2829–38.

Gisbert 2002a
Gisbert JP, Ducons J, Gomollon F, Dominguez-Muñoz E, Borda F, Mino G, et al. Validation of c-13-urea breath test for the initial diagnosis of Helicobacter pylori infection and for the confirmation of its eradication after treatment. *Gut* 2002;**51**(Suppl):A109.

Gisbert 2002b
Gisbert JP, Gomollon F, Dominguez-Muñoz E, Borda F, Jimenez I, Vazquez MA, et al. Isotope ratio mass spectrometry (irms) versus nondispersive infrared spectrometry (ndirs) c-13-urea breath test for the diagnosis of Helicobacter pylori infection. *Gut* 2002;**51**(Suppl): A111.

Gisbert 2002c
Gisbert JP, Vazquez MA, Cantero J, Pajares JM. Study of the validity of «rapid» serology in diagnosing Helicobacter pylori infection. *Atencion Primaria* 2002;**30**(8):501–6.

Gisbert 2002d
Gisbert JP, Cabrera Md Mdel M, Pajares JM. Stool antigen test for initial Helicobacter pylori diagnosis and for confirmation of eradication after therapy. *Medicina Clinica* 2002;**118**(11):401–4.

Gisbert 2003a
Gisbert JP, Gomollon F, Dominguez-Muñoz JE, Borda F, Jimenez I, Vazquez MA, et al. Comparison between two 13C-urea breath tests for the diagnosis of Helicobacter pylori infection: Isotope ratio mass spectrometer versus

infrared spectrometer. *Gastroenterologia Y Hepatologia* 2003; **26**(3):141–6.

Gisbert 2003b
Gisbert JP, Ducons J, Gomollon F, Dominguez-Muñoz JE, Borda F, Mino G, et al. Validation of the c-13-urea breath test for the initial diagnosis of Helicobacter pylori infection and to confirm eradication after treatment. *Revista Espanola De Enfermedades Digestivas* 2003;**95**(2):121–6.

Gisbert 2004a
Gisbert JP, Pajares JM. Stool antigen test for the diagnosis of Helicobacter pylori infection: A systematic review. *Helicobacter* 2004;**9**(4):347–68.

Gisbert 2004b
Gisbert JP, Khorrami S, Carballo F, Calvet X, Gene E, Dominguez-Muñoz E. Meta-analysis: Helicobacter pylori eradication therapy vs. antisecretory non-eradication therapy for the prevention of recurrent bleeding from peptic ulcer. *Alimentary Pharmacology and Therapeutics* 2004;**19** (6):617–29.

Gisbert 2005
Gisbert JP, Trapero M, Pajares JM. Evaluation of 3 different tests for the detection of stool antigens to confirm Helicobacter pylori eradication after treatment. A pilot study. *Gastroenterologia Y Hepatologia* 2005;**28**(10):615–8.

Gisbert 2006a
Gisbert JP, Abraira V. Accuracy of Helicobacter pylori diagnostic tests in patients with bleeding peptic ulcer: A systematic review and meta-analysis. *American Journal of Gastroenterology* 2006;**101**(4):848–63.

Gisbert 2006b
Gisbert JP, De la Morena F, Abraira V. Accuracy of monoclonal stool antigen test for the diagnosis of Helicobacter pylori infection: A systematic review and meta-analysis. *Helicobacter* 2006;**11**(4):380.

Gisbert 2006c
Gisbert JP, Esteban C, Jimenez I, Moreno-Otero R, Pajares JM. C-13-urea breath test during hospitalization for the diagnosis of Helicobacter pylori infection in peptic ulcer bleeding. *Helicobacter* 2006;**11**(4):382.

Gisbert 2006d
Gisbert JP, Olivares D, Jimenez I, Pajares JM. Is there any correlation between 13C-urea breath test values and response to first-line and rescue Helicobacter pylori eradication therapies?. *Digestive & Liver Disease* 2006;**38** (4):254–9.

Gisbert 2006e
Gisbert JP, Olivares D, Jimenez I, Pajares JM. Is there any correlation between c-13-urea breath test values and response to first-line and rescue Helicobacter pylori eradication therapies?. *Helicobacter* 2006;**11**(4):380–1.

Gisbert 2006f
Gisbert JP, Olivares D, Jimenez I, Pajares JM. Long-term follow-up of 13C-urea breath test results after Helicobacter pylori eradication: Frequency and significance of borderline delta13Co2 values. *Alimentary Pharmacology & Therapeutics* 2006;**23**(2):275–80.

Gisbert 2006g
Gisbert JR, De la Morena F, Abraira V. Accuracy of monoclonal stool antigen test for the diagnosis of h-pylori infection: A systematic review and meta-analysis. *American Journal of Gastroenterology* 2006;**101**(8):1921–30.

Gisbert 2006h
Gisbert JP. Breath test with c-13-urea for h. Pylori infection diagnosis by means of mass spectrometry and infrared spectrophotometry. *Salud I Ciencia* 2006;**15**(1):461–3.

Gisbert 2007
Gisbert JP, Esteban C, Jimenez I, Moreno-Otero R. 13C-urea breath test during hospitalization for the diagnosis of Helicobacter pylori infection in peptic ulcer bleeding. *Helicobacter* 2007;**12**(3):231–7.

Glassman 1990
Glassman MS, Dallal S, Berezin SH, Bostwick HE, Newman LJ, Perez-Perez GI, et al. Helicobacter pylori-related gastroduodenal disease in children. Diagnostic utility of enzyme-linked immunosorbent assay. *Digestive Diseases & Sciences* 1990;**35**(8):993–7.

Glupczynski 1992
Glupczynski Y, Bourdeaux L, Verhas M, DePrez C, DeVos D, Devreker T. Use of a urea breath test versus invasive methods to determine the prevalence of Helicobacter pylori in Zaire. *European Journal of Clinical Microbiology & Infectious Diseases* 1992;**11**(4):322–7.

Gobert 1988
Gobert B, Bene MC, Faure G, Dekorwin JD, Conroy MC, Mole C, et al. Detection of antibodies to campylobacter pyloridis by immunoprint and by quantitative ELISA test. *Annales De Biologie Clinique* 1988;**46**(7):523.

Gobert 1989
Gobert B, Bene MC, Faure G, Denis JJ, De Korwin JD, Conroy MC, et al. IgG, IgA and IgM antibodies to campylobacter pylori detected by dot-ELISA and ELISA. Gastroduodenal pathology and Campylobacter pylori: European Campylobacter Pylori Study Group ICS847. 1989:219–22.

Goel 2003
Goel N, Sherwal BL, Patwari AK, Bajaj P, Choudhury M. Evaluation of invasive and non-invasive diagnostic modalities for Helicobacter pylori infection in children. *Indian Pediatrics* 2003;**40**(2):141–6.

Goettner 2012
Goettner G, Formicella L, Romberg L, Bolz C, Nolting C, Soutschek E, et al. Novel immuno-line system to detect infections with pathogenic h. Pylori. *Helicobacter* 2012;**17**: 70.

Goh 1995
Goh KL, Parasakthi N, Peh SC, Ong KK. 14c-urea breath test: A useful non-invasive test in the diagnosis of Helicobacter pylori infection. *Medical Journal of Malaysia* 1995;**50**(3):208–11.

Goji 2015
Goji S, Tamura Y, Sasaki M, Nakamura M, Matsui H, Yamagata Murayama S, et al. Helicobacter suis-infected nodular gastritis and a review of diagnostic sensitivity for Helicobacter heilmannii-like organisms. *Case Reports in Gastroenterology* 2015;**9**:179–87.

Gold 2000
Gold BD, Colletti RB, Abbott M, Czinn SJ, Elitsur Y, Hassall E, et al. Helicobacter pylori infection in children: Recommendations for diagnosis and treatment. *Journal of Pediatric Gastroenterology and Nutrition* 2000;**31**(5):490–7.

Gold 2014
Gold BD, Elfant AB. Helicobacter pylori detection and eradication in pediatric and adult patients. *Gastroenterology and Hepatology* 2014;**10**(7):447–50.

Gomes 2002
Gomes AT, Coelho LK, Secaf M, Modena JL, Troncon LE, Oliveira RB. Accuracy of the 14c-urea breath test for the diagnosis of Helicobacter pylori. *Sao Paulo Medical Journal [Revista Paulista de Medicina]* 2002;**120**(3):68–71.

Gomes 2005
Gomes CAR Jr, Catapani WR, Mader AMAA, Locatelli A, Silva CBP, Waisberg J. Antral exfoliative cytology for the detection of Helicobacter pylori in the stomach. *World Journal of Gastroenterology* 2005;**11**(18):2784–8.

Gomez 2000
Gomez MR, Vargas J, Grande L, Otero MA, Bernal S, Fernandez MC. Usefulness of Helicobacter pylori antigens detection in stools for infection diagnosis and confirming eradication. *Medicina Clinica* 2000;**114**(15):571–3.

Gomez 2011
Gomez PP, Rodriguez CG, Meleiro JI, Rodriguez MM, Sanchez FM. Helicobacter pylori infection in children diagnosed via the urea breath test. *Helicobacter* 2011;**16**: 111.

Gomez-Camarasa 2014
Gomez-Camarasa C, Gutierrez-Fernandez J, Rodriguez-Granger JM, Sampedro-Martinez A, Sorlozano-Puerto A, Navarro-Mari JM. Evaluation of the rapid ridaquick campylobacter test in a general hospital. *Diagnostic Microbiology and Infectious Disease* 2014;**78**(2):101–4.

Gomollon 2003
Gomollon F, Ducons JA, Santolaria S, Omiste IL, Guirao R, Ferrero A, et al. Breath test is very reliable for diagnosis of Helicobacter pylori infection in real clinical practice. *Digestive and Liver Disease* 2003;**35**(9):612–8.

Gong 2010
Gong YH, Sun LP, Jin SG, Yuan Y. Comparative study of serology and histology based detection of Helicobacter pylori infections: A large population-based study of 7, 241 subjects from China. *European Journal of Clinical Microbiology & Infectious Diseases* 2010;**29**(7):907–11.

Gong 2014
Gong YH, Wei W, Yuan Y. Association between abnormal gastric function risk and Helicobacter pylori infection assessed by ELISA and C-14-urea breath test. *Diagnostic Microbiology and Infectious Disease* 2014;**80**(4):316–20.

Gonzalez 2003
Gonzalez P, Galleguillos C, Massardo T, Rivera M, Morales A, Smok G, et al. Could the [14c]urea breath test be proposed as a 'gold standard' for detection of Helicobacter pylori infection ?. *Medical Science Monitor* 2003;**9**(8): CR363–8.

Gonzalez 2004
Gonzalez P. 14c-urea breath test as a 'gold standard' for detection of Helicobacter pylori infection - in reply. *Medical Science Monitor* 2004;**10**(9):LE17–LE8.

Gonzalez 2007
Gonzalez FCG, Serrano C, Harris PR. Diagnosis of Helicobacter pylori infection in children based on stool antigen test. *Revista Medica De Chile* 2007;**135**(2):182–8.

Gonzalez 2012
Gonzalez CA, Megraud F, Buissonniere A, Lujan Barroso L, Agudo A, Duell EJ, et al. Helicobacter pylori infection assessed by ELISA and by immunoblot and noncardia gastric cancer risk in a prospective study: The eurgast-epic project. *Annals of Oncology* 2012;**23**(5):1320–4.

Gonzalez 2013
Gonzalez L, Marrero K, Reyes O, Rodriguez E, Martinez L, Rodriguez BL. Cloning and expression of a recombinant caga -gene fragment of Helicobacter pylori and its preliminary evaluation in serodiagnosis. *Biomedica* 2013;**33** (4):546–53.

Gonzalez-Cuevas 2001
Gonzalez-Cuevas A, Juncosa T, Jene M, Varea V, Gene A, Muñoz C, et al. Helicobacter pylori infections: Antigen detection in stool samples. *Enfermedades Infecciosas Y Microbiologia Clinica* 2001;**19**(2):49–52.

Good 1991
Good DJ, Dill S, Mossi S, Frey R, Beglinger C, Stalder GA, et al. Sensitivity and specificity of a simplified, standardized 13C-urea breath test for the demonstration of Helicobacter pylori. *Schweizerische Medizinische Wochenschrift Journal Suisse de Medecine* 1991;**121**(20):764–6.

Goodwin 1987
Goodwin CS, Blincow E, Peterson G. Enzyme-linked immunosorbent assay for campylobacter pyloridis: Correlation with presence of c. Pyloridis in the gastric mucosa. *Journal of Infectious Diseases* 1987;**155**(3):488–94.

Gosciniak 1993
Gosciniak G, Matysiak-Budnik T, Przondo-Mordarska A. Evaluation of three serological tests for the detection of Helicobacter pylori associated infection. *Archivum Immunologiae et Therapiae Experimentalis* 1993;**41**(5-6): 315–9.

Gosciniak 1996
Gosciniak G, Poniewierka E, Iwanczak B, Grzeszek T. Iga antibodies against Helicobacter pylori in serum and saliva of patients with upper gastrointestinal tract diseases. *Gastroenterologia Polska* 1996;**3**(2):119–24.

Gosciniak 2000
Gosciniak G, Przondo-Mordarska A, Iwanczak B, Poniewierka E. Neutralisation of vacuolating activity of cytotoxin by serum antibodies of Helicobacter pylori infected patients. *Acta Microbiologica Polonica* 2000;**49**(2): 113–20.

Gosciniak 2002
Gosciniak G, Przondo-Mordarska A, Iwanczak B, Blitek A. Detection of Helicobacter pylori antigen in stool specimens taken from children with chronic gastritis. *Polski Merkuriusz Lekarski* 2002;**12**(68):104–7.

Gosciniak 2003
Gosciniak G, Przondo-Mordarska A, Iwanczak B, Blitek A. Helicobacter pylori antigens in stool specimens of gastritis children before and after treatment. *Journal of Pediatric Gastroenterology & Nutrition* 2003;**36**(3):376–80.

Goto 1995
Goto Y, Ogihara Y, Taniguchi Y, Satoh K, Kimura K, Takatori K, et al. Simple rapid and inexpensive diagnosis of Helicobacter-pylori infection in c-13-urea breath test - ir spectrometric analysis. *Gastroenterology* 1995;**108**(4 (suppl)):A103.

Goto 1998
Goto A, Fujimori K, Kaneko T, Akamatsu T. Diagnosis of Helicobacter infections by serodiagnosis, analysis of serum pepsinogen, and urea breath tests. *Nihon Naika Gakkai Zasshi [Journal of the Japanese Society of Internal Medicine]* 1998;**87**(5):863–7.

Gotoh 1997
Gotoh T, Nishizono A, Mifune K, Fujioka T, Nasu M, Azumi J. Validity of the new ELISA system of serodiagnosis for eradication of Helicobacter pylori infection. *Gastroenterology* 1997;**112**(4 (suppl)):A131.

Gottrand 2001
Gottrand F. Diagnostic tests and treatment of helicopter pylori gastritis in children. *Archives De Pediatrie* 2001;**8**: 396S–8S.

Graham 1986
Graham DY, Klein PD, Evans DG, Opekun AR, Evans DG, Alpert LC, et al. Rapid noninvasive diagnosis of gastric campylobacter by a c-13 urea breath test. *Gastroenterology* 1986;**90**(5):1435.

Graham 1987
Graham DY, Evans DJ, Alpert LC, Klein PD, Evans DG, Opekun AR, et al. Campylobacter-pylori detected noninvasively by the c-13 urea breath test. *Lancet* 1987;**1** (8543):1174–7.

Graham 1991
Graham DY, Malaty HM, Evans DG, Evans DJ Jr, Klein PD, Adam E. Epidemiology of Helicobacter pylori in an asymptomatic population in the United States. Effect of age, race, and socioeconomic status. *Gastroenterology* 1991; **100**(6):1495–501.

Graham 1996b
Graham DY, Malaty HM, ElZimaity HM, Genta RM, Yousfi MM, Klein PD. 20 minute fasting version of the us c-13-urea breath test for the diagnosis of h-pylori infection. *Gastroenterology* 1996;**110**(4 (suppl)):A122.

Graham 2000
Graham DY, Klein PD. Accurate diagnosis of Helicobacter pylori - c-13-urea breath test. *Gastroenterology Clinics of North America* 2000;**29**(4):885.

Graham 2001a
Graham DY, Malaty HM, Cole RA, Martin RF, Klein PD. Simplified 13C-urea breath test for detection of Helicobacter pylori infection. *American Journal of Gastroenterology* 2001; **96**(6):1741–5.

Graham 2001b
Graham DY, Reddy S. Rapid detection of anti-Helicobacter pylori igg in urine using immunochromatography. *Alimentary Pharmacology & Therapeutics* 2001;**15**(5): 699–702.

Graham 2001c
Graham DY. An alternate explanation of the effect of citric acid on proton pump inhibitor-associated false negative urea breath tests. *American Journal of Gastroenterology* 2001; **96**(10):3037–9.

Graham 2010
Graham DY. Monoclonal stool antigen testing for diagnosing Helicobacter pylori in young children: Revisited. *Journal of Pediatric Gastroenterology and Nutrition* 2010;**51** (3):373.

Granberg 1993
Granberg C, Mansikka A, Lehtonen OP, Kujari H, Gronfors R, Nurmi H, et al. Diagnosis of Helicobacter pylori infection by using Pyloriset EIA-G and EIA-A for detection of serum immunoglobulin G (IgG) and IgA antibodies. *Journal of Clinical Microbiology* 1993;**31**(6):1450–3.

Grino 2001
Grino P, Pascual S, Such J, Casellas JA, Niveiro M, Andreu M, et al. Comparison of diagnostic methods for Helicobacter pylori infection in patients with upper gastrointestinal bleeding. *Scandinavian Journal of Gastroenterology* 2001;**36**(12):1254–8.

Grino 2003
Grino P, Pascual S, Such J, Casellas JA, Niveiro M, Andreu M, et al. Comparison of stool immunoassay with standard methods for detection of Helicobacter pylori infection in patients with upper-gastrointestinal bleeding of peptic origin. *European Journal of Gastroenterology & Hepatology* 2003;**15**(5):525–9.

Grossi 2000
Grossi C, Mombelli B, Capurso G, Martino G, Gismondo M, Lahner E, et al. Low sensitivity of c-13-urea breath test (ubt) in the diagnosis of h-pylori infection in atrophic body gastritis patients (abg). *Gut* 2000;**47**(Suppl 1):A117.

Grossi 2012
Grossi L, Di Tullio AM, Pagliaro M, Tavani R, Cocciolillo S, Ciccaglione AF, et al. Relationship between Helicobacter pylori infection and gerd symptoms. *Digestive and Liver Disease* 2012;**44**:S152.

Grotowski 1998
Grotowski M, Winnicki L, Trawinski J, Gancarz A, Domaniecki J. Prevalence of Helicobacter pylori infection after surgery of gastric or duodenal peptic ulcer. *Gastroenterologia Polska* 1998;**5**(6):525–30.

Groves 1997
Groves FD, Zhang L, Li JY, You WC, Chang YS, Zhao L, et al. Comparison of two enzyme-linked immunosorbent assay tests for diagnosis of Helicobacter pylori infection in China. *Cancer Epidemiology, Biomarkers & Prevention* 1997; **6**(7):551–2.

Groves 2002
Groves FD, Perez-Perez G, Zhang L, You WC, Lipsitz SR, Gail MH, et al. Serum antibodies to Helicobacter pylori and the caga antigen do not explain differences in the prevalence of precancerous gastric lesions in two Chinese populations with contrasting gastric cancer rates. *Cancer Epidemiology Biomarkers and Prevention* 2002;**11**(10 I): 1091–4.

Guducuoglu 2010
Guducuoglu H, Berktas M, Bozkurt H, Toka Ozer T, Bulut G, Ozturk O, et al. Evaluation of western blot method for the detection of antibodies to Helicobacter pylori antigens in patients with gastric carcinoma and cases with epigastric complaints. *Mikrobiyoloji Bulteni* 2010;**44**(1):21–8.

Guell 2006
Guell M, Artigau E, Esteve V, Sanchez-Delgado J, Junquera F, Calvet X. Usefulness of a delayed test for the diagnosis of Helicobacter pylori infection in bleeding peptic ulcer. *Alimentary Pharmacology & Therapeutics* 2006;**23**(1):53–9.

Guja 1999
Guja M, Lombardo L, Andrini L, Della Monica P, Vicari S, Sallio F, et al. Is Helicobacter pylori stool antigen assay comparable to urea breath test in the diagnosis of h-pylori infection?. *Gastroenterology* 1999;**116**(4 (suppl)):A178.

Gulcan 2005
Gulcan EM, Varol A, Kutlu T, Cullu F, Erkan T, Adal E, et al. Helicobacter pylori stool antigen test. *Indian Journal of Pediatrics* 2005;**72**(8):675–8.

Gunay 2009
Gunay EC, Yengel E, Ucblek E, Altintas E, Sezgin O. C-14 urea breath test values do not correlate with the degree of colonization by Helicobacter pylori in adults. *European Journal of Nuclear Medicine and Molecular Imaging* 2009; **36**:S442.

Guo 2005
Guo YY, Zhang ST, Peng XX, Zhan SY. A systematic review of diagnosis of Helicobacter pylori infection by Helicobacter pylori stool antigen test.. *National Medical Journal of China* 2005;**85**(22):1564–7.

Gupta 2003
Gupta P, Pandey LB, Behra RN, Rai MK, Chandra R. Role of ELISA in *H. pylori* detection and its correlation with urease test. *Indian Journal of Pathology & Microbiology* 2003;**46**(3):511–4.

Gurbuz 2009
Gurbuz ED, Soyturk M, Yilmaz O, Bekmen N, Guvenir M, Ellidokuz H, et al. The importance of stool antigen test for the diagnosis of Helicobacter pylori infection and eradication follow-up. *Clinical Microbiology and Infection* 2009;**15**:S316.

Guslandi 2000
Guslandi M. Stool immunoassay for Helicobacter pylori is not specific enough. *BMJ* 2000;**320**(7248):1541.

Gutierrez 1999
Gutierrez A, Celdran MT, Bonilla F, Vazquez N, Royo G, Sillero C. Use of Helicobacter pylori (hp) antigen test in stool samples to detect hp infection. *Gastroenterologia y Hepatologia* 1999;**22**(10):533.

Gutierrez 2005
Gutierrez S, Chacon-Petrola M, Flores M, Pinto A, Pacheco M. Evaluation of infection by Helicobacter pylori in hiv positive patients trough enzyme immunoassay and specific amplification of DNA. *Investigacion Clinica* 2005;**46**(1): 43–52.

Guven 2011
Guven MA, Ertas IE, Coskun A, Ciragil P. Serologic and stool antigen assay of Helicobacter pylori infection in hyperemesis gravidarum: Which test is useful during early pregnancy?. *Taiwanese Journal of Obstetrics & Gynecology* 2011;**50**(1):37–41.

Hackelsberger 1998
Hackelsberger A, Schultze V, Peitz U, Gunther T, Nilius M, Diete U, et al. Performance of a rapid whole blood test for Helicobacter pylori in primary care: A German multicenter study. *Helicobacter* 1998;**3**(3):179–83.

Haggerty 2005
Haggerty TD, Perry S, Sanchez L, Perez-Perez G, Parsonnet J. Significance of transiently positive enzyme-linked immunosorbent assay results in detection of Helicobacter pylori in stool samples from children. *Journal of Clinical Microbiology* 2005;**43**(5):2220–3.

Hahn 2000
Hahn M, Fennerty MB, Corless CL, Magaret N, Lieberman DA, Faigel DO. Noninvasive tests as a substitute for histology in the diagnosis of Helicobacter pylori infection. *Gastrointestinal Endoscopy* 2000;**52**(1):20–6.

Hamlet 1995
Hamlet AK, Erlandsson KIM, Olbe L, Svennerholm AM, Backman VEM, Pettersson AB. A simple, rapid, and highly reliable capsule-based ^{14}C urea breath test for diagnosis of Helicobacter pylori infection. *Scandinavian Journal of Gastroenterology* 1995;**30**(11):1058–63.

Hamlet 1999
Hamlet A, Stage L, Lonroth H, Cahlin C, Nystrom C, Pettersson A. A novel tablet-based c-13 urea breath test for Helicobacter pylori with enhanced performance during acid suppression therapy. *Scandinavian Journal of Gastroenterology* 1999;**34**(4):367–74.

Han 2006
Han FC, Li XJ, Jiang H, Qin LP, Li D, Guo YH, et al. Detection of h. Pylori antibody profile in serum by protein array. *World Journal of Gastroenterology* 2006;**12**(25): 4044–8.

Hanvivatvong 2004
Hanvivatvong O, Pongpanich A, Thong-Ngam D, Thammacharoenrach N, Kullavanijaya P. Evaluation of commercial immunoassays for detection of antibody against Helicobacter pylori in thai dyspeptic patients. *Clinical and Diagnostic Laboratory Immunology* 2004;**11**(3):618–20.

Hanvivatvong 2006
Hanvivatvong O, Thong-Ngam D, Kuakarn S, Mahachai V. Evaluation of Helicobacter pylori stool antigen test in Thai patients with upper gastrointestinal bleeding. *Journal of the Medical Association of Thailand* 2006;**89 Suppl 3**:S98–103.

Harde 2008
Harde H, Dressler M, Helmrich G, Wolff M, Groninga H. New optical analyzer for c-13-breath test. Biophotonics: photonic solutions for better health care. Progress in biomedical optics and imaging; 2008 April 8-10; Strasbourg. Bellingham (DC): SPIE, 2008; Vol. 6691: 69910T. [DOI: 10.1117/12.781271; 69910T

Harde 2010
Harde H, Helmrich G, Wolff M. Optoacoustic c-13-breath test analyzer. Photons plus ultrasound: imaging and sensing 2010. International Society for Optical Engineering; 2010 Jan 24-26; San Francisco (CA). Bellingham (WA): SPIE, 2010; Vol. 7564:75641E. [DOI: 10.1117/12.841660

Harries 1992
Harries AD, Stewart M, Deegan KM, Mughogho GK, Wirima JJ, Hommel M, et al. Helicobacter pyrlori in Malawi, central africa. *Journal of Infection* 1992;**24**(3): 269–76.

Harris 1995
Harris AW. Helicobacter pylori testing at home. *European Journal of Gastroenterology & Hepatology* 1995;**7**(7):595–6.

Harris 1998
Harris AW. Helicobacter pylori and urea breath testing. Can the breath test result predict the outcome of treatment? . *Italian Journal of Gastroenterology & Hepatology* 1998;**30** (2):151–2.

Harrison 1998
Harrison JR, Bevan J, Furth EE, Metz DC. Accustat whole blood fingerstick test for Helicobacter pylori infection - a reliable screening method. *Journal of Clinical Gastroenterology* 1998;**27**(1):50–3.

Hart 1999
Hart GC, Avison MP. 13C-urea versus 14c-urea breath test: Is there still a need for 14c-urea?. *Nuclear Medicine Communications* 1999;**20**(5):495–6.

Hartman 1992
Hartman NG, Jay M, Hill DB, Bera RK, Nickl NJ, Ryo UY. Noninvasive detection of Helicobacter pylori colonization in stomach using ^{11}C-urea. *Digestive Diseases and Sciences* 1992;**37**(4):618–21.

Hartmann 2003
Hartmann D, Schilling D, Riemann JF. New nondispersive infrared spectrometry in c-13-urea breath tests. *Deutsche Medizinische Wochenschrift* 2003;**128**(31-32):1645–8.

Hashemi 2008
Hashemi MR, Rahnavardi M, Bikdeli B, Zahedani MD, Iranmanesh F. Touch cytology in diagnosing Helicobacter pylori: Comparison of four staining methods. *Cytopathology* 2008;**19**(3):179–84.

Hassan 2013
Hassan K, Haq M. To study the frequency of h pylori in patients presenting with functional dyspepsia using stool antigen test and its comparison with serology. *Journal of Gastroenterology and Hepatology* 2013;**28**:547.

Hauser 2006
Hauser B, Wybo I, Tshibuabua G, Pierard D, Vandenplas Y. Multiple-step polyclonal versus one-step monoclonal enzyme immunoassay in the detection of Helicobacter pylori antigen in the stools of children. *Acta Paediatrica* 2006;**95**(3):297–301.

Havlasova 1998
Havlasova J, Bures J, Rejchrt S, Voxova B, Krejsek J. Helicobacter pylori caga antigen antibodies. *Casopis Lekaru Ceskych* 1998;**137**(13):404–9.

Hawthorne 1999
Hawthorne Barney A, Morgan S, Westmoreland D, Stenson R, Thomas GAO, Newcombe RG. A comparison of two rapid whole-blood tests and laboratory serology, in the diagnosis of Helicobacter pylori infection. *European Journal of Gastroenterology & Hepatology* 1999;**11**(8):863–5.

Hawtin 1999
Hawtin PR. Serology and urea breath test in the diagnosis of h-pylori infection. *Molecular Biotechnology* 1999;**11**(1): 85–92.

Hayashi 2003
Hayashi T, Karasawa T, Nagase H, Kinami S, Fujimura T, Miwa K, et al. Timing of sampling in endoscopic ^{13}C-urea breath test for *H. pylori* infection. *Japanese Pharmacology and Therapeutics* 2003;**31**(8):667–70.

He 1997
He YN, Chen HY, Zheng JJ, Zhang GY, Chen ZL. Differential pulse voltammetric enzyme-linked immunoassay for the determination of Helicobacter pylori specific immunoglobulin g (igg) antibody. *Talanta* 1997;**44** (5):823–30.

Heaney 1998
Heaney A, Collins JS, Watson RG, McFarland RJ, Bamford KB. Rapid serological diagnosis of Helicobacter pylori: A need for caution and re-evaluation. *Irish Journal of Medical Science* 1998;**167**(3):152–4.

Heanhean 2013
Heanhean Ng T, Rosaida R. Evaluation of serology and urea breath test as reliable diagnostic test for h.Pylori infection. *Journal of Gastroenterology and Hepatology* 2013;**28**:97.

Heenan 1989
Heenan A. Breath tester. *Nursing Times* 1989;**85**(36):23.

Hegedus 2001a
Hegedus O, Rehnberg AS, Bengtsson C, Befrits R, Granstrom M, Hellstrom PM. Refinement and development of a "dry" novel 14c-urea breath test (heliprobe (tm)) for detection of Helicobacter pylori. *Gastroenterology* 2001;**120** (5 (suppl)):A653.

Hegedus 2001b
Hegedus O, Mjornell U, Prior C, Ryden J, Hellstrom PM. Rapid urea breath test (heliprobe) for detection of Helicobacter pylori by use of encapsulated acidified solid c-14-urea: Validation of test accuracy. *Gut* 2001;**49**(Suppl): A101.

Hegedus 2002
Hegedus O, Ryden J, Rehnberg AS, Nilsson S, Hellstrom PM. Validated accuracy of a novel urea breath test for rapid Helicobacter pylori detection and in-office analysis. *European Journal of Gastroenterology & Hepatology* 2002;**14** (5):513–20.

Helvaci 1993
Helvaci S, Akdis C, Gulten M, Yerci O. Evaluation of the ELISA method for the diagnosis of Helicobacter pylori. *Mikrobiyoloji Bulteni* 1993;**27**(4):294–8.

Henze 1988
Henze E, Malfertheiner P, Burkhardt H, Clausen M, Adam WE. The c-14 urea breath test for detecting colonization of campylobacter pylori invivo. *European Journal of Nuclear Medicine* 1988;**14**(5-6):245.

Henze 1989
Henze E, Malfertheiner P, Clausen M, Lietzenmaier R, Burkhardt H, Adam WE. Diagnostic accuracy of a ^{14}C-urea breath test for detecting campylobacter pylori infection. Gastroduodenal pathology and Campylobacter pylori: European Campylobacter Pylori Study Group ICS847. 1989:85–8.

Henze 1990
Henze E, Malfertheiner P, Clausen M, Burkhardt H, Adam WE. Validation of a simplified carbon-14-urea breath test for routine use for detecting Helicobacter [correction of heliobacter] pylori noninvasively. *Journal of Nuclear Medicine* 1990;**31**(12):1940–4.

Herbrink 1988
Herbrink P, Vandenmunckhof HAM, Bumkens M, Lindeman J, Vandijk WC. Human-serum antibody-response in campylobacter-jejuni enteritis as measured by enzyme-linked immunosorbent-assay. *European Journal of Clinical Microbiology & Infectious Diseases* 1988;**7**(3): 388–93.

Herold 2002
Herold R, Becker M. 13C-urea breath test threshold calculation and evaluation for the detection of Helicobacter pylori infection in children. *BMC Gastroenterology* 2002;**2**: 12.

Hidaka 2010
Hidaka N, Nakayama Y, Horiuchi A, Kato S, Sano K. Endoscopic identification of Helicobacter pylori gastritis in children. *Digestive Endoscopy* 2010;**22**(2):90–4.

Higazy 2000
Higazy E, Al-Saeedi F, Loutfi I, Heiba S, Kalaoui M, Al-Nakib B, et al. The impact of brushing teeth on carbon-14 urea breath test results. *Journal of Nuclear Medicine Technology* 2000;**28**(3):162–4.

Hildebrand 1997
Hildebrand P, Beglinger C. Nondispersive infrared spectrometry: A new method for the detection of Helicobacter pylori infection with the c-13-urea breath test. *Clinical Infectious Diseases* 1997;**25**(5):1003–5.

Hilker 1994
Hilker E, Stoll R, Domschke W. Quantitative assessment of Helicobacter-pylori (hp) colonization of the gastric-mucosa by c-13-urea breath test. *Gastroenterology* 1994;**106**(4 (suppl)):A93.

Hilker 1996
Hilker E, Domschke W, Stoll R. C-13-urea breath test for detection of Helicobacter pylori and its correlation with endoscopic and histologic findings. *Journal of Physiology and Pharmacology* 1996;**47**(1):79–90.

Hino 2004
Hino B, Eliakim T, Levine A, Sprecher H, Berkowitz D, Hartman C, et al. Comparison of invasive and non-invasive tests diagnosis and monitoring of Helicobacter pylori infection in children. *Journal of Pediatric Gastroenterology and Nutrition* 2004;**39**(5):519–23.

Hirschl 1990
Hirschl AM, Rathbone BJ, Wyatt JI, Berger J, Rotter ML. Comparison of ELISA antigen preparations alone or in combination for serodiagnosing *Helicobacter pylori* infections. *Journal of Clinical Pathology* 1990;**43**(6):511–3.

Hirschl 1991
Hirschl AM, Hirschl MM, Berger J, Rotter ML. Evaluation of a commercial latex test for serological diagnosis of Helicobacter pylori infection in treated and untreated patients. *European Journal of Clinical Microbiology & Infectious Diseases* 1991;**10**(11):971–4.

Hirschl 1993
Hirschl AM, Brandstatter G, Dragosics B, Hentschel E, Kundi M, Rotter ML, et al. Kinetics of specific igg antibodies for monitoring the effect of anti-Helicobacter pylori chemotherapy. *Journal of Infectious Diseases* 1993;**168** (3):763–6.

Hirschl 1996
Hirschl AM, Rotter ML. Serological tests for monitoring Helicobacter pylori eradication treatment. *Journal of Gastroenterology* 1996;**31 Suppl 9**:33–6.

Hirschl 2005
Hirschl AM, Makristathis A. Non-invasive Helicobacter pylori diagnosis: Stool or breath tests?. *Digestive & Liver Disease* 2005;**37**(10):732–4.

Ho 1996
Ho AS, Young TH, Shyu RY, Yeh C, Tseng HH, Lee SC, et al. The accuracy of the rapid urease test and 13C-urea breath test in the diagnosis of Helicobacter pylori infection. *Chung Hua i Hsueh Tsa Chih [Chinese Medical Journal]* 1996;**58**(6):400–6.

Ho 2000
Ho B, Marshall BJ. Accurate diagnosis of Helicobacter pylori - serologic testing. *Gastroenterology Clinics of North America* 2000;**29**(4):853.

Ho 2004
Ho CY, Chen TS, Chang FY, Lee SD. Rapid urease test from non-ulcer part of stomach is superior to histology from ulcer in detection of Helicobacter pylori infection in patients with gastric ulcer. *Hepato-Gastroenterology* 2004;**51**(60):1877–80.

Hoang 2006
Hoang TT, Rehnberg AS, Wheeldon TU, Bengtsson C, Phung DC, Befrits R, et al. Comparison of the performance of serological kits for Helicobacter pylori infection with european and asian study populations. *Clinical Microbiology & Infection* 2006;**12**(11):1112–7.

Hoek 1992
Hoek FJ, Noach LA, Rauws EAJ, Tytgat GNJ. Evaluation of the performance of commercial test kits for detection of Helicobacter pylori antibodies in serum. *Journal of Clinical Microbiology* 1992;**30**(6):1525–8.

Hollenz 1999
Hollenz M, Stolte M, Labenz J. Helicobacter pylori screening in a general practice. *Deutsche Medizinische Wochenschrift* 1999;**124**(7):171–5.

Hong 2008
Hong WD, Zhu QH, Chen XR. Study on the value of helieobacter pylori (h. Pylori) stool antigen immunocard stat in the diagnosis of h. Pylori infection: A meta-analysis.. *Zhonghua Liu Xing Bing Xue Za Zhi* 2008;**29**(1):71–4.

Hooton 2006
Hooton C, Keohane J, Clair J, Azam M, O'Mahony S, Crosbie O, et al. Comparison of three stool antigen assays with the c-13-urea breath test for the primary diagnosis of Helicobacter pylori infection and monitoring treatment outcome. *European Journal of Gastroenterology & Hepatology* 2006;**18**(6):595–9.

Hoshiya 2001
Hoshiya S, Tokunaga K, Tanaka A, Takahashi S. Serological diagnosis of Helicobacter pylori infection. *Nihon Rinsho [Japanese Journal of Clinical Medicine]* 2001;**59**(2):259–64.

Houben 1998
Houben M, Hensen EF, Stam P, Van't Hoff BWM, Van der Hulst RWM, Van der Ende A, et al. Post-eradication evaluation of h-pylori (hp) status: The c-13 urea laser assisted ratio analyzer (lara) breath test. *Gastroenterology* 1998;**114**(4 (suppl)):A153.

Houben 1999
Houben M, Vaira D, Lam K, Hensen EF, Stam P, Van 't Hoff BWM, et al. Usefulness of the c-13 lara (tm) urea breath test in confirming eradication of Helicobacter pylori (hp). *Gastroenterology* 1999;**116**(4 (suppl)):A190.

Hsu 2010
Hsu PI. Application of serology in the diagnosis of Helicobacter pylori infection in patients with atrophic gastritis. *Journal of the Chinese Medical Association* 2010;**73**(11):561–2.

Hu 1995
Hu P, Cui Y, Chen M. Application of serology and 14c-urea breath test to monitoring of the effect of anti-Helicobacter pylori chemotheraphy.. *Zhonghua Nei Ke Za Zhi [Chinese journal of internal medicine]* 1995;**34**(12):819–22.

Hu 2000
Hu F, Cheng H, Li J. Evaluation and comparison of the Helicobacter pylori stool antigen test and the gastric mucosal antigen test.. *Zhonghua Yi Xue Za Zhi* 2000;**80**(11):820–2.

Hu 2007
Hu HM, Kuo CH, Lo YC, Wu MT, Wu IC, Lu CY, et al. Evaluation of the two immunochromatographic methods for detecting urine and serum igg antibodies to Helicobacter pylori and comparison of accuracy and clinical utility. *Hepato-Gastroenterology* 2007;**54**(73):119–23.

Hu 2011
Hu FL. Performance of current infection marker test for the diagnosis of Helicobacter pylori current infection: A multicenter clinical trial. *National Medical Journal of China* 2011;**91**(27):1891–4.

Huang 1993
Huang CK, Chen GH, Kao CH, Wang SJ, Leu JF, Shir JM, et al. A 10-minute carbon-14 urea breath test for the detection of Helicobacter pylori. *Chinese Journal of Gastroenterology* 1993;**10**(3):212–20.

Huang 1996
Huang MS, Wang WM, Wu DC, Chen LT, Jan CM, Chen CY, et al. Utility of brushing cytology in the diagnosis of Helicobacter pylori infection. *Acta Cytologica* 1996;**40**(4):714–8.

Huang 1998
Huang JQ, Sridhar S, Chen Y, Hunt RH. Meta-analysis of the relationship between Helicobacter pylori seropositivity and gastric cancer. *Gastroenterology* 1998;**114**(6):1169–79.

Huang 2000
Huang JJ, Huang CJ, Ruaan MK, Chen KW, Yen TS, Sheu BS. Diagnostic efficacy of (13)c-urea breath test for Helicobacter pylori infection in hemodialysis patients. *American Journal of Kidney Diseases* 2000;**36**(1):124–9.

Huang 2002
Huang JQ, Sridhar S, Hunt RH. Role of Helicobacter pylori infection and non-steroidal anti-inflammatory drugs in peptic-ulcer disease: a meta-analysis. *Lancet* 2002;**359**(9300):14–22.

Huang 2003
Huang JQ, Zheng GF, Sumanac K, Irvine EJ, Hunt RH. Meta-analysis of the relationship between cagA

seropositivity and gastric cancer. *Gastroenterology* 2003;**125** (6):1636–44.

Huelin 1996

Huelin J, Sanchez-Galdon S, Cardenas A, Ibanez J, Espana P, De la Cruz J, et al. Comparative study of Helisal™ rapid blood and ELISA, Jatrox and pathologic anatomy in the diagnosis of Helicobacter pylori infection [Spanish]. *Revista Espanola de Enfermedades Digestivas* 1996;**88**(12):825–7.

Huijsdens 2004

Huijsdens XW, Linskens RK, Koppes J, Tang YL, Meuwissen SGM, Vandenbroucke-Grauls CMJE, et al. Detection of Helicobacter species DNA by quantitative PCR in the gastrointestinal tract of healthy individuals and of patients with inflammatory bowel disease. *FEMS Immunology and Medical Microbiology* 2004;**41**(1):79–84.

Hung 2002

Hung CT, Leung WK, Chan FKL, Sung JJY. Comparison of two new rapid serology tests for diagnosis of Helicobacter pylori infection in Chinese patients. *Digestive and Liver Disease* 2002;**34**(2):111–5.

Hung 2010

Hung HH, Chen TS, Lin HC. Immunoglobulin g antibody against Helicobacter pylori is an accurate test for atrophic gastritis. *Journal of the Chinese Medical Association* 2010;**73** (7):355–9.

Husson 2000

Husson MO, Rolland C, Gottrand F, Guimber D, Kalach N, Spyckerelle C, et al. Evaluation of a Helicobacter pylori stool antigen test for the diagnosis and follow-up of infections in children. *European Journal of Clinical Microbiology & Infectious Diseases* 2000;**19**(10):787–9.

Hynes 1998

Hynes SO, Moran AP. Comparison of enzyme-linked immunosorbent assay, immunodot and western blot techniques for detecting lewis antigen expression on Helicobacter pylori clinical isolates. *Gut* 1998;**43**(Suppl 2): A20.

Hynes 2000

Hynes SO, Moran AP. Comparison of three serological methods for detection of lewis antigens on the surface of Helicobacter pylori. *FEMS Microbiology Letters* 2000;**190** (1):67–72.

Ibrahim 2012

Ibrahim NH, Gomaa AA, Abu-Sief MA, Hifnawy TM, Tohamy MAE. The use of different laboratory methods in diagnosis of Helicobacter pylori infection; a comparative study. *Life Science Journal-Acta Zhengzhou University Overseas Edition* 2012;**9**(4):249–59.

Ichinose 1998

Ichinose Y, Kanai E, Yamasawa F, Nishi I, Toyama K. Simultaneous continuous 13C, 12c analysis of expired gas in the 13C breath test. *Respirology* 1998;**3**(1):21–4.

Ierardi 2002

Ierardi E, Margiotta M, Monno R, De Francesco V, Minenna MF, Burattini O, et al. A new semiquantitative method of quantifying Helicobacter pylori in antigen stools. *Journal of Clinical Gastroenterology* 2002;**35**(5):375–8.

Ierfone 2003

Ierfone N, Di Fulvio A, Standoli M, Pontone S, Tonda M, Pontone P. Breath test as non-invasive assessment for the initial screening of non-ulcerous dyspepsia. *Giornale di Chirurgia* 2003;**24**(10):357–63.

Ignys 2006

Ignys I, Klincewicz B, Malewski W, Cichy W. The non-invasive diagnostic test for detection of Helicobacter pylori infection in children - the value of Helicobacter pylori stool antigen test. *Pediatria Wspolczesna* 2006;**8**(4):234–6.

Iijima 1998

Iijima K, Ohara S, Sekine H, Moriyama S, Kato K, Koike T, et al. Correlation between 13C-urea breath test and gastric histological findings in Helicobacter pylori positive patients. *Nippon Shokakibyo Gakkai Zasshi [Japanese Journal of Gastroenterology]* 1998;**95**(1):18–25.

Ilan 1998

Ilan Y, Israelit YY, Bar Meir S, Yudchack S, Goldin E. A novel method & device for Helicobacter pylori detection: Continuous, fast c-13-urea breath test. *Gastroenterology* 1998;**114**(4):A157.

Ilga 2008

Ilga U, Ozyurt M, Yildirim S, Ergunay K, Ardic N, Demirturk L, et al. Helicobacter pylori isolation, serology and caga, cage and virb11 detection in patients with non-ulcer dyspepsia from Turkey: Correlation with histopathologic findings. *Central European Journal of Medicine* 2008;**3**(1):41–6.

Imperiale 1996

Imperiale TF, McCullough AJ. C-13 urea breath test for Helicobacter pylori infection. *American Journal of Gastroenterology* 1996;**91**(1):175–6.

Imrie 2001

Imrie C, Rowland M, Bourke B, Drumm B. Limitations to carbon 13-labeled urea breath testing for Helicobacter pylori in infants. *Journal of Pediatrics* 2001;**139**(5):734–7.

Inaba 2002

Inaba T, Mizuno M, Kawai K, Takaguchi K, Yoshida Y, Kita K, et al. Effect of antiulcer agents on the urea breath test - comparison between rebamipide and ecabet sodium. *Japanese Journal of Gastroenterology* 2002;**99**(1):27–33.

Iranikhah 2013

Iranikhah A, Ghadir MR, Sarkeshikian S, Saneian H, Heidari A, Mahvari M. Stool antigen tests for the detection of Helicobacter pylori in children. *Iranian Journal of Pediatrics* 2013;**23**(2):138–42.

Ishihara 2000

Ishihara S, Kaji T, Kawamura A, Rumi MAK, Sato H, Okuyama T, et al. Diagnostic accuracy of a new non-invasive enzyme immunoassay for detecting Helicobacter pylori in stools after eradication therapy. *Alimentary Pharmacology and Therapeutics* 2000;**14**(5):611–4.

Ishizuka 1999
Ishizuka J. Clinical evaluation of Helicobacter pylori stool antigen (HPSA) assay for assessment of diagnosis and eradication. *Japanese Journal of Gastroenterology* 1999;**96** (10):1196.

Islami 2008
Islami F, Kamangar F. Helicobacter pylori and esophageal cancer risk: a meta-analysis. *Cancer Prevention Research* 2008;**1**(5):329–38.

Ismail 2016
Ismail H, Morgan C, Griffiths P, Williams J, Jenkins G. A newly developed nested PCR assay for the detection of Helicobacter pylori in the oral cavity. *Journal of Clinical Gastroenterology* 2016;**50**(1):17–22.

Isomoto 2002
Isomoto H, Inoue K, Shikuwa S, Furusu H, Nishiyama T, Omagari K, et al. Five minute endoscopic urea breath test with 25 mg of c-13-urea in the management of Helicobacter pylori infection. *European Journal of Gastroenterology & Hepatology* 2002;**14**(10):1093–100.

Isomoto 2003
Isomoto H, Inoue KI, Mizuta Y, Nakazato M, Kanazawa Y, Nishiyama H, et al. Validation of endoscopic ^{13}C-urea breath test with nondispersive infrared spectrometric analysis in the management of Helicobacter pylori infection. *Hepato-Gastroenterology* 2003;**50**(50):422–5.

Isomoto 2006
Isomoto H, Kawazoe K, Inoue K, Kohno S. Usefulness of the immunological rapid urease test for detection of Helicobacter pylori in patients who are reluctant to undergo endoscopic biopsies. *Digestive Diseases & Sciences* 2006;**51** (12):2302–5.

Israeli 2003
Israeli E, Ilan Y, Meir SB, Buenavida C, Goldin E. A novel 13C-urea breath test device for the diagnosis of Helicobacter pylori infection: Continuous online measurements allow for faster test results with high accuracy. *Journal of Clinical Gastroenterology* 2003;**37**(2):139–41.

Ito 2002
Ito M, Haruma K, Kaya S, Kamada T, Kim S, Sasaki A, et al. Role of anti-parietal cell antibody in Helicobacter pylori-associated atrophic gastritis: Evaluation in a country of high prevalence of atrophic gastritis. *Scandinavian Journal of Gastroenterology* 2002;**37**(3):287–93.

Ito 2005
Ito M, Tanaka S, Kim SJ, Tahara K, Kawamura Y, Sumii M, et al. A combination of the Helicobacter pylori stool antigen test and urea breath test is useful for clinical evaluation of eradication therapy: A multicenter study. *Journal of Gastroenterology and Hepatology* 2005;**20**(8):1241–5.

Iwanczak 2005
Iwanczak F, Pytrus T, Iwanczak B, Gosciniak G, Witkowska-Vogtt E, Dzierzanowska D, et al. Assessment of selected tests in diagnostics of Helicobacter pylori infections. *Polski Merkuriusz Lekarski* 2005;**19**(109):52–6.

Jaakkimainen 1999
Jaakkimainen RL, Boyle E, Tudiver F. Is Helicobacter pylori associated with non-ulcer dyspepsia and will eradication improve symptoms? A meta-analysis. *BMJ* 1999;**319** (7216):1040–4.

Jabbari 2009
Jabbari Moghaddam Y, Rafeey M, Radfar R. Comparative assessment of Helicobacter pylori colonization in children tonsillar tissues. *International Journal of Pediatric Otorhinolaryngology* 2009;**73**(9):1199–201.

Jadresin 2000
Jadresin O, Kolacek S, Percl M, Tambic A, Dasovic I, Grguric J. Detection of Helicobacter pylori antigen in stools - an alternative method of verifying hp infection in children. *Paediatria Croatica* 2000;**44**(4):141–4.

Jaff 2011
Jaff MS. Relation between ABO blood groups and Helicobacter pylori infection in symptomatic patients. *Clinical and Experimental Gastroenterology* 2011;**4**(1): 221–6.

Jafri 2010
Jafri W, Yakoob J, Abid S, Siddiqui S, Awan S, Nizami SQ. Helicobacter pylori infection in children: Population-based age-specific prevalence and risk factors in a developing country. *Acta Paediatrica* 2010;**99**(2):279–82.

Jaime 2013
Jaime F, Villagran A, Serrano C, Cerda J, Harris PR. Frequency of Helicobacter pylori infection in 144 school age Chilean children. *Revista Medica de Chile* 2013;**141** (10):1249–54.

Jain 1999
Jain A, Buddhiraja S, Khurana B, Singhal R, Nair D, Arora P, et al. Risk factors for duodenal ulcer in north India. *Tropical Gastroenterology* 1999;**20**(1):36–9.

Jalali 1988
Jalali S, Hollingsworth J, Vanzanten SV, Tytgat K, Goldie J, Bowen B, et al. C-14 urea breath test for the detection of *C pylori* (cp) infections. *Gastroenterology* 1988;**94**(5):A205.

Jane 1999
Jane Santamaria M, Varea Calderon V, Camacho E. Concordance between breath test and histologic damage in Helicobacter pylori associated infections in infancy. *Revista Espanola De Enfermedades Digestivas* 1999;**91**(10):703–10.

Janjetic 2010
Janjetic MA, Goldman CG, Balcarce NE, Rua EC, Gonzalez AB, Fuda JA, et al. Iron, zinc, and copper nutritional status in children infected with Helicobacter pylori. *Journal of Pediatric Gastroenterology & Nutrition* 2010;**51**(1):85–9.

Janjetic 2011
Janjetic MA, Goldman CG, Barrado DA, Rua EC, Balcarce N, Mantero P, et al. Decreasing trend of Helicobacter pylori infection in children with gastrointestinal symptoms from Buenos Aires, Argentina. *Helicobacter* 2011;**16**(4):316–9.

Janjetic 2015
Janjetic MA, Mantero P, Rua EC, Balcarce N, De Palma GZ, Catalano M, et al. Dietary and anthropometric indicators of nutritional status in relation to Helicobacter pylori infection in a paediatric population. *British Journal of Nutrition* 2015;**113**(7):1113–9.

Janssen 2001
Janssen K. Diagnostic series. Helicobacter pylori infections rapidly recognized. *MMW Fortschritte der Medizin* 2001; **143**(13):41–2.

Janulaityte 1998
Janulaityte D, Kupcinskas L, Pavilonis A, Wadstrom T, Andersen L. Western blot analysis of Helicobacter pylori infection in patients with and without gastric cancer. *Gut* 1998;**43**(Suppl 2):A69.

Janus 1991
Janus G, Hammermeister I, Prignet JM, Saccharin C, Kist M, Koch HK. Helicobacter pylori: A serological study of young soldiers with endoscopic. Microbiologic and histologic study of ten cases with positive serology. *Medecine et Maladies Infectieuses* 1991;**21**(5):308–12.

Jarbol 2006
Jarbol DE, Kragstrup J, Stovring H, Havelund T, Schaffalitzky de Muckadell OB. Proton pump inhibitor or testing for Helicobacter pylori as the first step for patients presenting with dyspepsia? A cluster-randomized trial. *American Journal of Gastroenterology* 2006;**101**(6):1200–8.

Jensen 1993
Jensen AKV, Andersen LP, Wachmann CH. Evaluation of eight commercial kits for Helicobacter pylori IgG antibody detection. *APMIS* 1993;**101**(10):795–801.

Ji 1993
Ji J, Li XM, Jiang GH. Diagnosis of Helicobacter pylori infection by 13C-urea breath test. *Zhonghua Nei Ke za Zhi [Chinese Journal of Internal Medicine]* 1993;**32**(3):170–2.

Jiang 2004
Jiang Z, Huang AL, Tao XH, Wang PL. Diagnosis of Helicobacter pylori infection and diseases associated with Helicobacter pylori by Helicobacter pylori outer membrane proteins. *World Journal of Gastroenterology* 2004;**10**(23): 3464–9.

Jo 2008
Jo Y, Chung M, Lim C, Son B, Jun D, Kim S, et al. Urea breath test is the most reliable h. Pylori diagnostic test in patients with upper gastrointestinal bleeding in high h. Pylori prevalent population. *Helicobacter* 2008;**13**(5):451.

Jo 2014
Jo Y, Lee J, Kim J, Kim T. Urea breath test and serological test have equivalent accuracy to detect Helicobacter pylori in patients with gastroduodenal ulcer bleeding. *Helicobacter* 2014;**19**:124.

Johansen 2004
Johansen JK, Sehested A, Myrhoj T, Ladefoged K, Krogfelt KA. Helicobacter pylori infection in Greenlandic patients with dyspepsia. *International Journal of Circumpolar Health* 2004;**63 Suppl 2**:219–20.

Johnston 1998
Johnston BJ, Gruer N, Johnson P. Effect of patient position on the performance of the c-13-urea breath test for the detection of Helicobacter pylori. *Gut* 1998;**43**(Suppl 2): A57.

Jolley 2007
Jolley CD, Wagner DA. Comparison of the c-13-urea blood test to histology and rapid urease testing in the diagnosis of Helicobacter pylori infection in children. *Journal of Pediatric Gastroenterology and Nutrition* 2007;**44**(1):68–70.

Jonaitis 2007
Jonaitis LV, Kiudelis G, Kupcinskas L. Evaluation of a novel c-14-urea breath test "heliprobe" in diagnosis of Helicobacter pylori infection. *Medicina-Lithuania* 2007;**43** (1):32–5.

Jones 1997a
Jones R, Phillips I, Felix G, Tait C. An evaluation of near-patient testing for Helicobacter pylori in general practice. *Alimentary Pharmacology & Therapeutics* 1997;**11**(1):101–5.

Jones 1997b
Jones NL, Bourke B, Sherman PM. Breath testing for Helicobacter pylori infection in children: A breath of fresh air?. *Journal of Pediatrics* 1997;**131**(6):791–3.

Jones 2007
Jones RT, Darboe MK, Doherty CP, MacKay WG, Weaver LT, Campbell DI, et al. Evaluation of c-13-urea breath test and fecal antigen immunoassay to detect Helicobacter pylori infection in Gambian infants. *Journal of Pediatric Gastroenterology and Nutrition* 2007;**44**(5):650–2.

Juhasz 2000
Juhasz M, Pronai L, Zagoni T, Nemeth A, Herszenyi L, Schandl L, et al. Comparison of various methods in the detection of Helicobacter pylori infection. *Orvosi Hetilap* 2000;**141**(17):911–4.

Juncal 1998
Juncal AR, Garea MT, Cid A, Penalver MD, Vazquez R, Montero E, et al. Evaluation of four commercial enzyme immunoassays for the serologic diagnosis of infection by Helicobacter pylori. *Enfermedades Infecciosas y Microbiologia Clinica* 1998;**16**(4):185–9.

Jung 2002
Jung A, Wasilewska-Radwanska M, Kopanski Z. Semiempirical model for diagnostication Helicobacter pylori infection by use of c-14 labelled urea. *Nukleonika* 2002;**47**(3):95–9.

Jung 2013
Jung H, Moon J, Park K, Kwon M, Jeong S, Park Y, et al. Detection rates of clarithromycin resistance and eradication rates of Helicobacter pylori infection: efficacy of Panplex™ Clar-H. pylori detection. *Helicobacter* 2013;**18**:132.

Kabir 2001
Kabir S. Detection of Helicobacter pylori in faeces by culture, PCR and enzyme immunoassay. *Journal of Medical Microbiology* 2001;**50**(12):1021–9.

Kajiwara 1997
Kajiwara M, Iida K, Takatori K, Taniguchi Y, Kimura K. Validity of the c-13-urea breath test for the diagnosis of Helicobacter pylori infection. *Chemical & Pharmaceutical Bulletin* 1997;**45**(4):741–3.

Kajiwara 1998
Kajiwara M, Iida K, Takatori K, Taniguchi Y, Kimura K. Validity of the c-13-urea breath test for the diagnosis of Helicobacter pylori infection. In: Heys JR, Melillo DG editor(s). *Synthesis and Applications of Isotopically Labelled Compounds 1997*. 1st Edition. Chichester: John Wiley & Sons, 1998:627–31.

Kakinoki 2001
Kakinoki K, Takemori Y, Noda Y. Efficacy of the urine antibody test for detection of Helicobacter pylori: Comparison with serum antibody tests. *Japanese Journal of Gastroenterology* 2001;**98**(8):935–41.

Kaklikkaya 2006
Kaklikkaya N, Akdogan RA, Ozgur O, Uzun DY, Cobanoglu U, Dinc U, et al. Evaluation of a new rapid lateral flow chromatography test for the diagnosis of Helicobacter pylori. *Saudi Medical Journal* 2006;**27**(6): 799–803.

Kalach 1996
Kalach N, Briet F, Raymond J, Benhamou P, Senouci L, Bergert M, et al. Time course analysis and simplification of the c-13-urea breath test (c-13-ubt) in the detection of Helicobacter pylori infection (h-pylori) in children. *Gastroenterology* 1996;**110**(4 (suppl)):A148.

Kalach 1998b
Kalach N, Benhamou PH, Briet F, Raymond J, Dupont C. The urea-c-13 breath test in the course of Helicobacter pylori gastric infection in children. *Archives De Pediatrie* 1998;**5**(12):1359–65.

Kalach 2005
Kalach N, Nguyen V, Bergeret M, Boutros N, Dupont C, Raymond J. Usefulness and influence of age of a novel rapid monoclonal enzyme immunoassay stool antigen for the diagnosis of Helicobacter pylori infection in children. *Diagnostic Microbiology and Infectious Disease* 2005;**52**(2): 157–60.

Kalach 2009
Kalach N, Dehecq E, Gosset P, Decoster A, Bergeret M, Dupont C, et al. Usefulness and influence of age of a novel rapid Hpstar™ stool antigen for the diagnosis of Helicobacter pylori infection in children. *Diagnostic Microbiology and Infectious Disease* 2009;**65**(4):450–3.

Kalem 2010
Kalem F, Ozdemir M, Baysal B. Investigation of the presence of Helicobacter pylori by different methods in patients with dyspeptic complaints. *Mikrobiyoloji Bulteni* 2010;**44**(1):29–34.

Kang 1999
Kang G, Rajan DP, Patra S, Chacko A, Mathan MM. Use of serology, the urease test & histology in diagnosis of Helicobacter pylori infection in symptomatic & asymptomatic Indians. *Indian Journal of Medical Research* 1999;**110**:86–90.

Kannath 2007
Kannath A, Rutt HN. Development of low cost instrumentation for non-invasive detection of Helicobacter pylori - art. No. 64300l. *Advanced Biomedical and Clinical Diagnostic Systems* 2007;**6430**:L4300.

Kao 1993
Kao CH, Huang CK, Wang SJ, Hsu CY, Lin WY, Chen GH. Accuracy of a rapid 10-minute carbon-14 urea breath test for the diagnosis of Helicobacter pylori-associated peptic ulcer disease. *European Journal of Nuclear Medicine* 1993;**20**(8):708–11.

Kaore 2012
Kaore NM, Nagdeo NV, Thombare VR. Comparative evaluation of the diagnostic tests for Helicobacter pylori and dietary influence for its acquisition in dyspeptic patients: a rural hospital based study in central India. *Journal of Clinical and Diagnostic Research* 2012;**6**(4 SUPPL 2): 636–41.

Kaptan 2009
Kaptan ZK, Emir H, Uzunkulaoglu H, Yucel M, Karakoc E, Koca G, et al. Determination of Helicobacter pylori in patients with chronic nonspecific pharyngitis. *Laryngoscope* 2009;**119**(8):1479–83.

Karakus 2013
Karakus C, Salih BA. Comparison of the lateral flow immunoassays (LFIA) for the diagnosis of Helicobacter pylori infection. *Journal of Immunological Methods* 2013; **396**(1-2):8–14.

Karsligil 2010
Karsligil T, Mehli M, Koruk M, Eksi F. Urea breath test and specific IgA in Helicobacter pylori infection. *Nobel Medicus* 2010;**6**(3):46–50.

Kasho 1996
Kasho VN, Cheng S, Jensen DM, Ajie H, Lee WNP, Faller LD. Feasibility of analysing c-13 urea breath tests for Helicobacter pylori by gas chromatography-mass spectrometry in the selected ion monitoring mode. *Alimentary Pharmacology & Therapeutics* 1996;**10**(6): 985–95.

Kassa 1996
Kassa E, Tsega E, Gebre W. Comparison of diagnostic methods for detection of Helicobacter pylori. *East African Medical Journal* 1996;**73**(4):239–41.

Katelaris 1997
Katelaris PH, Jones DB. Testing for Helicobacter pylori infection after antibiotic treatment. *American Journal of Gastroenterology* 1997;**92**(8):1245–7.

Katelaris 1998
Katelaris PH, Connor SJ, Seow F, Huntley S, Ngu MC. The effect of short term omeprazole use on the accuracy of the c-13-urea breath test in Helicobacter pylori infected subjects. *Gut* 1998;**43**(Suppl 2):A53.

Kato 1997
Kato M, Ohara S, Asaka M, Toyota T. New, on-the-spot infrared analyzer for c-13-urea breath test: A simple, easy-to-use method for detecting Helicobacter pylori in the physician's office. *Gastroenterology* 1997;**112**(4 (suppl)): A169.

Kato 1998
Kato M, Kobayashi T, Ishizuka J, Kudo T, Katagiri M, Komatsu Y, et al. Detection of h-pylori infections by urine-based enzyme-linked immunosorbent assay. *Gastroenterology* 1998;**114**(4):A169.

Kato 1999
Kato M, Asaka M, Saito M, Ohara S, Toyota T, Akamatsu T, et al. Clinical usefulness of a urine-based ELISA for detection of anti-Helicobacter pylori antibody. *Gastroenterology* 1999;**116**(4 (suppl)):A206–A7.

Kato 2000a
Kato M, Hokari K, Ishizuka J, Mizushima T, Sukegawa M, Komatsu Y, et al. Assessment of Helicobacter pylori eradication using a urine-based ELISA of anti-Helicobacter pylori antibody. *Gastroenterology* 2000;**118**(4 Part 1):A505.

Kato 2000b
Kato S, Tachikawa T, Ozawa K, Konno M, Oyake Y, Nakazato Y, et al. Usefulness of urine-based ELISA for detection of IgG antibodies to Helicobacter pylori in children. *Gastroenterology* 2000;**118**(4):A506.

Kato 2000c
Kato M, Asaka M, Saito M, Sekine H, Ohara S, Toyota T, et al. Clinical usefulness of urine-based enzyme-linked immunosorbent assay for detection of antibody to Helicobacter pylori: A collaborative study in nine medical institutions in Japan. *Helicobacter* 2000;**5**(2):109–19.

Kato 2001a
Kato M. Evaluation of a new $^{13}co_2$ infrared analyzer (ubit-ir300) for ^{13}C-urea breath test. *Japanese Journal of Gastroenterology* 2001;**98**(7):853.

Kato 2001b
Kato S, Tachikawa T, Ozawa K, Konno M, Okuda M, Fujisawa T, et al. Urine-based enzyme-linked immunosorbent assay for the detection of Helicobacter pylori infection in children. *Pediatrics* 2001;**107**(6):E87.

Kato 2001c
Kato C, Yamaguchi T, Yusa K, Sasaki H, Suzuki K, Sato K, et al. 13C-urea breath test. *Nippon Rinsho [Japanese Journal of Clinical Medicine]* 2001;**59**(2):267–71.

Kato 2002a
Kato M, Iwasaki T, Miyazaki H, Ohira K, Oizumi S, Kawarazaki M, et al. Urea breath test for diagnosis of Helicobacter pylori infection. *Nippon Rinsho [Japanese Journal of Clinical Medicine]* 2002;**60**(Suppl 2):332–8.

Kato 2002b
Kato S, Ozawa K, Konno M, Kagimoto S, Okuda M, Fujisawa T, et al. Usefulness of the stool antigen test (HPSA) for diagnosis of Helicobacter pylori infection in Japanese children: A multicenter study. *Gastroenterology* 2002;**122**(4 (suppl)):A202–A3.

Kato 2002c
Kato S, Ozawa K, Konno M, Tajiri H, Yoshimura N, Shimizu T, et al. Diagnostic accuracy of the c-13-urea breath test for childhood Helicobacter pylori infection: A multicenter Japanese study. *American Journal of Gastroenterology* 2002;**97**(7):1668–73.

Kato 2002d
Kato S, Ozawa K, Minoura T, Iinuma K. A simplified c-13-urea breath test for diagnosis of Helicobacter pylori infection in children. *Gastroenterology* 2002;**122**(4 (Suppl)): A206.

Kato 2002e
Kato C, Kasugai S, Fukuda Y, Yusa K, Kudara N, Iwasaki M, et al. Diagnosis of Helicobacter pylori infection by the antigen analysis of stools. *Nippon Rinsho [Japanese Journal of Clinical Medicine]* 2002;**60**(Suppl 2):347–9.

Kato 2003a
Kato C, Sugiyama T, Sato K, Saito S, Kudara N, Abiko Y, et al. Appropriate cut-off value of 13C-urea breath test after eradication of Helicobacter pylori infection in Japan. *Journal of Gastroenterology & Hepatology* 2003;**18**(12): 1379–83.

Kato 2003b
Kato S, Ozawa K, Okuda M, Fujisawa T, Kagimoto S, Konno M, et al. Accuracy of the stool antigen test for the diagnosis of childhood Helicobacter pylori infection: A multicenter Japanese study. *American Journal of Gastroenterology* 2003;**98**(2):296–300.

Kato 2004a
Kato S, Nakayama K, Minoura T, Konno M, Tajiri H, Matsuhisa T, et al. Comparison between the 13C-urea breath test and stool antigen test for the diagnosis of childhood Helicobacter pylori infection. *Journal of Gastroenterology* 2004;**39**(11):1045–50.

Kato 2004b
Kato S, Ozawa K, Okuda M, Nakayama Y, Yoshimura N, Konno M, et al. Multicenter comparison of rapid lateral flow stool antigen immunoassay and stool antigen enzyme immunoassay for the diagnosis of Helicobacter pylori infection in children. *Helicobacter* 2004;**9**(6):669–73.

Kato 2004c
Kato M, Saito M, Fukuda S, Kato C, Ohara S, Hamada S, et al. C-13-urea breath test, using a new compact nondispersive isotope-selective infrared spectrophotometer: Comparison with mass spectrometry. *Journal of Gastroenterology* 2004;**39**(7):629–34.

Kato 2005a
Kato M, Shimizu Y, Nakagawa S, Nakagawa M, Ono Y, Ono S, et al. Prevention of false-positive result of 13C-urea breath test after eradication of h. Pylori using film-coated 13C-urea tablet. *Gastroenterology* 2005;**128**(4 (suppl)): A561.

Kato 2005b
Kato M, Shimizu Y, Shouji E, Takeda H, Asaka M. Problem of 13C-urea breath test in the diagnosis of h. Pylori after eradication. *Nippon Rinsho [Japanese Journal of Clinical Medicine]* 2005;**63**(Suppl 11):221–5.

Kato 2005c
Kato M, Asaka M. Helicobacter pylori igg antibody, urea breath test, Helicobacter pylori antigen in the stool. *Nippon Rinsho [Japanese Journal of Clinical Medicine]* 2005;**63** (Suppl 7):175–9.

Kato 2007
Kato C, Sugiyama T, Horie A, Igarashi M, Takayanagi N, Tsuchida Y. Diagnostic accuracy of a novel Helicobacter pylori stool antigen test using monoclonal antibody after eradication therapy in Japanese population. *Helicobacter* 2007;**12**(4):442–3.

Kato 2010
Kato M, Asaka M. Helicobacter pylori (igg antibody test, urea breath test, stool antigen test). *Nippon Rinsho [Japanese Journal of Clinical Medicine]* 2010;**68**(Suppl 6):183–8.

Katsuragi 1998
Katsuragi K, Noda A, Tachikawa T, Azuma A, Mukai F, Murakami K, et al. Highly sensitive urine-based enzyme-linked immunosorbent assay for detection of antibody to Helicobacter pylori. *Helicobacter* 1998;**3**(4):289–95.

Kaul 1998
Kaul A, Bhasin DK, Pathak CM, Ray P, Vaiphei K, Sharma BC, et al. Normal limits of 14c-urea breath test. *Tropical Gastroenterology* 1998;**19**(3):110–3.

Kawai 2008
Kawai T, Kawakami K, Kataoka M, Itoi T, Takei K, Moriyasu F, et al. A study of the relationship between Helicobacter pylori microbial susceptibility, 13C-urea breath test values. *Hepato-Gastroenterology* 2008;**55**(82-83): 786–90.

Kawakami 2002
Kawakami E, Machado RS, Reber M, Patricio FR. 13 c-urea breath test with infrared spectroscopy for diagnosing Helicobacter pylori infection in children and adolescents. *Journal of Pediatric Gastroenterology & Nutrition* 2002;**35** (1):39–43.

Kazemi 2011
Kazemi S, Tavakkoli H, Habizadeh MR, Emami MH. Diagnostic values of Helicobacter pylori diagnostic tests: Stool antigen test, urea breath test, rapid urease test, serology and histology. *Journal of Research in Medical Sciences* 2011; **16**(9):1097–104.

Kearney 1999
Kearney DJ, Boes L, Peacock JS. Use of a dried plasma collection card for simplified diagnosis of Helicobacter pylori infection. *Alimentary Pharmacology & Therapeutics* 1999;**13**(11):1531–4.

Kearney 2002
Kearney DJ, Hubbard T, Putnam D. Breath ammonia measurement in Helicobacter pylori infection. *Digestive Diseases & Sciences* 2002;**47**(11):2523–30.

Ken 2013
Ken Dror S, Barak M. Evaluation of the diasorin liaison automatic stool antigen test for the diagnosis of Helicobacter pylori infection. *Biochimica Clinica* 2013;**37**:S659.

Kesli 2010
Kesli R, Gokturk HS, Erbayrak M, Karabagli P, Terzi Y. Comparison of the diagnostic values of the 3 different stool antigen tests for the noninvasive diagnosis of Helicobacter pylori infection. *Journal of Investigative Medicine* 2010;**58** (8):982–6.

Kessenich 2012
Kessenich CR, Erigo-Backsman RC. Gastritis and noninvasive testing for Helicobacter pylori. *Nurse Practitioner* 2012;**37**(4):7–9.

Khafri 2005
Khafri A, Van yousefi J, Madani R, Pourdian M, Khaki P. Designing an ELISA technique for h.Pylori antibody detection using water extracted antigens. *Iranian Journal of Public Health* 2005;**34**(2):14–9.

Khalifehgholi 2013
Khalifehgholi M, Shamsipour F, Ajhdarkosh H, Daryani NE, Reza Pourmand M, Hosseini M, et al. Comparison of five diagnostic methods for Helicobacter pylori. *Iranian Journal of Microbiology* 2013;**5**(4):396–401.

Kharchenko 2012
Kharchenko N, Lopukh I, Janelidze D. Helicobacter pylori immediate detection with helic breath test: Diagnostic value comparison with c-13 breath test and PCR DNA in feces. *Journal of Gastroenterology and Hepatology* 2012;**27**:297–8.

Khorovskaya 2003
Khorovskaya LA, Kornienko EA, Dmitrienko MA, Nazhiganov ON. Experience of a modified non-isotopic, non-invasive breath test for Helicobacter pylori in pediatric practice. *Clinical Chemistry* 2003;**49**(6 (suppl)):A52.

Kias 2011
Kias F, Taleb F, Mouffok F, Matougui N, Boudjella M, Lamri A, et al. *Helicobacter pylori:* diagnosis of infection in adults in Algeria. *Helicobacter* 2011;**16**:116.

Kikuchi 1999
Kikuchi H, Ichinose Y, Ishii H, Mori M, Yamaguchi K, Igari K. Influence on diagnosis of Helicobacter pylori infection in 13C urea breath test of existence of dead space gas. *Journal of Occupational Health* 1999;**41**(6):183–9.

Kim 1996
Kim J, Bank S, Bailey B. Comparison of C14 breath test with clo test in detecting Helicobacter pylori. *Gastroenterology* 1996;**110**(4 (suppl)):A155.

Kim 1997
Kim MJ, Michener R, Triadafilopoulos G. Serum c-13-bicarbonate assay for the diagnosis of gastric Helicobacter pylori infection and response to treatment. *Gastroenterology* 1997;**113**(1):31–7.

Kim 1999
Kim PS, Lee JW, Pai SH, Choe YH, Shin YW, Kim YS. Detection of *H. pylori* antigen in stool by ELISA. *Gut* 1999; **45**(Suppl 3):A133.

Kim 2001
Kim I, Kim P, Kwon K, Lee D, Kim H, Shin Y, et al. Comparison of urine-based enzyme-linked immunosorbent assay and c-14 ubt test for detection of Helicobacter pylori. *Gut* 2001;**49**(suppl):A102–A3.

Kim 2002
Kim PS, Lee J, Pai SH, Kim YB, Cho JK, Lee JW, et al. Detection of Helicobacter pylori antigen in stool by enzyme immunoassay. *Yonsei Medical Journal* 2002;**43**(1):7–13.

Kim 2009
Kim D. The detection of Helicobacter pylori in the terminal ileum and rectum from urea breath test positive healthy adults with culture and PCR during colonoscopy. *American Journal of Gastroenterology* 2009;**104**:S514.

Kim 2012
Kim WJ, Kim HD. The efficacy of monoclonal antibody-based test as addictive tool to detect h. Pylori. *Journal of Gastroenterology and Hepatology* 2012;**27**:65.

Kim 2013
Kim HD, Kim DH, Park H, Kim WJ, Ahn YS, Lee YJ, et al. Detection of Helicobacter pylori in gastric aspirates using a monoclonal antibody-based test. *Gut and Liver* 2013;**7**(1):30–4.

Kim 2014
Kim H, Choi S, Beom J. New monoclonal antibody-based test for Helicobacter pylori urease in gastric tissue. *Journal of Gastroenterology and Hepatology (Australia)* 2014;**29**:228–9.

Kindermann 2000
Kindermann A, Demmelmair H, Koletzko B, Krauss-Etschmann S, Wiebecke B, Koletzko S. Influence of age on c-13-urea breath test results in children. *Journal of Pediatric Gastroenterology and Nutrition* 2000;**30**(1):85–91.

Kindermann 2001a
Kindermann A, Konstantopoulos N, Lehn N, Demmelmair H, Koletzko S. Evaluation of two commercial enzyme immunoassays, testing immunoglobulin g (igg) and iga responses, for diagnosis of Helicobacter priori infection in children. *Journal of Clinical Microbiology* 2001;**39**(10): 3591–6.

Kindermann 2001b
Kindermann A, Faus-Kessler T, Ballauff A, Findeisen A, Laske G, Demmelmair H, et al. Evaluation of a rapid whole blood test to detect Helicobacter pylori infection in children. *Scandinavian Journal of Gastroenterology* 2001;**36** (6):572–6.

Kishkun 2002
Kishkun AA, Sadokov VM, Arsenin SL, Budzinskii AA, Klimkova MA, Kuchin GA, et al. Significance of the operational test parameters in selection of a diagnostic test for Helicobacter infection. *Eksperimental'naia i Klinicheskaia Gastroenterologiia [Experimental & Clinical Gastroenterology]* 2002;**4**:103-8, 34-35.

Kist 1999
Kist M, Strobel S, Kirchner T, Dammann HG. Impact of ELISA and immunoblot as diagnostic tools one year after eradication of *Helicobacter pylori* in a multicentre treatment study. *FEMS Immunology & Medical Microbiology* 1999;**24** (2):239–42.

Klein 1996
Klein PD, Malaty HM, Martin RF, Graham KS, Genta RM, Graham DY. Noninvasive detection of Helicobacter pylori infection in clinical practice: The c-13 urea breath test. *American Journal of Gastroenterology* 1996;**91**(4):690–4.

Klein 1999
Klein PD, Malaty HM, Czinn SJ, Emmons SC, Martin RF, Graham DY. Normalizing results of 13C-urea breath testing for co2 production rates in children. *Journal of Pediatric Gastroenterology & Nutrition* 1999;**29**(3):297–301.

Klyucharova 2013
Klyucharova A, Garipova E, Skorohodkina O. Comparison of the urea breath test with bacteriological investigation in detecting of Helicobacter pylori in patients with chronic urticaria. *Allergy: European Journal of Allergy and Clinical Immunology* 2013;**68**:604–5.

Kobayashi 2002
Kobayashi D, Eishi Y, Ohkusa T, Ishige I, Suzuki T, Minami J, et al. Gastric mucosal density of Helicobacter pylori estimated by real-time PCR compared with results of urea breath test and histological grading. *Journal of Medical Microbiology* 2002;**51**(4):305–11.

Koca 2005
Koca G, Ozdemir E, Cakal E, Culha C, Turkolmez S, Korkmaz M, et al. Comparison of c-14 urea-breath test, Helicobacter pylori igg and cytotoxin associated gene a findings in diabetic patients with dyspeptic complaints. *European Journal of Nuclear Medicine and Molecular Imaging* 2005;**32**:S218.

Kodama 2004
Kodama M, Fujioka T, Okimoto T, Kagawa J, Murakami K, Sato R, et al. Evaluation of the Helicobacter pylori stool antigen (HPSA) assay for diagnosing infection and confirming eradication after treatment. *Journal of Gastroenterology* 2004;**39**(12):1219–20.

Kodama 2012
Kodama M, Murakami K, Okimoto T, Fukuda Y, Shimoyama T, Okuda M, et al. Infuence of proton pump inhibitor treatment on Helicobacter pylori stool antigen test. *World Journal of Gastroenterology* 2012;**18**(1):44–8.

Koizumi 2003
Koizumi W, Tanabe S, Imaizumi H, Hibi KI, Kida M, Ohida M, et al. Effect of anti-Helicobacter pylori igg antibody titer following eradication of Helicobacter pylori infection. *Hepato-Gastroenterology* 2003;**50**(49):293–6.

Kokkola 1998
Kokkola A, Puolakkainen P, Rautelin H, Sipponen P, Farkkila M, Haapiainen R, et al. Positive serology indicates an active h-pylori infection in patients with atrophic gastritis in spite of negative histology and c-13-urea breath test. *Gastroenterology* 1998;**114**(4):A183.

Kokkola 2000
Kokkola A, Rautelin H, Puolakkainen P, Sipponen P, Farkkila M, Haapiainen R, et al. Diagnosis of Helicobacter pylori infection in patients with atrophic gastritis: Comparison of histology, c-13-urea breath test, and serology. *Scandinavian Journal of Gastroenterology* 2000;**35** (2):138–41.

Koletzko 1995
Koletzko S, Haisch M, Seeboth I, Braden B, Hengels K, Koletzko B, et al. Isotope-selective non-dispersive infrared spectrometry for detection of Helicobacter pylori infection with ^{13}C-urea breath test. *Lancet* 1995;**345**(8955):961–2.

Koletzko 2003
Koletzko S, Konstantopoulos N, Bosman D, Feydt-Schmidt A, Van der Ende A, Kalach N, et al. Evaluation of a novel monoclonal enzyme immunoassay for detection of Helicobacter pylori antigen in stool from children. *Gut* 2003;**52**(6):804–6.

Kolho 2002
Kolho KL, Korhonen J, Verkasalo M, Lindahl H, Savilahti E, Rautelin H. Helicobacter pylori serology at diagnosis and follow-up of biopsy-verified infection in children. *Scandinavian Journal of Infectious Diseases* 2002;**34**(3): 177–82.

Kolho 2006
Kolho KL, Klemola T, Koivusalo A, Rautelin H. Stool antigen tests for the detection of Helicobacter pylori in children. *Diagnostic Microbiology and Infectious Disease* 2006;**55**(4):269–73.

Kolt 1997
Kolt SD, Dow C, Elliott SL, Yeomans ND. Effect of omeprazole on the accuracy of the i mu ci c-14-urea breath test for h-pylori. *Gastroenterology* 1997;**112**(4 (suppl)): A180.

Kolts 1993
Kolts BE, Joseph B, Achem SR, Bianchi T, Monteiro C. Helicobacter-pylori detection - a quality and cost-analysis. *American Journal of Gastroenterology* 1993;**88**(5):650–5.

Kondo 2000
Kondo T, Mitsui T, Kitagawa M, Nakae Y. Association of fasting breath nitrous oxide concentration with gastric juice nitrate and nitrite concentrations and Helicobacter pylori infection. *Digestive Diseases & Sciences* 2000;**45**(10): 2054–7.

Konorev 2013
Konorev MR, Matveenko ME, Komleva EN. Comparative evaluation of efficiency of helic ammonia breath test for diagnostics of h. Pylori infection in gastric mucous. *Helicobacter* 2013;**18**:122.

Konorev 2014
Konorev MR, Komleva EN, Matveenko ME. Evaluation of efficiency of helic ammonia breath test for diagnostics of h. Pylori infection in stomach in rheumatoid arthritis patients taking nsaids. *Helicobacter* 2014;**19**:123.

Konstantopoulos 2001
Konstantopoulos N, Russmann H, Tasch C, Sauerwald T, Demmelmair H, Autenrieth I, et al. Evaluation of the Helicobacter pylori stool antigen test (HPSA) for detection of Helicobacter pylori infection in children. *American Journal of Gastroenterology* 2001;**96**(3):677–83.

Konturek 1999
Konturek SJ, Bielanski W, Bobrzynski A, Rembiarz K, Winiarski M, Karczewska E, et al. Upper gastrointestinal bleeding does not interfere with the effectiveness of urea breath test in detecting of Helicobacter pylori in humans. *Gastroenterology* 1999;**116**(4 (suppl)):A220.

Kopacova 1999
Kopacova M, Bures J, Vorisek V, Konstacky M, Rejchrt S, Zivny P, et al. Detection of Helicobacter pylori by means of ^{13}C-urea breath test: Clinical reproducibility of the test. *Klinicka Biochemie a Metabolismus* 1999;**7**(4):213–6.

Kopacova 2005
Kopacova M, Bures J, Vorisek V, Konstacky M, Rejchrt S, Zivny P, et al. Comparison of different protocols for c-13-urea breath test for the diagnosis of Helicobacter pylori infection in healthy volunteers. *Scandinavian Journal of Clinical & Laboratory Investigation* 2005;**65**(6):491–8.

Kopanski 1993a
Kopanski Z, Cienciata A. Serologic detection of Helicobacter pylori antibodies after surgery for stomach and duodenal ulcer. *Wiener Klinische Wochenschrift* 1993;**105** (14):408–11.

Kopanski 1993b
Kopanski Z, Cienciala A, Slowakiewicz E, Witkowska B, Ulatowski Z. Serological diagnosis of infection by Helicobacter pylori in chronic ulcer disease. *Materia Medica Polona* 1993;**25**(2):81–2.

Kopanski 1996
Kopanski Z, Schlegel-Zawadzka M, Witkowska B, Cienciala A, Szczerba J. Role of the enterotest in the diagnosis of the Helicobacter pylori infections. *European Journal of Medical Research* 1996;**1**(11):520–2.

Kopanski 1997
Kopanski Z, Niziol J, Micherdzinski J, Wasilewska-Radwanska H, Schlegel-Zawadzka M, Lasa J, et al. Significance of the 14c-urea breath test in the determination of the location infected by Helicobacter pylori in the alimentary canal. *European Journal of Medical Research* 1997;**2**(3):136–8.

Kopanski 2002
Kopanski Z, Jung A, Wasilewska-Radwanska M, Kuc T, Schlegel-Zawadzka M, Witkowska B. Comparative diagnostic value of the breath test and the urine test with ^{14}C-urea in the detection of the Helicobacter pylori infection. *Nuclear Medicine Review* 2002;**5**(1):21–4.

Korkmaz 2013
Korkmaz H, Kesli R, Karabagli P, Terzi Y. Comparison of the diagnostic accuracy of five different stool antigen tests for the diagnosis of Helicobacter pylori infection. *Helicobacter* 2013;**18**(5):384–91.

Korkmaz 2015
Korkmaz H, Findik D, Ugurluoglu C, Terzi Y. Reliability of stool antigen tests: Investigation of the diagnostic value of a new immunochromatographic Helicobacter pylori approach in dyspeptic patients. *Asian Pacific Journal of Cancer Prevention: Apjcp* 2015;**16**(2):657–60.

Korzonek 1997
Korzonek M. Diagnostic value of different methods applied for detecting Helicobacter pylori infection in gastric mucosa. *Annales Academiae Medicae Stetinensis* 1997;**43**:143–59.

Koumi 2011
Koumi A, Filippidis T, Leontara V, Makri L, Panos MZ. Detection of Helicobacter pylori: A faster urease test can save resources. *World Journal of Gastroenterology* 2011;**17**(3):349–53.

Kountouras 1996
Kountouras J, Boura P, Iliadis M, Giannouli P, Tsapas G. Saliva urease test and serological surveillance of Helicobacter pylori infection during treatment of peptic ulcer disease. *Hellenic Journal of Gastroenterology* 1996;**9**(1):67–71.

Kowalski 1990
Kowalski AJ, Cuan J, Chiang CS, Grove T, Perezperez G, Blaser M. Detection of antibodies to Helicobacter-pylori by ELISA. *Clinical Chemistry* 1990;**36**(6):1092.

Kozaiwa 1997
Kozaiwa K, Tajiri H, Sawada A, Miyoshi Y, Tada K, Etani Y, et al. Usefulness of c-13 urea breath test in diagnosis and monitoring of Helicobacter pylori infection in children with recurrent abdominal pain. *Gastroenterology* 1997;**112**(4 (suppl)):A184.

Kozlov 2006
Kozlov AV, Evstratova Iu S, Novikova VP, Tkachenko EI, Khochinskaia O. Gas analyzer "helicosense" as a new device for diagnosis of the Helicobacter infection. *Meditsinskaia Tekhnika* 2006;**3**:44–6.

Krausse 2008
Krausse R, Muller G, Doniec M. Evaluation of a rapid new stool antigen test for diagnosis of Helicobacter pylori infection in adult patients. *Journal of Clinical Microbiology* 2008;**46**(6):2062–5.

Kroser 1998
Kroser JA, Faigel DO, Furth EE, Metz DC. Comparison of rapid office-based serology with formal laboratory-based ELISA testing for diagnosis of *Helicobacter pylori* gastritis. *Digestive Diseases & Sciences* 1998;**43**(1):103–8.

Krumbiegel 2000a
Krumbiegel P, Muller DM. Helicobacter pylori in vivo diagnosis after food intake: Results of simultaneous n-15 urea urine and c-13 acetate breath tests. *Isotopes in Environmental and Health Studies* 2000;**36**(2):99–110.

Krumbiegel 2000b
Krumbiegel P, Herbarth O, Kiess W, Muller DM, Richter T. Diagnosis of Helicobacter pylori infection in children: Is the n-15 urine test more reliable than the c-13 breath test?. *Scandinavian Journal of Gastroenterology* 2000;**35**(4):353–8.

Kryvy 2012
Kryvy V, Klyaryts'ka I. Modified 13C-urea breath test in the diagnosis of infection h. Pylori in crimean population patients with gastritis. *Helicobacter* 2012;**17**:94.

Kuang 1998
Kuang A, Liang Z, Tan T, Chen D, Ma H, Si K, et al. Rapid microdose 14c-urea breath test for detection of Helicobacter pylori infection.. *Hua Xi Yi Ke Da Xue Xue Bao [Journal of West China University of Medical Sciences]* 1998;**29**(4):435–8.

Kubo 2001
Kubo Y, Matsui H, Ninomiya T, Mizukami Y, Onji M. Non-invasive approach for diagnosing atrophic gastritis using the c-13-bicarbonate breath test. *International Journal of Molecular Medicine* 2001;**7**(4):381–4.

Kubota 2002
Kubota K, Shimoyama S, Shimizu N, Noguchi C, Mafune K, Kaminishi M, et al. Studies of c-13-urea breath test for diagnosis of Helicobacter pylori infection in patients after partial gastrectomy. *Digestion* 2002;**65**(2):82–6.

Kubota 2003
Kubota K, Hiki N, Shimizu N, Shimoyama S, Noguchi C, Tange T, et al. Utility of [13C] urea breath test for Helicobacter pylori detection in partial gastrectomy patients. *Digestive Diseases & Sciences* 2003;**48**(11):2135–8.

Kumbhari 2012
Kumbhari V, Rahme N, Meredith CG. Evaluation of a novel office-based c-14 urea breath test 'heliprobe (r)' for the rapid detection of Helicobacter pylori. *Journal of Gastroenterology and Hepatology* 2012;**27**:58.

Kumbhari 2013
Kumbhari V, Rahme N, Meredith C. Evaluation of a novel office based 14c urea breath test, heliprobe, in patients undergoing endoscopy. *Gastroenterology* 2013;**1**:S334.

Kuo 2002
Kuo CH, Wu DC, Lu CY, Su YC, Yu FJ, Lee YC, et al. The media of rapid urease test influence the diagnosis of Helicobacter pylori. *Hepato-Gastroenterology* 2002;**49**(47):1191–4.

Kuo 2005
Kuo FC, Wang SW, Wu IC, Yu FJ, Yang YC, Wu JY, et al. Evaluation of urine ELISA test for detecting Helicobacter pylori infection in Taiwan: a prospective study. *World Journal of Gastroenterology* 2005;**11**(35):5545–8.

Kushch 2009
Kushch I, Korenev N, Kamarchuk L, Pospelov A, Alexandrov J, Kamarchuk G. Non-urease recognition of Helicobacter pylori infection using novel sensor technique for breath gas analysis. *Scandinavian Journal of Gastroenterology* 2009;**44**:25.

Kwon 2004
Kwon KT, Lee DS, Chung IK, Park MJ, Park CK, Cho CM, et al. The diagnostic validity of Helicobacter pylori stool antigen test in the pre- and post-eradication. *Taehan Sohwagi Hakhoe C [Korean Journal of Gastroenterology]* 2004;**44**(4):199–205.

Kwon 2015
Kwon YH, Kim N, Lee JY, Choi YJ, Yoon K, Hwang JJ, et al. The diagnostic validity of citric acid-free, high dose c-13-urea breath test after Helicobacter pylori eradication in Korea. *Helicobacter* 2015;**20**(3):159–68.

Kyrlagkitsis 2007
Kyrlagkitsis I, Ladas SD, Mallass EG, Raptis S, Mentis A, Delliou E, et al. Evaluation of a conventional ELISA (Novitec) and a near patient immunochromatographic test (Stick H. pyl) for Helicobacter pylori antigen detection in stool. *Hepato-Gastroenterology* 2007;**54**(75):799–802.

Labenz 1996
Labenz J, Barsch G, Peitz U, Aygen S, Hennemann O, Tillenburg B, et al. Validity of a novel biopsy urease test (hut) and a simplified 13C-urea breath test for diagnosis of Helicobacter pylori infection and estimation of the severity of gastritis. *Digestion* 1996;**57**(6):391–7.

Labenz 1997
Labenz J, Peitz U, Aygen S, Hennemann O, Stolte M. Accuracy of rapid urease test and urea breath test for diagnosis of Helicobacter pylori infection after treatment - an investigator blind multicenter study. *Gastroenterology* 1997;**112**(4 (suppl)):A188.

Ladas 2000
Ladas SD, Malamou H, Giota G, Varzakakos I, Kitsanta P, Georgopoulos S, et al. Prospective evaluation of a whole-blood antibody test (flexpack hp) for in-office diagnosis of Helicobacter pylori infection in untreated patients. *European Journal of Gastroenterology & Hepatology* 2000;**12**(7):727–31.

Ladas 2002b
Ladas SD, Varzakakos I, Malamou H, Georgopoulos S, Giota G, Triantafyllou K, et al. Evaluation of a single-step serological assay for laboratory diagnosis of Helicobacter pylori infection. *European Journal of Clinical Microbiology & Infectious Diseases* 2002;**21**(1):56–9.

Lahaie 1995
Lahaie RG, Desroches J, Picard M, Lemoyne M, Poitras P, Gagnon M, et al. Value of one-step, 20 min c-14 urea breath test in diagnosis and proof of eradication of Helicobacter-pylori infection. *Gastroenterology* 1995;**108**(4):A141.

Laheij 2006
Laheij RJ. Assessment of a new rapid urease test (gut test) to diagnose Helicobacter pylori infection. *Netherlands Journal of Medicine* 2006;**64**(9):317–8.

Lai 1997
Lai KC, Chu KM, Hui WM, Wong BCY, Lam SK. Non-invasive tests before endoscopy in area with high prevalence of gastric carcinoma - Helicobacter pylori serology or urea breath test?. *Gastroenterology* 1997;**112**(4 (Suppl)):A599.

Laine 1997
Laine L, Lewin DN, Naritoku W, Cohen H. Prospective comparison of H&E, Giemsa, and Genta stains for the diagnosis of Helicobacter pylori. *Gastrointestinal Endoscopy* 1997;**45**(6):463–7.

Laine 1999
Laine L, Knigge K, Faigel D, Margaret N, Marquis SP, Vartan G, et al. Fingerstick Helicobacter pylori antibody test: Better than laboratory serological testing?. *American Journal of Gastroenterology* 1999;**94**(12):3464–7.

Lamarque 1996
Lamarque D, Tankovic J, Benamouzig R, Mahe S, Chaumette MT, Auroux J, et al. Quantification of Helicobacter pylori (hp) infection in antrum: Comparison of culture, histological examination and c-13-urea breath test. *Gastroenterology* 1996;**110**(4 (suppl)):A169.

Langhorst 2002
Langhorst J, Heuer S, Drouven FU, Schwobel HD, Reichenberger S, Neuhaus H. Evaluation of a new immunochromatographic based whole blood near patient test for the diagnosis of Helicobacter pylori infection. *Zeitschrift Fur Gastroenterologie* 2002;**40**(6):389–93.

Larras 2009
Larras R, Moubri M, Berrah H, Mouffok F, Bouhadef A, Bouzid K, et al. Evaluation of a monoclonal stool antigen test for the diagnosis of *H. pylori* infection in preschool Algerian children. *Helicobacter* 2009;**14**(4):347.

Lassnig 1988
Lassnig C, Umlauft F, Schaber E, Stoffler G, Aigner F. The value of indirect immunofluorescence, ELISA and western blots for diagnosis and epidemiology of *campylobacter pylori* infections. *Biological Chemistry Hoppe-Seyler* 1988;**369**(9):862.

Laszewicz 2014
Laszewicz W, Iwanczak F, Iwanczak B, Task Force of the Polish Society of Gastroenterology. Seroprevalence of Helicobacter pylori infection in Polish children and adults depending on socioeconomic status and living conditions. *Advances in Medical Sciences* 2014;**59**(1):147–50.

Lee 1999
Lee CL, Lee SC, Wu CH, Chen TK. Diagnosis of h. Pylori infection by urea breath test: Comparison of 50 mg vs 100 mg of c-13 urea. *Gut* 1999;**45**(Suppl 3):A131.

Lee 2000a
Lee SC, Sheu BS, Huang JJ, Yang HB, Lin XZ. Diagnostic efficacy of c-13-urea breath test for Helicobacter pylori infection in hemodialysis patients. *Gut* 2000;**47**(Suppl 1):A120.

Lee 2000b
Lee JM, Breslin NP, Fallon C, O'Morain CA. Rapid urease tests lack sensitivity in Helicobacter pylori diagnosis when peptic ulcer disease presents with bleeding. *American Journal of Gastroenterology* 2000;**95**(5):1166–70.

Lee 2003
Lee YH, Lee SY, Kim YT, Park CK, Jo CM, Tak WY, et al. Diagnosis of Helicobacter pylori infection with urine

and stool. *Taehan Sohwagi Hakhoe Chi [Korean Journal of Gastroenterology]* 2003;**42**(2):115–20.

Lee 2013

Lee YC, Chiu HM, Chiang TH, Yen AMF, Chiu SYH, Chen SLS, et al. Accuracy of faecal occult blood test and Helicobacter pylori stool antigen test for detection of upper gastrointestinal lesions. BMJ Open 2013; Vol. 3, issue 10: e003989. [DOI: 10.1136/bmjopen-2013-003989

Lee 2014

Lee YC, Tseng PH, Liou JM, Chen MJ, Chen CC, Tu CH, et al. Performance of a one-step fecal sample-based test for diagnosis of Helicobacter pylori infection in primary care and mass screening settings. *Journal of the Formosan Medical Association* 2014;**113**(12):899–907.

Lee 2015a

Lee SY, Moon HW, Hur M, Yun YM. Validation of western Helicobacter pylori igg antibody assays in Korean adults. *Journal of Medical Microbiology* 2015;**64**(Pt 5):513–8.

Lee 2015b

Lee JY, Kim N. Diagnosis of Helicobacter pylori by invasive test: histology. *Annals of Translational Medicine* 2015;**3**(1): 10.

Leja 2009

Leja M, Kupcinskas L, Funka K, Sudraba A, Jonaitis L, Ivanauskas A, et al. The validity of a biomarker method for indirect detection of gastric mucosal atrophy versus standard histopathology. *Digestive Diseases & Sciences* 2009; **54**(11):2377–84.

Lelwala 1990

Lelwala Guruge J, Schalen C, Nilsson I, Ljungh A, Tyskiewicz T, Wikander M, et al. Detection of antibodies to Helicobacter pylori cell surface antigens. *Scandinavian Journal of Infectious Diseases* 1990;**22**(4):457–65.

Lemus 2004

Lemus SMV, Acar MR, Ponce MC, Torres J, Rodriguez OO. Detection of antibodies against Helicobacter pylori and positivity to the 13 carbon urea breath test in patients with rosacea. *Dermatologia Revista Mexicana* 2004;**48**(4): 189–96.

Leodolter 1997

Leodolter A, DominguezMunoz JE, Nilius M, VonArnim U, Malfertheiner P. Non-invasive primary diagnosis of h-pylori infection: 13C-urea breath test or serology?. *Gastroenterology* 1997;**112**(4 (suppl)):A197.

Leodolter 1998a

Leodolter A, Dominguez-Muñoz JE, Von Arnim U, Manes G, Malfertheiner P. 13C-urea breath test for the diagnosis of Helicobacter pylori infection. A further simplification for clinical practice. *Scandinavian Journal of Gastroenterology* 1998;**33**(3):267–70.

Leodolter 1998b

Leodolter A, Dominguez-Muñoz JE, Gerards C, Von Arnim U, Malfertheiner P. Validity of a modified c-13-urea breath test (c-13-ubt) for pre- and post-treatment diagnosis of Helicobacter pylori infection in clinical routine. *Gut* 1998; **43**(Suppl 2):A52.

Leodolter 1999a

Leodolter A, Dominguez-Muñoz JE, Von Arnim U, Malfertheiner P. Citric acid or orange juice for the c-13-urea breath test: The impact of ph and gastric emptying. *Alimentary Pharmacology & Therapeutics* 1999;**13**(8): 1057–62.

Leodolter 1999b

Leodolter A, Dominguez-Muñoz JE, Von Arnim U, Kahl S, Peitz U, Malfertheiner P. Validity of a modified c-13-urea breath test for pre- and posttreatment diagnosis of Helicobacter pylori infection in the routine clinical setting. *American Journal of Gastroenterology* 1999;**94**(8):2100–4.

Leodolter 2000

Leodolter A, Von Arnim U, Gerards C, Kahl S, Malfertheiner P. Pre- and post-treatment diagnosis of h-pylori infection by the c-13-urea breath test (13C-ubt): Validation of a new isotope-selective infrared spectrometer (isis). *Gastroenterology* 2000;**118**(4 Part 1):A506.

Leodolter 2001a

Leodolter A, Vaira D, Bazzoli F, Hirschl A, Megraud F, Malfertheiner P. European multicentre validation trial of two new non-invasive tests for detection of antibody to *H. pylori*: urine-based ELISA and rapid urine test. *Gastroenterology* 2001;**120**(5):A491.

Leodolter 2001b

Leodolter A, Ziegler K, Lehn N, Malfertheiner P. The h-pylori antigen stool test for determination of h-pylori status in general practice: Is unfrozen delivery of stool specimens sufficient using a regular postal service?. *Gut* 2001;**49** (suppl):A97.

Leodolter 2001c

Leodolter A, Agha-Amiri K, Peitz U, Gerards C, Ebert MP, Malfertheiner P. Validity of a Helicobacter pylori stool antigen assay for the assessment of h-pylori status following eradication therapy. *European Journal of Gastroenterology & Hepatology* 2001;**13**(6):673–6.

Leodolter 2002

Leodolter A, Peitz U, Ebert MP, Agha-Amiri K, Malfertheiner P. Comparison of two enzyme immunoassays for the assessment of Helicobacter pylori status in stool specimens after eradication therapy. *American Journal of Gastroenterology* 2002;**97**(7):1682–6.

Leodolter 2003a

Leodolter A, Wolle K, Wex T, Peitz U, Malfertheiner P. Evaluation of a novel rapid H. pylori stool antigen test: Is a reliable diagnosis now possible in the doctor's office?. *Gastroenterology* 2003;**124**(4):A58.

Leodolter 2003b

Leodolter A, Vaira D, Bazzoli F, Schutze K, Hirschl A, Megraud F, et al. European multicentre validation trial of two new non-invasive tests for the detection of *Helicobacter pylori* antibodies: urine-based ELISA and rapid urine test. *Alimentary Pharmacology & Therapeutics* 2003;**18**(9): 927–31.

Leodolter 2004
Leodolter A, Wolle K, Peitz U, Schaffranke A, Wex T, Malfertheiner P. Evaluation of a near-patient fecal antigen test for the assessment of Helicobacter pylori status. *Diagnostic Microbiology & Infectious Disease* 2004;**48**(2): 145–7.

Leodolter 2005
Leodolter A, Wolle K, Von Arnim U, Kahl S, Treiber G, Ebert MP, et al. Breath and string test: A diagnostic package for the identification of treatment failure and antibiotic resistance of Helicobacter pylori without the necessity of upper gastrointestinal endoscopy. *World Journal of Gastroenterology* 2005;**11**(4):584–6.

Lepper 2004
Lepper PM, Moricke A, Vogt K, Bode G, Trautmann M. Comparison of different criteria for interpretation of immunoglobulin g immunoblotting results for diagnosis of Helicobacter pylori infection. *Clinical & Diagnostic Laboratory Immunology* 2004;**11**(3):569–76.

Lerang 1998a
Lerang F, Moum B, Mowinckel P, Haug JB, Ragnhildstveit E, Berge T, et al. Accuracy of seven different tests for the diagnosis of Helicobacter pylori infection and the impact of H2 receptor antagonists on test results. *Scandinavian Journal of Gastroenterology* 1998;**33**(4):364–9.

Lerang 1998b
Lerang F, Haug JB, Moum B, Mowinckel P, Berge T, Ragnhildstveit E, et al. Accuracy of IgG serology and other tests in confirming Helicobacter pylori eradication. *Scandinavian Journal of Gastroenterology* 1998;**33**(7):710–5.

Leszczynska 2009
Leszczynska K, Namiot DB, Namiot Z, Leszczynska JK, Jakoniuk P, Kemona A. Application of immunoassay for detection of Helicobacter pylori antigens in the dental plaque. *Advances in Medical Sciences* 2009;**54**(2):194–8.

Leung 1998a
Leung WK, Ng EKW, Sung JY. Performance of commercially available serological ELISA test for H. pylori infection: discrepancy between east and west. *Gastroenterology* 1998;**114**(4 (suppl)):A201.

Leung 1998b
Leung WK, Chan FKL, Falk MS, Suen R, Sung JJY. Comparison of two rapid whole-blood tests for Helicobacter pylori infection in Chinese patients. *Journal of Clinical Microbiology* 1998;**36**(11):3441–2.

Leung 1999
Leung WK, Ng EKW, Chan FKL, Chung SCS, Sung JJY. Evaluation of three commercial enzyme-linked immunosorbent assay kits for diagnosis of Helicobacter pylori in Chinese patients. *Diagnostic Microbiology and Infectious Disease* 1999;**34**(1):13–7.

Leung 2001
Leung WK, Chow TP, Ng EKW, Chan FKL, Chung SCS, Sung JJY. Validation of a new immunoblot assay for the diagnosis of Helicobacter pylori in the asian population. *Alimentary Pharmacology and Therapeutics* 2001;**15**(3): 423–8.

Leunk 1990
Leunk RD, Ferguson MA, Morgan DR, Low DE, Simor AE. Antibody to cytotoxin in infection by Helicobacter pylori. *Journal of Clinical Microbiology* 1990;**28**(6):1181–4.

Levine 2004a
Levine A, Shevah O, Shabat-Sehayek V, Aeed H, Boaz M, Moss SF, et al. Masking of c-13 urea breath test by proton pump inhibitors is dependent on type of medication: Comparison between omeprazole, pantoprazole, lansoprazole and esomeprazole. *Alimentary Pharmacology & Therapeutics* 2004;**20**(1):117–22.

Levine 2004b
Levine A, Shevah O, Miloh T, Wine F, Niv Y, Bujanover Y, et al. Validation of a novel real time c-13 urea breath test for rapid evaluation of Helicobacter pylori in children and adolescents. *Journal of Pediatrics* 2004;**145**(1):112–4.

Lew 1999
Lew EA, Pisegna JR, Ohning GV, Faller LD, David S, Walsh JH, et al. Intragastric ph titration affects the accuracy of uc urea breath test in the diagnosis of Helicobacter pylori. *Gastroenterology* 1999;**116**(4 (suppl)):A235.

Lewin-van 1999
Lewin-van den Broek NT, Numans ME, Buskens E, De Wit NJ, Smout AJPM, Verheij TJM. Validation and value of an enzyme-linked immunosorbent assay for Helicobacter pylori in primary care. *Scandinavian Journal of Gastroenterology* 1999;**34**(4):391–5.

Lewis 1997
Lewis JD, Kroser J, Bevan J, Furth EE, Metz DC. Urease-based tests for Helicobacter pylori gastritis - accurate for diagnosis but poor correlation with disease severity. *Journal of Clinical Gastroenterology* 1997;**25**(2):415–20.

Li 1995
Li C, Ha T, Ferguson DA, Zhao RG, Chi DS, Patel NR, et al. Comparison of PCR detection of Helicobacter-pylori infection using gastric biopsy, saliva and stool specimens with other established techniques (ELISA, culture and histology). *Gastroenterology* 1995;**108**(4):A147.

Li 1996
Li C, Ha T, Ferguson DA, Jr, Chi DS, Zhao R, et al. A newly developed PCR assay of h. Pylori in gastric biopsy, saliva, and feces. Evidence of high prevalence of h. Pylori in saliva supports oral transmission. *Digestive Diseases & Sciences* 1996;**41**(11):2142–9.

Li 2004
Li YH, Guo H, Zhang PB, Zhao XY, Da SP. Clinical value of Helicobacter pylori stool antigen test, immunocard stat HPSA, for detecting h pylori infection. *World Journal of Gastroenterology* 2004;**10**(6):913–4.

Liao 2002
Liao CC, Lee CL, Chiang TC, Lee SC, Huang SH, Tu TC, et al. The c-13-urea breath test to detect Helicobacter pylori injection: A validated simple methodology with 50 mg c-

13-urea. *Alimentary Pharmacology & Therapeutics* 2002;**16** (4):787–92.

Liao 2003
Liao CC, Lee CL, Lai YC, Huang SH, Lee SC, Wu CH, et al. Accuracy of three diagnostic tests used alone and in combination for detecting Helicobacter pylori infection in patients with bleeding gastric ulcers. *Chinese Medical Journal* 2003;**116**(12):1821–6.

Lie 2012
Lie MR, Ganesh S, Haringsma J, Francke J, Kuipers EJ. Analytical equivalence study of ndirs versus irms in breath test analysis. *Gastroenterology* 2012;**142**(5 (Suppl 1)):S487.

Lim 2005
Lim LG, Yeoh KG, Ho B, Lim SG. Validation of four Helicobacter pylori rapid blood tests in a multi-ethnic asian population. *World Journal of Gastroenterology* 2005;**11**(42): 6681–3.

Lin 1992
Lin SK, Lambert JR, Schembri M, Nicholson L, Finlay M, Wong C, et al. A comparison of diagnostic tests to determine Helicobacter pylori infection. *Journal of Gastroenterology & Hepatology* 1992;**7**(2):203–9.

Lin 2004a
Lin HJ, Lo WC, Perng CL, Li AF, Tseng GY, Sun IC, et al. Helicobacter pylori stool antigen test in patients with bleeding peptic ulcers. *Helicobacter* 2004;**9**(6):663–8.

Lin 2004b
Lin HJ, Sun IC, Lo WC. Helicobacter pylori stool antigen test is not reliable in patients with bleeding peptic ulcers. *Gastroenterology* 2004;**126**(4 (Suppl)):A184.

Lin 2004c
Lin FY, Sabri M, Erickson D, Alirezaie J, Li D, Sherman PM. Development of a novel microfluidic immunoassay for the detection of Helicobacter pylori infection. *Analyst* 2004;**129**(9):823–8.

Lin 2015
Lin Z, Cheng SL, Yan Q, Liu XF, Zheng W, Hu XM, et al. Development of an immunochromatographic lateral flow device for rapid detection of Helicobacter pylori stool antigen. *Clinical Biochemistry* 2015;**48**(18):1298–303.

Lindsetmo 2008
Lindsetmo RO, Johnsen R, Eide TJ, Gutteberg T, Husum HH, Revhaug A. Accuracy of Helicobacter pylori serology in two peptic ulcer populations and in healthy controls. *World Journal of Gastroenterology* 2008;**14**(32):5039–45.

Ling 2013
Ling D. Carbon-13 urea breath test for Helicobacter pylori infection in patients with uninvestigated ulcer-like dyspepsia: An evidence-based analysis. *Ontario Health Technology Assessment Series* 2013;**13**(19):1–30.

Liquornik 1998
Liquornik KN, Liacouras CA, Ruchelli ED, Metz DC. The c13-urea breath test: An excellent noninvasive method for detection of h-pylori infection in pediatric patients. *Gastroenterology* 1998;**114**(4 (suppl)):A205.

Liston 1996
Liston R, Pitt MA, Banerjee AK. IgG ELISA antibodies and detection of Helicobacter pylori in elderly patients. *Lancet* 1996;**347**(8996):269.

Liu 2002
Liu W, Xiao S, Wang J, Zhao Z, Qian J, Hu F, et al. Evaluation of Helicobacter pylori stool antigen test for detection of Helicobacter pylori: A multicenter study. *Chinese Journal of Gastroenterology* 2002;**7**(3):136–9.

Llor 2014
Llor C, Bjerrum L. Antimicrobial resistance: risk associated with antibiotic overuse and initiatives to reduce the problem. *Therapeutic Advances in Drug Safety* 2014;**5**(6):229–41.

Lo 2005
Lo CC, Lai KH, Peng NJ, Lo GH, Tseng HH, Lin CK, et al. Polymerase chain reaction: A sensitive method for detecting Helicobacter pylori infection in bleeding peptic ulcers. *World Journal of Gastroenterology* 2005;**11**(25): 3909–14.

Locatelli 2004
Locatelli A, Catapani WR, Gomes CR Jr, Silva CBP, Waisberg J. Detection of anti-Helicobacter pylori antibodies in serum and duodenal fluid in peptic gastroduodenal disease. *World Journal of Gastroenterology* 2004;**10**(20): 2997–3000.

Loeb 1997
Loeb MB, Riddell RH, James C, Hunt R, Smaill FM. Evaluation of salivary antibodies to detect infection with Helicobacter pylori. *Canadian Journal of Gastroenterology* 1997;**11**(5):437–40.

Loffeld 1989
Loffeld RJ, Stobberingh E, Flendrig JA, Van Spreeuwel JP, Arends JW. Diagnostic value of an immunoassay to detect anti campylobacter pylori antibodies in non-ulcer dyspepsia. *Lancet* 1989;**1**(8648):1182–5.

Loffeld 1993
Loffeld RJLF, Vriese WTJ, Stobberingh EE. Usefulness of several commercial enzyme-linked; immunoassays for detection of Helicobacter pylori infection in clinical medicine. *European Journal of Gastroenterology & Hepatology* 1993;**5**(5):333–7.

Logan 1990
Logan RPH, Dill S, Walker MM, Bauer FE, Rathbone BP, Johnson P, et al. Evaluation of European standard c-13 urea breath test for the detection of Helicobacter-pylori. *Gut* 1990;**31**(10):A1177.

Logan 1991b
Logan RPH, Dill S, Bauer FE, Walker MM, Hirschl AM, Gummett PA, et al. The European c-13-urea breath test for the detection of Helicobacter-pylori. *European Journal of Gastroenterology & Hepatology* 1991;**3**(12):915–21.

Lombardo 1999
Lombardo L, Masoero G, Della Monica P, Taraglio S, Motta M, Ravarino N, et al. Six-time points c-13-urea breath test is a suitable method for Helicobacter pylori diagnosis in postgastrectomy patients. *Gut* 1999;**45**(Suppl 3):A131.

Lopez 2001

Lopez Penas D, Naranjo Rodriguez A, Munoz Molinero J, Rodriguez Lopez F, Galvez Calderon C, Chicano Gallardo M, et al. Efficacy of fecal detection of Helicobacter pylori with the HPSA technique in patients with upper digestive hemorrhage. *Gastroenterologia y Hepatologia* 2001;**24**(1): 5–8.

Lopez 2004

Lopez T, Quesada M, Almirall J, Sanfeliu I, Segura F, Calvet X. Usefulness of non-invasive tests for diagnosing Helicobacter pylori infection in patients undergoing dialysis for chronic renal failure. *Helicobacter* 2004;**9**(6):674–80.

Lopez-Brea 1998

Lopez-Brea M, Alarcon T, Domingo D, Sanchez I, Martinez MJ, Sanz JC. Evaluation of a western-blot technique (helicoblot 2.0) for the detection of antibodies versus specific antigens of Helicobacter in children. *Enfermedades Infecciosas Y Microbiologia Clinica* 1998;**16**(6):275–9.

Lotterer 1991

Lotterer E, Ramaker J, Ludtke FE, Tegeler R, Geletneky JV, Bauer FE. The simplified 13C-urea breath test--one point analysis for detection of Helicobacter pylori infection. *Zeitschrift Fur Gastroenterologie* 1991;**29**(11):590–4.

Lotterer 1993a

Lotterer E, Ludtke FE, Tegeler R, Lepsien G, Bauer FE. The 13C-urea breath test--detection of Helicobacter pylori infection in patients with partial gastrectomy. *Zeitschrift Fur Gastroenterologie* 1993;**31**(2):115–9.

Lotterer 1993b

Lotterer E, Ludtke FE, Tegeler R, Bauer FE. The c-13-urea breath test, Helicobacter-pylori infection, and the operated stomach. *Journal of Clinical Gastroenterology* 1993;**16**(1): 82–3.

Loy 1996

Loy CT, Irwig LM, Katelaris PH, Talley NJ. Do commercial serological kits for Helicobacter pylori infection differ in accuracy? A meta-analysis. *American Journal of Gastroenterology* 1996;**91**(6):1138–44.

Lozniewski 1996

Lozniewski A, DeKorwin JD, Conroy MC, Plenat F, Weber M. Evaluation of Pyloriset dry, a new rapid agglutination test for Helicobacter pylori antibody detection. *Journal of Clinical Microbiology* 1996;**34**(7):1773–5.

Lu 2005

Lu CY, Kuo CH, Lo YC, Chuang HY, Yang YC, Wu IC, et al. The best method of detecting prior Helicobacter pylori infection. *World Journal of Gastroenterology* 2005;**11**(36): 5672–6.

Lu 2006

Lu CY, Kuo FC, Wang SW, Lo YC, Wu IC, Chang LL, et al. The clinical applications and accuracy of 2 rapid near-patient tests in detecting Helicobacter pylori infection. *Diagnostic Microbiology & Infectious Disease* 2006;**56**(3): 241–6.

Lucio 1999

Lucio L, Masoero G, Della Monica P, Taraglio S, Motta M, Ravarino N, et al. Six-time points c-13-urea breath test is a suitable method for Helicobacter pilory diagnosis in post-gastrectomy patients. *Gastroenterology* 1999;**116**(4 (suppl)): A240.

Luzza 1995

Luzza F, Maletta M, Imeneo M, Doldo P, Marasco R, Biancone L, et al. Salivary specific igg is a sensitive indicator of the humoral immune response to Helicobacter pylori. *FEMS Immunology & Medical Microbiology* 1995;**10**(3-4): 281–3.

Luzza 1997

Luzza F, Oderda G, Maletta M, Imeneo M, Mesuraca L, Chioboli E, et al. Salivary immunoglobulin g assay to diagnose Helicobacter pylori infection in children. *Journal of Clinical Microbiology* 1997;**35**(12):3358–60.

Luzza 2000

Luzza F, Imeneo M, Marasco A, Crotta S, Ierardi E, Usai P, et al. Evaluation of a commercial serological kit for detection of salivary immunoglobulin g to Helicobacter pylori: A multicentre study. *European Journal of Gastroenterology & Hepatology* 2000;**12**(10):1117–20.

Ma 2006

Ma YJ, Liu GQ, Zhang HD, Fang QB, Zhao HG. Feasibility of ammonia breath test in diagnosis of Helicobacter pylori infection.. *World Chinese Journal of Digestology* 2006;**14** (36):3504–8.

Maaroos 2004

Maaroos HI, Andreson H, Loivukene K, Hutt P, Kolk H, Kull I, et al. The diagnostic value of endoscopy and Helicobacter pylori tests for peptic ulcer patients in late post-treatment setting. *BMC Gastroenterology* 2004;**4**:27.

Macaskill 2013

Macaskill P, Gatsonis C, Deeks JJ, Harbord RM, Takwoingi Y, editor(s). Chapter 10: Analysing and Presenting Results. In: Deeks JJ, Bossuyt PM, Gatsonis C, editor(s). Cochrane Handbook for Systematic Reviews of Diagnostic Test Accuracy Version 1.0.0. The Cochrane Collaboration, 2013. Available from srdta.cochrane.org.

Machado 2004

Machado RS, Patricio FRD, Kawakami E. C-13-urea breath test to diagnose Helicobacter pylori infection in children aged up to 6 years. *Helicobacter* 2004;**9**(1):39–45.

Machado 2006

Machado RS, Kawakami E, Patricio FRD, Reber M. Urease activity does not reflect the degree of colonization by Helicobacter pylori in children. *Pediatrics International* 2006;**48**(4):398–402.

MacKay 2003

MacKay WG, Williams CL, McMillan M, Ndip RN, Shepherd AJ, Weaver LT. Evaluation of protocol using gene capture and PCR for detection of Helicobacter pylori DNA in feces. *Journal of Clinical Microbiology* 2003;**41**(10): 4589–93.

Madico 1995
Madico G, Verastegui M. Serodiagnosis of Helicobacter pylori infection by enzyme-linked immunoelectrotransfer blot. Gastrointestinal physiology working group of Cayetano Heredia University. *Journal of Diarrhoeal Diseases Research* 1995;**13**(2):122–6.

Mahmood 2010
Mahmood S, Hamid A. Comparison between invasive and noninvasive tests in diagnosis of Helicobacter pylori infection. *Pakistan Journal of Biological Sciences* 2010;**13**(10):509–12.

Mahony 1988
Mahony MJ, Littlewood JM. Diagnosis of campylobacter pylori gastritis by IgG ELISA. *Pediatric Research* 1988;**24**(3):416.

Maity 2014
Maity A, Banik GD, Ghosh C, Som S, Chaudhuri S, Daschakraborty SB, et al. Residual gas analyzer mass spectrometry for human breath analysis: A new tool for the non-invasive diagnosis of Helicobacter pylori infection. *Journal of Breath Research* 2014;**8**(1):016005.

Makristathis 1998
Makristathis A, Pasching E, Schutze K, Wimmer M, Rotter ML, Hirschl AM. Detection of Helicobacter pylori in stool specimens by PCR and antigen enzyme immunoassay. *Journal of Clinical Microbiology* 1998;**36**(9):2772–4.

Makristathis 2000
Makristathis A, Barousch W, Pasching E, Binder C, Kuderna C, Apfalter P, et al. Two enzyme immunoassays and PCR for detection of Helicobacter pylori in stool specimens from pediatric patients before and after eradication therapy. *Journal of Clinical Microbiology* 2000;**38**(10):3710–4.

Malaty 1996
Malaty HM, El-Zimaity HM, Genta RM, Klein PD, Graham DY. Twenty-minute fasting version of the us 13C-urea breath test for the diagnosis of h. Pylori infection. *Helicobacter* 1996;**1**(3):165–7.

Malaty 2000
Malaty HM, Logan ND, Graham DY, Ramchatesingh JE, Reddy SG. Helicobacter pylori infection in asymptomatic children: Comparison of diagnostic tests. *Helicobacter* 2000;**5**(3):155–9.

Malaty 2002
Malaty HM, Haveman T, Graham DY, Fraley JK. Helicobacter pylori infection in asymptomatic children: Impact of epidemiologic factors on accuracy of diagnostic tests. *Journal of Pediatric Gastroenterology & Nutrition* 2002;**35**(1):59–63.

Malfertheiner 1988
Malfertheiner P, Henze E, Stanescu A, Glasbrenner B, Schoetensack C, Ditschuneit H. C-14-breath-test to identify campylobacter-pylori colonization of the mucous-membrane of the stomach. *Zeitschrift fur Gastroenterologie* 1988;**26**(9):528.

Malfertheiner 2002
Malfertheiner P, Axon A, O'Morain C, Pajares-Garcia JM, Ekstrom P, Schutze K, et al. Evaluation of a new Helicobacter pylori catalase based stool antigen test (femtolab h. Pylori cnx): A European multicenter study. *Gastroenterology* 2002;**122**(4 (Suppl)):A205.

Malfertheiner 2005
Malfertheiner P. 13C-urea breath test: Further modification towards an unrestricted use. *Digestion* 2005;**71**(4):206–7.

Malfertheiner 2012
Malfertheiner P, Megraud F, O'Morain CA, Atherton J, Axon AT, Bazzoli F, et al. Management of Helicobacter pylori infection - the Maastricht IV/ Florence Consensus Report. *Gut* 2012;**61**(5):646–64.

Mana 2000a
Mana F, Lacor P, Urbain D. ^{13}C urea breath test for the diagnosis of Helicobacter pylori infection: Contribution of an infrared spectrometer. *Tijdschrift voor Geneeskunde* 2000;**56**(17):1240–6.

Mana 2000b
Mana F, Franken PR, Ham HR, Reynaert H, Urbain D. C-13 urea breath test with nondispersive isotope-selective infrared spectrometry: Reproducibility and importance of the fasting status. *Helicobacter* 2000;**5**(2):104–8.

Mana 2001b
Mana F, Ham HR, Reynaert H, Franken P, Urbain D. Urea breath test for the diagnosis of Helicobacter pylori. *Gastrointestinal Endoscopy* 2001;**53**(6):700–1.

Mana 2005
Mana F, Van Laer W, Bossuyt A, Urbain D. The early effect of proton pump inhibitor therapy on the accuracy of the 13C-urea breath test [erratum appears in Digestive & Liver Disease 2009;41(8):613 note: Van laere, w [corrected to van laer, w]]. *Digestive & Liver Disease* 2005;**37**(1):28–32.

Manes 2000
Manes G, Balzano A, Iaquinto G, Ricci C, Giardullo N, Lioniello M, et al. Accuracy of the h-pylori stool antigen test in the pre- and post-eradication assessment and in patients on omeprazole treatment. *Gut* 2000;**47**(Suppl 1):A113.

Manes 2001
Manes G, Balzano A, Iaquinto G, Ricci C, Piccirillo MM, Giardullo N, et al. Accuracy of the stool antigen test in the diagnosis of Helicobacter pylori infection before treatment and in patients on omeprazole therapy. *Alimentary Pharmacology & Therapeutics* 2001;**15**(1):73–9.

Manes 2005
Manes G, Zanetti MV, Piccirillo MM, Lombardi G, Balzano A, Pieramico O. Accuracy of a new monoclonal stool antigen test in post-eradication assessment of Helicobacter pylori infection: Comparison with the polyclonal stool antigen test and urea breath test. *Digestive & Liver Disease* 2005;**37**(10):751–5.

Mansour-Ghanaei 2013
Mansour-Ghanaei F, Joukar F, Sheykhian MR, Soati F, Rafatzand AM. Effect of gastric acidification on the c-14-

ubt heliprobe (r) accuracy during pantoprazole treatment in Helicobacter pylori positive patients. *International Journal of Clinical and Experimental Medicine* 2013;**6**(3):185–91.

Marchildon 1996
Marchildon PA, Ciota LM, Zamaniyan FZ, Peacock JS, Graham DY. Evaluation of three commercial enzyme immunoassays compared with the c-13 urea breath test for detection of Helicobacter pylori infection. *Journal of Clinical Microbiology* 1996;**34**(5):1147–52.

Marchildon 1999
Marchildon P, Balaban DH, Sue M, Charles C, Doobay R, Passaretti N, et al. Usefulness of serological igg antibody determinations for confirming eradication of Helicobacter pylori infection. *American Journal of Gastroenterology* 1999; **94**(8):2105–8.

Marchildon 2003
Marchildon PA, Sugiyama T, Fukuda Y, Peacock JS, Asaka M, Shimoyama T, et al. Evaluation of the effects of strain-specific antigen variation on the accuracy of serologic diagnosis of Helicobacter pylori infection [erratum appears in Journal of Clinical Microbiology 2003;41(7):3462 note: Fukada, y [corrected to fukuda, y]]. *Journal of Clinical Microbiology* 2003;**41**(4):1480–5.

Marshall 1988a
Marshall BJ, Surveyor I. Carbon-14 urea breath test for the diagnosis of campylobacter pylori associated gastritis. *Journal of Nuclear Medicine* 1988;**29**(1):11–6.

Marshall 1988b
Marshall BJ, Guerrant RL, Plankey MW, Dye KR, Barrett L, Frierson HF, et al. Comparison of c-14-urea breath test, microbiology and histology for the diagnosis of campylobacter pylori. *Gastroenterology* 1988;**94**(5):A284.

Marshall 1988c
Marshall BJ, Plankey MW, Dye KR, Frierson H, Hoffman SR, Barrett L, et al. A rapid c-14 urea breath test for the diagnosis of c-pylori associated gastritis. *Clinical Research* 1988;**36**(1):A14.

Marshall 1991
Marshall BJ, Plankey MW, Hoffman SR, Boyd CL, Dye KR, Frierson HF Jr, et al. A 20-minute breath test for Helicobacter pylori. *American Journal of Gastroenterology* 1991;**86**(4):438–45.

Marshall 1999
Marshall JK, O'Brien BJ, Armstrong D. C-13-urea breath test or h-pylori serology for the initial evaluation of young patients with ulcer-like dyspepsia: A decision analysis. *Gastroenterology* 1999;**116**(4 (suppl)):A78.

Marusic 2006
Marusic M, Presecki V, Katicic M, Dominis M, Kalenic S. The place and role of serologic methods in detecting Helicobacter pylori infection. *Collegium Antropologicum* 2006;**30**(3):529–33.

Masoero 2000
Masoero G, Lombardo L, Della Monica P, Vicari S, Crocilla C, Duglio A, et al. Discrepancy between Helicobacter pylori stool antigen assay and urea breath test in the detection of Helicobacter pylori infection. *Digestive & Liver Disease* 2000;**32**(4):285–90.

Massarrat 2012
Massarrat S, Sheykholeslami A. Serum pepsinogen ii as a good marker for mass screening and eradication of h. Pylori infection in populations at risk for gastric cancer. *Archives of Iranian Medicine* 2012;**15**(4):265–6.

Matougui 2007
Matougui N, Boudjella MA, Oumnia N, Lahcene M, Tebaibia A, Mouffok F, et al. Evaluation of pronto-dry test versus c-13 urea breath test in determining Helicobacter pylori status after treatment. *Helicobacter* 2007;**12**(4):445.

Matsuda 2003a
Matsuda M, Noda Y, Takemori Y. Utility and limitations of a method for detecting Helicobacter pylori-specific antigens in the stool. *Journal of Gastroenterology* 2003;**38**(3):222–8.

Matsuda 2003b
Matsuda M, Noda Y, Takemori Y. Novel diagnostic method of testing for Helicobacter pylori infection using the rapid leukocyte strip test, leukostix. *Journal of Gastroenterology and Hepatology* 2003;**18**(10):1196–201.

Matsukura 1995
Matsukura N, Onda M, Tokunaga A, Kato S, Yamashita K, Ohbayashi M. Detection of Helicobacter pylori DNA in gastric juice by the polymerase chain reaction: Comparison with findings in bacterial culture and the detection of tissue iga and serum igg antibodies against Helicobacter pylori. *Journal of Gastroenterology* 1995;**30**(6):689–95.

Matsukura 2004
Matsukura N, Tajiri T, Kato S, Togashi A, Masuda G, Tokunaga A, et al. Diagnostic value of culture, histology and PCR for Helicobacter pylori in the remnant stomach after surgery. *Alimentary Pharmacology & Therapeutics* 2004;**20 Suppl 1**:33–8.

Matsuo 2000
Matsuo K, Hamajima N, Tominaga S, Suzuki T, Nakamura T, Matsuura A, et al. Helicobacter pylori igg antibody test established in the United States showed a substantially lower sensitivity for Japanese population. *American Journal of Gastroenterology* 2000;**95**(6):1597–8.

Mattar 1999
Mattar R, Silva FM, Alexandrino AM, Laudanna AA. Validation of 14c-urea breath test for diagnosis of Helicobacter pylori. *Revista do Instituto de Medicina Tropical de Sao Paulo* 1999;**41**(1):3–8.

Mattar 2014
Mattar R, Villares CA, Marostegam PF, Chaves CE, Pinto VB, Carrilho FJ. Low dose capsule based 13C-urea breath test compared with the conventional 13C-urea breath test and invasive tests. *Arquivos de Gastroenterologia* 2014;**51**(2): 133–8.

Matthews 2000
Matthews GM, Butler RN, Cummins AG, Lawrence A, Johnson B, Campbell F. The c-13-urea breath test

reflects the severity of Helicobacter pylori associated antral inflammation. *Gastroenterology* 2000;**118**(4 (Part 2)): A1272.

Matthews 2005
Matthews GM, Cummins AG, Lawrence A, Johnson B, Campbell F, Butler RN. 13C-urea breath test: Reproducibility and association with the severity of Helicobacter pylori-associated antral gastritis. *Journal of Gastroenterology and Hepatology* 2005;**20**(2):270–4.

Mauro 2006a
Mauro M, Radovic V, Zhou P, Wolfe M, Kamath M, Bercik P, et al. ^{13}C urea breath test for Helicobacter pylori: determination of the optimal cut-off point in a Canadian community population. *Canadian Journal of Gastroenterology* 2006;**20**(12):770–4.

Mauro 2006b
Mauro M, Radovic V, Wolfe M, Kamath M, Bercik P, Armstrong D. C-13 urea breath test for Helicobacter pylori: Evaluation of 10-minute breath collection. *Canadian Journal of Gastroenterology* 2006;**20**(12):775–8.

McColl 1997
McColl KE, El-Nujumi A, Murray L, El-Omar E, Gillen D, Dickson A, et al. The Helicobacter pylori breath test: A surrogate marker for peptic ulcer disease in dyspeptic patients. *Gut* 1997;**40**(3):302–6.

McColl 2003
McColl KE, Murray LS, Gillen D, Delaney B. Noninvasive Helicobacter pylori testing was as effective as endoscopy for managing dyspepsia. *Evidence-Based Medicine* 2003;**8**(1): 20–1.

McNamara 1999
McNamara D, Whelan H, Hamilton H, Beattie S, O'Morain C. Hpsa: Assessment of a new non-invasive diagnostic assay for Helicobacter pylori infection in an Irish population. *Irish Journal of Medical Science* 1999;**168**(2): 111–3.

McNulty 1999
McNulty CA, Nair P, Watson BE, Uff JS, Valori RM. A comparison of six commercial kits for Helicobacter pylori detection. *Communicable Disease & Public Health* 1999;**2** (1):59–63.

McNulty 2005
McNulty C, Teare L, Owen R, Tompkins D, Hawtin P, McColl K. Test and treat for dyspepsia - but which test?. *BMJ* 2005;**330**(7483):105–6.

Mediero 2007
Mediero GG, Ramos JM, Garcia JI, Varela IO, Del Blanco T, Conde JAS. Evaluation of Helicobacter pylori stool antigen test for the detection of h-pylori infection in paediatric patients. *International Journal of Antimicrobial Agents* 2007;**29**:S641.

Megraud 1988
Megraud F. Comparison of different tests for campylobacter pylori. *Scandinavian Journal of Gastroenterology - Supplement* 1988;**142**:64–8.

Megraud 2000
Megraud F, Burette A, Glupczynski Y, Fiocca R, Logan R, Quina M, et al. Comparison of tests for assessment of Helicobacter pylori eradication: Results of a multi-centre study using centralized facility testing. *European Journal of Gastroenterology & Hepatology* 2000;**12**(6):629–33.

Megraud 2005
Megraud F, European PTFonHp. Comparison of non-invasive tests to detect Helicobacter pylori infection in children and adolescents: Results of a multicenter European study. *Journal of Pediatrics* 2005;**146**(2):198–203.

Mehrazma 2014
Mehrazma M, Nakhaii S, Talachian E, Harahdashti AL. Diagnostic accuracy of Helicobacter pylori stool antigen test in iranian children. *Infectious Diseases in Clinical Practice* 2014;**22**(3):154–6.

Meijer 1997
Meijer BC, Thijs JC, Kleibeuker JH, Van Zwet AA, Berrelkamp RJP. Evaluation of eight enzyme immunoassays for detection of immunoglobulin g against Helicobacter pylori. *Journal of Clinical Microbiology* 1997;**35**(1):292–4.

Meltzer 2013
Meltzer AC, Pierce R, Cummings DAT, Pines JM, May L, Smith MA, et al. Rapid ^{13}C urea breath test to identify Helicobacter pylori infection in emergency department patients with upper abdominal pain. *Western Journal of Emergency Medicine* 2013;**14**(3):278–82.

Mendall 1992
Mendall MA, Goggin PM, Marrero JM, Molineaux N, Levy J, Badve S, et al. Role of Helicobacter pylori serology in screening prior to endoscopy. *European Journal of Gastroenterology & Hepatology* 1992;**4**(9):713–7.

Mendoza 2006
Mendoza RB, Sio-Aguilar JO. The validity of Helicobacter pylori immunochromatographic stool antigen test and campylobacter urease test in the diagnosis of Helicobacter pylori infection among pediatric patients. *Journal of Gastroenterology and Hepatology* 2006;**21**:A392.

Menegatti 1997a
Menegatti M, Vaira D, Stanghellini V, Ali A, Landi F, Ricci C, et al. Comparison of c-13- vs c-14-urea breath test (ubt) for Helicobacter pylori (hp). *Gastroenterology* 1997;**112**(4 (suppl)):A218.

Menegatti 1997b
Menegatti M, Stanghellini V, Landi F, Farinelli S, Mucci F, Ali A, et al. C-13 with and without test meal vs c-14 urea breath test (ubt) to detect h-pylori before and after treatment. *Gut* 1997;**41**(Suppl):A162–A3.

Metz 1998
Metz DC, Furth EE, Faigel DO, Kroser JA, Alavi A, Barrett DM, et al. Realities of diagnosing Helicobacter pylori infection in clinical practice: A case for non-invasive indirect methodologies. *Yale Journal of Biology & Medicine* 1998;**71**(2):81–90.

Metz 2000
Metz DC. Stool testing for Helicobacter pylori infection: Yet another noninvasive alternative. *American Journal of Gastroenterology* 2000;**95**(2):546–8.

Midolo 1995
Midolo PD, Lambert JR, Russell EG, Lin SK. A practical single sample dry latex agglutination test for Helicobacter pylori antibody detection. *Journal of Clinical Pathology* 1995;**48**(10):969–71.

Miehlke 1996
Miehlke S, Figura N, Kim JG, Small SM, Graham DY, Do MF. Western blotting for detection of Helicobacter pylori anti-caga antibodies strongly correlates with presence of the caga gene. *Gastroenterology* 1996;**110**(4 (suppl)):A197.

Miftahussurur 2016
Miftahussurur M, Yamaoka Y. Diagnostic methods of Helicobacter pylori infection for epidemiological studies: Critical importance of indirect test validation. BioMed Research International 2016; Vol. 2016:4819423. [DOI: 10.1155/2016/4819423

Minoli 1998
Minoli G, Prada A, Schuman R, Murnick D, Rigas B. A simplified urea breath test for the diagnosis of Helicobacter pylori infection using the lara system. *Journal of Clinical Gastroenterology* 1998;**26**(4):264–6.

Mion 1996
Mion F, Rousseau M. Diagnostic tests to document Helicobacter pylori eradication. *Gastroenterology* 1996;**110** (1 (suppl)):324–5.

Mion 1997a
Mion F, Rosner G, Rousseau M, Minaire Y. 13C-urea breath test for Helicobacter pylori: Cut-off point determination by cluster analysis. *Clinical Science* 1997;**93**(1):3–6.

Mion 1997b
Mion F, Rosner G, Rousseau M, Brazier JL. C-13-urea breath test for Helicobacter pylori: Optimal cutoff point determination by roc curve and cluster analysis. *Clinical Chemistry* 1997;**43**(6 (Suppl 2)):17.

Mion 2001
Mion F, Ecochard R, Guitton J, Ponchon T. (co2)-c-13 breath tests: Comparison of isotope ratio mass spectrometry and non-dispersive infrared spectrometry results. *Gastroenterologie Clinique Et Biologique* 2001;**25**(4): 375–9.

Mirbagheri 2005
Mirbagheri SA, Sohrabpour AA, Hasibi M, Moghimi B, Mohamadnejad M. 14c-urea breath test in patients undergoing anti-tuberculosis therapy. *World Journal of Gastroenterology* 2005;**11**(11):1712–4.

Mitchell 1988
Mitchell HM, Lee A, Berkowicz J, Borody T. The use of serology to diagnose active campylobacter pylori infection. *Medical Journal of Australia* 1988;**149**(11-12):604–9.

Miwa 1997
Miwa H, Murai T, Ohkura R, Kawabe M, Tanaka H, Ogihara T, et al. Effect of fasting subjects' posture on c-13-urea breath test for detection of Helicobacter pylori infection. *Helicobacter* 1997;**2**(2):82–5.

Miwa 1998a
Miwa H, Ohkura R, Nagahara A, Murai T, Ogihara T, Watanabe S, et al. C-13 -urea breath test for assessment of cure of Helicobacter pylori infection at 1 month after treatment. *Journal of Clinical Gastroenterology* 1998;**27**: S150–S3.

Miwa 1998b
Miwa H, Murai T, Ohkura R, Nagahara A, Watanabe H, Terai T, et al. Usefulness of the c-13 -urea breath test for detection of Helicobacter pylori infection in fasting patients. *Journal of Gastroenterology and Hepatology* 1998; **13**(10):1039–43.

Miwa 1999
Miwa H, Hirose M, Kikuchi S, Terai T, Iwazaki R, Kobayashi O, et al. How useful is the detection kit for antibody to Helicobacter pylori in urine (urinelisa) in clinical practice?. *American Journal of Gastroenterology* 1999; **94**(12):3460–3.

Miwa 2000
Miwa H, Kikuchi S, Ohtaka K, Kobayashi O, Ogihara A, Hojo M, et al. Insufficient diagnostic accuracy of imported serological kits for Helicobacter pylori infection in Japanese population. *Diagnostic Microbiology & Infectious Disease* 2000;**36**(2):95–9.

Miwa 2001
Miwa H, Akamatsu S, Tachikawa T, Sogabe T, Ohtaka K, Nagahara A, et al. On-site diagnosis of h-pylori infection by urine. *Diagnostic Microbiology and Infectious Disease* 2001; **39**(2):95–7.

Mizukami 1994
Mizukami T, Osawa T, Niwa M, Oya A, Masubuchi N, Takahashi S. An enzyme-linked immunosorbent assay for the detection of igg antibodies against urease of Helicobacter pylori. *Rinsho Byori [Japanese Journal of Clinical Pathology]* 1994;**42**(11):1188–93.

Moayyedi 1997
Moayyedi P, Braunholtz D, Heminbrough E, Clough M, Tompkins DS, Mapstone NP, et al. Do patients need to fast for a c-13-urea breath test?. *European Journal of Gastroenterology & Hepatology* 1997;**9**(3):275–7.

Mock 1999
Mock T, Yatscoff R, Foster R, Hyun JH, Chung IS, Shim CS, et al. Clinical validation of the helikit™: A c-13 urea breath test used for the diagnosis of Helicobacter pylori infection. *Clinical Biochemistry* 1999;**32**(1):59–63.

Mohammadi 2008
Mohammadi M, Talebkhan Y, Khalili G, Mahboudi F, Massarrat S, Zamaninia L, et al. Advantage of using a home-made ELISA kit for detection of Helicobacter pylori infection over commercially imported kits. *Indian Journal of Medical Microbiology* 2008;**26**(2):127–31.

Moncayo 2006
Moncayo JI, Santacruz JJ, Alvarez AL, Franco B, Lopez MA, Angel A, et al. Comparison of methods in the diagnosis of Helicobacter pylori infection in Quindio, Colombia. *Colombia Medica* 2006;**37**(3):203–12.

Monteiro 2001b
Monteiro L, Gras N, Megraud F. Magnetic immuno-PCR assay with inhibitor removal for direct detection of Helicobacter pylori in human feces. *Journal of Clinical Microbiology* 2001;**39**(10):3778–80.

Morales 2002
Morales A, Hurtado C, Madrid AM, Pimentel C, Espinosa MN. An ELISA stool test to detect Helicobacter pylori infection. *Revista Medica de Chile* 2002;**130**(1):61–5.

Moshkowitz 1993
Moshkowitz M, Peled Y, Baratz M, Halpern Z, Tiomny E, Gilat T. 14c-urea breath test--a simple, noninvasive method for the detection of Helicobacter pylori infection. *Israel Journal of Medical Sciences* 1993;**29**(2-3):94–7.

Motta 2009
Motta O, De Caro F, Quarto F, Proto A. New FTIR methodology for the evaluation of (13)C/(12)C isotope ratio in Helicobacter pylori infection diagnosis. *Journal of Infection* 2009;**59**(2):90–4.

Moulton-Barrett 1993
Moulton-Barrett R, Triadafilopoulos G, Michener R, Gologorsky D. Serum 13C-bicarbonate in the assessment of gastric Helicobacter pylori urease activity. *American Journal of Gastroenterology* 1993;**88**(3):369–74.

Mowat 1997
Mowat C, Murray L, Hilditch TE, Kelman A, Oien K, McColl KEI. Comparison of helisal test kit and c-14-urea breath test in determining h-pylori status and predicting ulcer disease in dyspeptic patients. *Gastroenterology* 1997; **112**(4 (suppl)):A226.

Mowat 1998
Mowat C, Murray L, Hilditch TE, Kelman A, Oien K, McColl KE. Comparison of helisal rapid blood test and 14c-urea breath test in determining Helicobacter pylori status and predicting ulcer disease in dyspeptic patients. *American Journal of Gastroenterology* 1998;**93**(1):20–5.

Mrevlje 2012
Mrevlje Z, Plut S, Jeverica S, Osredkar J, Stabuc B. Comparison of success rates of noninvasive and invasive methods in diagnosis of Helicobacter pylori infection. *Helicobacter* 2012;**17**:94.

Muhsen 2006
Muhsen K, Athamna A, Athamna M, Spungin-Bialik A, Cohen D. Evaluation of a urine-based enzyme-linked immunosorbent assay test for the detection of Helicobacter pylori infection among 3- to 5-year-old Israeli Arab healthy children. *Journal of Pediatric Gastroenterology & Nutrition* 2006;**43**(3):398–401.

Muhsen 2012
Muhsen K, Jurban M, Goren S, Cohen D. Incidence, age of acquisition and risk factors of Helicobacter pylori infection among Israeli Arab infants. *Journal of Tropical Pediatrics* 2012;**58**(3):208–13.

Munster 1993
Munster DJ, Chapman BA, Burt MJ, Dobbs BR, Allardyce RA, Bagshaw PF, et al. The fate of ingested 14c-urea in the urea breath test for Helicobacter pylori infection. *Scandinavian Journal of Gastroenterology* 1993;**28**(8):661–6.

Murakami 2003
Murakami K, Sato R, Okimoto T, Watanabe K, Nasu M, Fujioka T, et al. Influence of anti-ulcer drugs used in Japan on the result of c-13-urea breath test for the diagnosis of Helicobacter pylori infection. *Journal of Gastroenterology* 2003;**38**(10):937–41.

Murakami 2011
Murakami K, Kamada T, Ishikawa H, Imamura H, Matsumoto H, Fujita M, et al. An evaluation of the performance of a novel stick-type kit for rapid detection of Helicobacter pylori antibodies in urine. *Clinical Laboratory* 2011;**57**(7-8):481–7.

Murata 2002
Murata Y, Kojyo A, Ikeda A, Yamanaka K. Study on the detection methods of Helicobacter pylori from clinical specimens. *Rinsho Biseibutsu Jinsoku Shindan Kenkyukai Shi [JARMAM : Journal of the Association for Rapid Method and Automation in Microbiology]* 2002;**12**(2):105–19.

Murphy 2015
Murphy C, Yamaguchi D, Rainey PM. Helicobacter pylori c-13-urea breath test: The unique challenges of validating a clia-waived test. *American Journal of Clinical Pathology* 2015;**143**:A11.

Murugesan 2011
Murugesan SV, Steele I, Tiszlavicz L, Farragher T, Moore AR, Varro A, et al. Factors that determine the sensitivity of rapid urease tests for the detection of Helicobacter pylori infection. *Gastroenterology* 2011;**140**(5 (suppl)):S879.

Muñoz 1998
Muñoz E, Corcuera M, Roldán M, Gómez F, Picazo A, Baquero M, et al. Comparative study of microbiological and histopathological techniques used for the detection of Helicobacter pylori. *European Journal of Histochemistry* 1998;**42**(4):297–302.

Muñoz 1999
Muñoz C, Jane M, Gonzalez-Cuevas A, Juncosa T, Gene A, Varea V, et al. Evaluation of a simple, rapid polymerase chain reaction (PCR) technique for the diagnosis of Helicobacter pylori infection in infancy. *Enfermedades Infecciosas Y Microbiologia Clinica* 1999;**17**(3):119–25.

Myllyniemi 2007
Myllyniemi M, Linnala A, Paloheimo LI, Hendolin P, Engstrand L, Perez GP, et al. Improved specificity of Helicobacter pylori IgA/IgG ELISA over other H. pylori tests. *Helicobacter* 2007;**12**(4):447.

Myllyniemi 2008
Myllyniemi M, Hendolin P, Telaranta-Keerie A, Nikulin M, Paloheimo LI, Engstrand L, et al. New specific *H. pylori* IgG ELISA test. *Helicobacter* 2008;**13**(5):472–3.

Nagahara 2003
Nagahara Y, Mizuno M, Maga T, Ishiki K, Okuno T, Yoshida T, et al. Outcome of patients with inconsistent results from c-13-urea breath test and bacterial culture at the time of assessment of heliclobacter pylori eradication therapy in Japan. *Hepato-Gastroenterology* 2003;**50**(53): 1700–3.

Nair 1995
Nair P, Stephens JC, Mackay EH, West K, Mayberry JF, Wicks ACB, et al. A simple 3-minute latex agglutination-test for rapid Helicobacter-pylori serodiagnosis. *Gastroenterology* 1995;**108**(4):A174.

Nakagawa 1995
Nakagawa T, Ohara H, Yamamoto M, Yoneshima M, Suzuki T, Murai S, et al. 13C-urea breath test for the detection of Helicobacter pylori infection and the assessment of therapeutic effect. *Nippon Shokakibyo Gakkai Zasshi [Japanese Journal of Gastroenterology]* 1995;**92**(3):264.

Nakata 1995
Nakata H, Itoh H, Yokoya Y, Kawai J, Nishioka S, Miyamoto K, et al. Serum antibody against *Helicobacter pylori* assayed by a new capture ELISA. *Journal of Gastroenterology* 1995;**30**(3):295–300.

Nakata 2004
Nakata H, Itoh H, Ishiguchi T, Iwata T, Sato H, Higashimoto Y, et al. Immunological rapid urease test using monoclonal antibody for Helicobacter pylori. *Journal of Gastroenterology and Hepatology* 2004;**19**(9):970–4.

Nakayama 2004
Nakayama K, Konno M, Tajiri H, Matsuhisa T, Kato S, Minoura T, et al. Comparison between the ^{13}C-urea breath test and stool antigen test for the diagnosis of childhood Helicobacter pylori infection. *Journal of Gastroenterology* 2004;**39**(11):1045–50.

Naruki 1996
Naruki Y, Koyama H, Kurita T, Nishino M, Higashi Y, Otsuka S, et al. Evaluation of c-13 urea breath test in a diagnosis of Helicobacter pylori. *Journal of Nuclear Medicine* 1996;**37**(5 (suppl)):246 (abstract 1103).

Navarro 1992
Navarro F, Coll P, Sainz S, Mirelis B, Cardenosa N, Alonso C, et al. Evaluation of two different commercial kits for Helicobacter pylori specific antibodies detection in patients undergoing gastrointestinal endoscopic procedures. A seroprevalence study in asymptomatic population. *Enfermedades Infecciosas Y Microbiologia Clinica* 1992;**10**(4): 190–4.

NCBI 2014
NCBI. MeSH. NLM Controlled Vocabulary. Helicobacter pylori. www.ncbi.nlm.nih.gov/mesh/68016480 (accessed 3 August 2014).

Negayama 1992
Negayama K, Terada S, Kawanishi K. Clinical significance of anti-Helicobacter pylori antibody in the diagnosis of Helicobacter pylori infection in chronic gastritis. *Kansenshogaku Zasshi [Journal of the Japanese Association for Infectious Diseases]* 1992;**66**(11):1597–8.

Negrini 1992
Negrini R, Zanella I, Savio A, Poiesi C, Verardi R, Ghielmi S, et al. Serodiagnosis of Helicobacter pylori-associated gastritis with a monoclonal antibody competitive enzyme-linked immunosorbent assay. *Scandinavian Journal of Gastroenterology* 1992;**27**(7):599–605.

Neri 1999
Neri M, Angelucci D, Laterza F, Ricciuti M, Del Duca L, Di Matteo S, et al. False negativity of c-13 urea breath test in the presence of coccoid forms of h.Pylori: Effects on the sensitivity of the test. *Gastroenterology* 1999;**116**(4 (suppl)): A265.

Neumann 2010
Neumann H, Foertsch S, Vieth M, Mudter J, Kuth R, Neurath MF. Immediate detection of Helicobacter infection with a novel electrochemical system: Feasibility and comparison of diagnostic yield with immunohistochemistry, 13C urea breath test and Helicobacter urease test. *Gastroenterology* 2010;**138**(5 (suppl 1)):S114.

Neumann 2011
Neumann H, Foertsch S, Vieth M, Kuth R, Roll S, Neurath MF. A newly developed electrochemical device enables accurate and immediate detection of h. Pylori infection within 10 seconds. *Gastroenterology* 2011;**140**(5 (suppl)): S58.

Neumann 2012
Neumann H, Foertsch S, Ritter B, Vieth M, Kuth R, Neurath MF. Final data of a new electrochemical device that enables rapid and accurate detection of Helicobacter pylori infection. *Gastroenterology* 2012;**142**(5 (Suppl 1)):S484.

Newell 1988
Newell DG, Johnston BJ, Ali MH, Reed PI. An enzyme-linked immunosorbent assay for the serodiagnosis of campylobacter pylori-associated gastritis. *Scandinavian Journal of Gastroenterology - Supplement* 1988;**142**:53–7.

Newell 1989a
Newell DG, Rathbone BJ. The serodiagnosis of campylobacter pylori infection. *Serodiagnosis and Immunotherapy in Infectious Disease* 1989;**3**(1):1–6.

Newell 1989b
Newell DG, Stacey A. Antigens for the serodiagnosis of campylobacter pylori infections. *Gastroenterologie Clinique et Biologique* 1989;**13**(1 Pt 1):37B–41B.

Newell 1991
Newell DG, Hawtin PR, Stacey AR, MacDougall MH, Ruddle AC. Estimation of prevalence of Helicobacter pylori infection in an asymptomatic elderly population comparing [14c] urea breath test and serology. *Journal of Clinical Pathology* 1991;**44**(5):385–7.

Ng 2002
Ng FH, Lai KC, Wong BC, Wong WM, Wong SY, Chow KC, et al. [13C]-urea breath test without prior fasting and without test meal is accurate for the detection

of Helicobacter pylori infection in Chinese. *Journal of Gastroenterology and Hepatology* 2002;**17**(8):834–8.

Ng 2013
Ng TH, Rosaida R. Evaluation of serology and urea breath test as reliable diagnostic test for h.Pylori infection. *Journal of Gastroenterology and Hepatology* 2013;**28**:97.

Nguyen 2008a
Nguyen TV, Bengtsson C, Nguyen GK, Granstrom M. Evaluation of a novel monoclonal-based antigen-in-stool enzyme immunoassay (premier platinum HPSA plus) for diagnosis of Helicobacter pylori infection in Vietnamese children. *Helicobacter* 2008;**13**(4):269–73.

Nguyen 2008b
Nguyen TVH, Bengtsson C, Nguyen GK, Granstrom M. Evaluation of a novel monoclonal-based antigen-in-stool enzyme immunoassay (premier platinum HPSA plus) for diagnosis of Helicobacter pylori infection in Vietnamese children. *Helicobacter* 2008;**13**(4):269–73.

Nguyen 2010
Nguyen LT, Uchida T, Tsukamoto Y, Trinh TD, Ta L, Ho DQD, et al. Evaluation of rapid urine test for the detection of Helicobacter pylori infection in the Vietnamese population. *Digestive Diseases and Sciences* 2010;**55**(1): 89–93.

Nguyen 2012
Nguyen VB, Nguyen GK, Ha Nguyen TV, Ha Hoang TT, Anh Le TL, Xuan Nguyen TA, et al. Helicobacter pylori (hp) infection in Vietnam: Epidemiology, symptomatology, diagnosis and treatment in children. *Journal of Gastroenterology and Hepatology* 2012;**27**:46.

Nguyen 2013
Nguyen B, Anhthi Nguyen V, Nguyen K, Anhthi Le L, Hathi Nguyen V, Hathi Hoang T, et al. Helicobacter pylori (hp) infection in Vietnam: Epidemiology, symptomatology, diagnosis and treatment in children. *Journal of Gastroenterology and Hepatology* 2013;**28**:550–1.

Ni 2000
Ni YH, Lin JT, Huang SF, Yang JC, Chang MH. Accurate diagnosis of Helicobacter pylori infection by stool antigen test and six other currently available tests in children. *Gastroenterology* 2000;**118**(4):A1283.

Nightingale 1996
Nightingale SL. Breath test for Helicobacter pylori collection kit approved. *Journal of the American Medical Association* 1996;**276**(21):1710.

Nijevitch 2001
Nijevitch AA, Sataev VU. The reliability of urease tests for Helicobacter pylori in childhood. *Journal of Clinical Gastroenterology* 2001;**32**(3):277–9.

Nilius 2001
Nilius M, Wex T, Muller-Dietz G, Leodolter A, Schilling D, Malfertheiner P. Comparative evaluation of two hemagglutination tests for the detection of anti-Helicobacter pylori antibodies. *Diagnostic Microbiology & Infectious Disease* 2001;**41**(4):221–3.

Nishi 1998
Nishi I, Irie H, Watanabe N, Futami J, Suzuki H, Ichinose Y, et al. Urea breath test "breath by breath measurement" of (v)over-dot(13)co(2) and (v)over-dot(12)co(2): An approach to the quantitative evaluation for the therapeutic elimination of h-pylori. *Gastroenterology* 1998;**114**(4 (suppl)):A243.

Nishikawa 1996
Nishikawa K, Katagiri M, Kagaya H, Kudo M, Kato M, Takeda H, et al. Evaluation of rapid urease tests for Helicobacter pylori in biopsy specimens, compared with culture and c-13-urea breath test. *Gastroenterology* 1996; **110**(4 (suppl)):A212.

Nishikawa 1999
Nishikawa K, Kato M, Sugiyama T, Asaka M. Helicobacter pylori, serum igg antibody, urea breath test. *Nippon Rinsho* 1999;**57**(Suppl):154–6.

Nishikawa 2000
Nishikawa K, Sugiyama T, Kato M, Ishizuka J, Kagaya H, Hokari K, et al. A prospective evaluation of new rapid urease tests before and after eradication treatment of Helicobacter pylori, in comparison with histology, culture and c-13-urea breath test. *Gastrointestinal Endoscopy* 2000;**51**(2):164–8.

Nishizono 1998
Nishizono A, Gotoh T, Fujioka T, Murakami K, Kubota T, Nasu M, et al. Serological assessment of the early response to eradication therapy using an immunodominant outer membrane protein of Helicobacter pylori. *Clinical & Diagnostic Laboratory Immunology* 1998;**5**(6):856–61.

Niv 1998
Niv Y, Sperber AD, Scapa E, Maoz E, Fraser G, Druzd T, et al. A comparison of new rapid urease tests for detection of Helicobacter pylori: Test characteristics and factors affecting positivity and time to positivity. *Journal of Clinical Gastroenterology* 1998;**27**(4):327–30.

Niv 2000
Niv Y, Abuksis G, Ben-Gur S, Koren K. 13C-urea breath test (13C-ubt) for validation of successful Helicobacter pylori eradication. Evaluation of 1371 patients. *Gastroenterology* 2000;**118**(4 (part 2)):A1284.

Niv 2003
Niv Y, Abuksis G, Koren R. 13C urea breath test (13C ubt) for Helicobacter pylori (hp) diagnosis in geriatrics. *Gastroenterology* 2003;**124**(4 (suppl)):A625.

Noguchi 2007
Noguchi N, Rimbara E, Kato A, Tanaka A, Tokunaga K, Kawai T, et al. Detection of mixed clarithromycin-resistant and -susceptible Helicobacter pylori using nested PCR and direct sequencing of DNA extracted from faeces. *Journal of Medical Microbiology* 2007;**56**(9):1174–80.

Notarnicola 1996
Notarnicola M, Russo F, Cavallini A, Bianco M, Jirillo E, Pece S, et al. PCR identification of Helicobacter pylori DNA in faeces from patients with gastroduodenal pathology. *Medical Science Research* 1996;**24**(11):785–7.

Nugalieva 2006
Nugalieva ZZ, Opekun AR, Graham DY. Problem of distinguishing false-positive tests from acute or transient Helicobacter pylori infections. *Helicobacter* 2006;**11**(2): 69–74.

Nurgalieva 2003
Nurgalieva Z, Goodman KJ, Wang C, Day RS, Campos A, de la Rosa J. Detection of Helicobacter pylori infection in children followed from birth: Correspondence of serology and the urea breath test. *American Journal of Epidemiology* 2003;**157**(11):S85–S.

Nurgalieva 2008
Nurgalieva Z, Goodman KJ, Phillips CV, Fischbach L, de la Rosa JM, Gold BD. Correspondence between Helicobacter pylori antibodies and urea breath test results in a US-Mexico birth cohort. *Paediatric and Perinatal Epidemiology* 2008;**22** (3):302–12.

Nysaeter 1992
Nysaeter G, Berstad K, Weberg R, Berstad A, Hardardottir H. Diagnosis of Helicobacter pylori infection. Rapid urease test, microscopy of smears and culture from ventricular biopsy compared with the 14c-urea breath test. *Tidsskrift for Den Norske Laegeforening* 1992;**112**(18):2356–8.

O'Connor 2010
O'Connor A, O'Morain NR, Dobson M, Qasim A, Ryan BM, Breslin N, et al. Helicobacter pylori eradication treatment is more successful when diagnosis is made after urea breath test than after rapid urease testing at endoscopy in patients with dyspepsia. *Gastroenterology* 2010;**138**(5 (suppl 1)):S340.

Oak 2011
Oak JH, Chung WC, Jung SH, Choi KH, Kim EJ, Kang BK, et al. Effect of acid pump antagonist (revaprazan, revanex(r)) on result of 13C urea breath test in patients with Helicobacter pylori associated peptic ulcer disease. *Taehan Sohwagi Hakhoe Chi Korean Journal of Gastroenterology]* 2011;**57**(1):8–13.

Obata 2003
Obata Y, Kikuchi S, Miwa H, Yagyu K, Lin YS, Ogihara A. Diagnostic accuracy of serological kits for Helicobacter pylori infection with the same assay system but different antigens in a Japanese patient population. *Journal of Medical Microbiology* 2003;**52**(10):889–92.

Obradovic 2001
Obradovic V, Artiko V, Petrovic M, Petrovic N, Davidovic B, Bosnjakovic V, et al. Detection of Helicobacter pylori infection using 14-c urea breath test. *European Journal of Nuclear Medicine* 2001;**28**(8):1188.

Odaka 2002
Odaka T, Yamaguchi T, Koyama H, Saisho H, Nomura F. Evaluation of the Helicobacter pylori stool antigen test for monitoring eradication therapy. *American Journal of Gastroenterology* 2002;**97**(3):594–9.

Oderda 1989
Oderda G, Vaira D, Holton J, Dowsett JF, Ansaldi N. Serum pepsinogen i and igg antibody to campylobacter pylori in non-specific abdominal pain in childhood. *Gut* 1989;**30**(7):912–6.

Oderda 1998a
Oderda G, Garisio P, Harding M, Thomas JE. Use of the c-13 urea breath test for the diagnosis of Helicobacter pylori infection in childhood. *Gut* 1998;**43**:S11–S2.

Oderda 1998b
Oderda G, Harding M, Thomas JE, Coward WA, Bazzoli F, Zagari M, et al. The c-13 urea breath test to assess Helicobacter pylori eradication in childhood h pylori gastritis. *Gut* 1998;**43**(Suppl 3):S9–S10.

Oderda 1999
Oderda G, Rapa A, Ronchi B, Lerro P, Pastore M, Staiano A, et al. Evaluation of the Helicobacter pylori stool antigen test (HPSA) for detection of h-pylori infection in children. A multicentre Italian study. *Gut* 1999;**45**(Suppl 3):A93–A4.

Oderda 2000
Oderda G, Rapa A, Ronchi B, Lerro P, Pastore M, Staiano A, et al. Detection of Helicobacter pylori in stool specimens by non-invasive antigen enzyme immunoassay in children: Multicentre Italian study. *BMJ* 2000;**320**(7231):347–8.

Oderda 2004
Oderda G, Rapa A, Bona G. Diagnostic tests for childhood Helicobacter pylori infection: Invasive, noninvasive or both?. *Journal of Pediatric Gastroenterology and Nutrition* 2004;**39**(5):482–4.

Ogunc 2003
Ogunc D, Artan R, Ongut G, Gelen T, Colak D, Donmez L, et al. Evaluation of a western blot technique (helicoblot 2.1) for the diagnosis of Helicobacter pylori infection in children. *Pathology* 2003;**35**(2):157–60.

Ohara 1995
Ohara H, Suzuki T, Nakagawa T, Yoneshima M, Yamamoto M, Tsujino D, et al. 13C-ubt using an infrared spectrometer for detection of Helicobacter pylori and for monitoring the effects of lansoprazole. *Journal of Clinical Gastroenterology* 1995;**20 Suppl 2**:S115–7.

Ohara 1996
Ohara S, Sekine H, Moriyama S, Sugiyama K, Arikawa T, Iijima K, et al. Methodological study of ^{13}C urea breath test for detection of Helicobacter pylori infection. *Japanese Journal of Gastroenterology* 1996;**93**(8):530–6.

Ohara 1997
Ohara S, Kato M, Asaka M, Toyota T. Cut-off vague and clinical utility of c-13-urea breath test for diagnosis of Helicobacter pylori infection. *Gastroenterology* 1997;**112**(4 (suppl)):A241.

Ohara 1998a
Ohara S, Kato M, Asaka M, Toyota T. Studies of 13C-urea breath test for diagnosis of Helicobacter pylori infection in Japan. *Journal of Gastroenterology* 1998;**33**(1):6–13.

Ohara 1998b
Ohara S, Kato M, Asaka M, Toyota T. The ubit-100 13Co2 infrared analyzer: Comparison between infrared

spectrometric analysis and mass spectrometric analysis. *Helicobacter* 1998;**3**(1):49–53.

Ohara 2004
Ohara S, Kato M, Saito M, Fukuda S, Kato C, Hamada S, et al. Comparison between a new c-13-urea breath test, using a film-coated tablet, and the conventional c-13-urea breath test for the detection of Helicobacter pylori infection. *Journal of Gastroenterology* 2004;**39**(7):621–8.

Ohkura 1998
Ohkura R. Usefulness of Helicobacter pylori stool antigen (HPSA) assay for detection of Helicobacter pylori infection. *Japanese Journal of Gastroenterology* 1998;**95**(12):1397.

Ohkura 2000
Ohkura R, Miwa H, Murai T, Nagahara A, Ohta K, Sato K, et al. Usefulness of a novel enzyme immunoassay for the detection of Helicobacter pylori in feces. *Scandinavian Journal of Gastroenterology* 2000;**35**(1):49–53.

Oksanen 1997
Oksanen A, Bergstrom M, Sjostedt S, Gad A, Hammarlund B, Seensalu R. Accurate detection of Helicobacter pylori infection with a simplified c-13 urea breath test. *Scandinavian Journal of Clinical & Laboratory Investigation* 1997;**57**(8):689–94.

Oksanen 1998
Oksanen A, Veijola L, Sipponen P, Schauman KO, Rautelin H. Evaluation of Pyloriset screen, a rapid whole-blood diagnostic test for Helicobacter pylori infection. *Journal of Clinical Microbiology* 1998;**36**(4):955–7.

Oksanen 2001
Oksanen A, Sipponen P, Sarna S, Rautelin H. Serologic diagnosis of Helicobacter pylori infection in outpatients aged 45 years or less. *European Journal of Clinical Microbiology & Infectious Diseases* 2001;**20**(8):554–7.

Okuda 2002
Okuda M, Miyashiro E, Koike M, Tanaka T, Bouoka M, Okuda S, et al. Serodiagnosis of Helicobacter pylori infection is not accurate for children aged below 10. *Pediatrics International* 2002;**44**(4):387–90.

Okuda 2004
Okuda M, Nakazawa T, Booka M, Miyashiro E, Yosikawa N. Evaluation of a urine antibody test for Helicobacter pylori in Japanese children. *Journal of Pediatrics* 2004;**144**(2):196–9.

Okuda 2005
Okuda M, Sugiyama T, Fukunaga K, Kondou M, Miyashiro E, Nakazawa T. A strain-specific antigen in Japanese Helicobacter pylori recognized in sera of Japanese children. *Clinical & Diagnostic Laboratory Immunology* 2005;**12**(11):1280–4.

Okuda 2010
Okuda M, Oomatsu H, Kotake J, Fukuda N, Yamamoto N, Sakaedani N, et al. Evaluation of urine antibody test for *h. pylori* in Japanese children. *Helicobacter* 2010;**15**(4):361.

Okuda 2013
Okuda M, Kamiya S, Booka M, Kikuchi S, Osaki T, Hiwatani T, et al. Diagnostic accuracy of urine-based kits for detection of Helicobacter pylori antibody in children. *Pediatrics International* 2013;**55**(3):337–41.

Okuda 2014
Okuda M, Osaki T, Kikuchi S, Ueda J, Lin YS, Yonezawa H, et al. Evaluation of a stool antigen test using a mab for native catalase for diagnosis of Helicobacter pylori infection in children and adults. *Journal of Medical Microbiology* 2014;**63**:1621–5.

Olafsson 2012
Olafsson S, Patel B, Jackson C, Cai J. Helicobacter pylori breath testing in an open access system has a high rate of potentially false negative results due to protocol violations. *Helicobacter* 2012;**17**(5):391–5.

Oleastro 2000
Oleastro M, Monteiro L, Matos R, Lopes AI, Cabral J, Cabrita J. Evaluation of a western blot test, helico blot 2.1, in the diagnosis of Helicobacter pylori infection in a Portuguese paediatric population. *Gut* 2000;**47**(Suppl 1):A98.

Oleastro 2002
Oleastro M, Matos R, Cabral J, Barros R, Lopes AI, Ramalho P, et al. Evaluation of a western blot test, helico blot 2.1, in the diagnosis of Helicobacter pylori infection in a pediatric population. *Helicobacter* 2002;**7**(3):210–5.

Oliaro 2000
Oliaro J, Johnson RD, Chen WX, Chadwick VS, Murray A. Identification of an immunogenic 18-kda protein of Helicobacter pylori by alkaline phosphatase gene fusions. *Journal of Medical Microbiology* 2000;**49**(7):643–50.

Olsson 1993
Olsson K, Wadstrom T, Tyskiewicz T. PCR identification of Helicobacter pylori in gastritis patients. *Lancet* 1993;**341**(8853):1155.

Omorogbe 2015
Omorogbe JA, Brennan D, Alsaffar M, Smith S, McNamara D, Trinity Acad Gastroenterology G. Comparison of non-invasive tests; stool HpSA ELISA and c13urea breath test in the diagnosis of Helicobacter pylori infection in a low prevalence cohort. *Helicobacter* 2015;**20**:89.

Ong 1993
Ong KK, Goh KL, Parasakthi N. C-14 urea breath test - a useful noninvasive test in the diagnosis of Helicobacter-pylori infection. *Gastroenterology* 1993;**104**(4 suppl):A165.

Opekun 2002
Opekun AR, Abdalla N, Sutton FM, Hammoud F, Kuo GM, Torres E, et al. Urea breath testing and analysis in the primary care office. *Journal of Family Practice* 2002;**51**(12):1030–2.

Opekun 2006
Opekun AR, Luu P, Gotschall AB, Abdalla N, Torres E, Rudd SB, et al. Point-of-care Helicobacter pylori urine antibody detection in a multi-ethnic adult population in

the United States. *Translational Research: The Journal Of Laboratory & Clinical Medicine* 2006;**148**(1):13–8.

Ormand 1990
Ormand JE, Talley NJ, Carpenter HA, Shorter RG, Conley CR, Wilson WR, et al. [14c]urea breath test for diagnosis of Helicobacter pylori. *Digestive Diseases & Sciences* 1990; **35**(7):879–84.

Ortiz-Olvera 2007
Ortiz-Olvera Nayeli NX, Moran Villota S, Gallardo Wong I, Blancas Valencia JM, Cabrera Muñoz L. Validation of a simplified method of the ^{13}C urea breath test for diagnosis of Helicobacter pylori. *Revista Espanola de Enfermedades Digestivas* 2007;**99**(7):392–7.

Osaki 2008
Osaki T, Mabe K, Hanawa T, Kamiya S. Urease-positive bacteria in the stomach induce a false-positive reaction in a urea breath test for diagnosis of Helicobacter pylori infection. *Journal of Medical Microbiology* 2008;**57**(Pt 7): 814–9.

Osman 2014
Osman HA, Hasan H, Suppian R, Bahar N, Hussin NSC, Rahim AA, et al. Evaluation of the atlas Helicobacter pylori stool antigen test for diagnosis of infection in adult patients. *Asian Pacific Journal of Cancer Prevention* 2014;**15**(13): 5245–7.

Osoba 2004
Osoba AO, Ibrahim MB, Al-Shareef BA, Yassen AA, Hussein BA. Comparison of Helicobacter pylori stool antigen test with clo test in the diagnosis of Helicobacter pylori associated dyspepsia in a Saudi population. *Saudi Medical Journal* 2004;**25**(12):1906–8.

Ou 2013
Ou ZY, Xiong LY, Li DY, Geng LL, Li LX, Chen PY, et al. Evaluation of a new fluorescence quantitative PCR test for diagnosing Helicobacter pylori infection in children. BMC Gastroenterology 2013 Jan 14; Vol. 13:7. [DOI: 10.1186/1471-230X-13-7

Ozdemir 2008
Ozdemir E, Karabacak NI, Degertekin B, Cirak M, Dursun A, Engin D, et al. Could the simplified ^{14}C urea breath test be a new standard in noninvasive diagnosis of Helicobacter pylori infection?. *Annals of Nuclear Medicine* 2008;**22**(7): 611–6.

Ozturk 2009
Ozturk E, Yesilova Z, Ilgan S, Ozguven M, Dagalp K. Performance of acidified c-14-urea capsule breath test during pantoprazole and ranitidine treatment. *Journal of Gastroenterology and Hepatology* 2009;**24**(7):1248–51.

Pacheco 2001
Pacheco N, Mago V, Gomez I, Gueneau P, Guelrud M, Reyes N, et al. Comparison of PCR and common clinical tests for the diagnosis of h-pylori in dyspeptic patients. *Diagnostic Microbiology and Infectious Disease* 2001;**39**(4): 207–10.

Pacheco 2013
Pacheco SLM, Ogata SK, Machado RS, Patricio FRDS, Pardo MLE, Kawakami E. Diagnosis of Helicobacter pylori infection by means of reduced-dose 13C-urea breath test and early sampling of exhaled breath. *Journal of Pediatric Gastroenterology and Nutrition* 2013;**57**(5):607–11.

Paimela 2006
Paimela HM, Oksala NK, Kaariainen IP, Carlson PJ, Kostiala AA, Sipponen PI. Faecal antigen tests in the confirmation of the effect of Helicobacter eradication therapy. *Annals of Medicine* 2006;**38**(5):352–6.

Palka 2010
Palka M, Tomasik T, Windak A, Margas G, Mach T, Bohonos A. The reliability of ELISA in predicting *H. pylori* infection in dyspeptic populations under age 45. *Medical Science Monitor* 2010;**16**(1):PH24–8.

Pandya 2014
Pandya HB, Patel JS, Agravat HH, Singh NKR. Non-invasive diagnosis of Helicobacter pylori: Evaluation of two enzyme immunoassays, testing serum igg and iga response in the Anand district of central Gujarat, india. *Journal of Clinical and Diagnostic Research* 2014;**8**(6):D12–D5.

Pantoflickova 1999
Pantoflickova D, Blum AL, Blackmon K, Dorta G. Optimization of c-13 urea breath test (ubt) for diagnosis of h-pylori (hp) infection. *Gastroenterology* 1999;**116**(4 (suppl)):A276.

Pantoflickova 2000
Pantoflickova D, Lew EA, Dorta G, Pisegna JR, Ohning GV, Faller LV, et al. Intragastric ph affects the results of the c-13-urea breath test (ubt) in the diagnosis of h-pylori (hp). *Gastroenterology* 2000;**118**(4 (part 1)):A507.

Pantoflickova 2003
Pantoflickova D, Scott DR, Sachs G, Dorta G, Blum AL. 13C urea breath test (ubt) in the diagnosis of Helicobacter pylori: Why does it work better with acid test meals?. *Gut* 2003;**52**(7):933–7.

Paoluzi 2001
Paoluzi OA, Rossi P, Montesano C, Bernardi S, Carnieri E, Marchione OP, et al. Discrepancy between polymerase chain reaction assay and western blot analysis in the assessment of caga status in dyspeptic patients. *Helicobacter* 2001;**6**(2):130–5.

Parejo 1998
Parejo Carranza R, Olivares Miguel F, Escobar Castro H, Jimenez Alonso I, De Rafael Nerpell L, Camarero Salces C. Comparative analysis of diagnostic methods for Helicobacter pylori infection in children. *Anales Espanoles de Pediatria* 1998;**49**(3):257–63.

Parente 2000a
Parente F, Maconi G, Sainaghi M, Imbesi V, Vago L, Porro GB. Pretreatment c-13-urea breath test values but not h-pylori antigen levels in stool correlate well with bacterial density and gastritis activity in the gastric body. *Gut* 2000; **47**(Suppl 1):A114.

Parente 2000b

Parente F, Sainaghi M, Maconi G, Imbesi V, Cucino C, Porro GB. Not all short-term proton pump inhibitors (ppi) impair the accuracy of c-13-urea breath test and h.Pylori stool antigen assay. *Gut* 2000;**46**(Suppl 2):A86.

Parente 2001

Parente F, Bianchi Porro G. The (13)c-urea breath test for non-invasive diagnosis of Helicobacter pylori infection: Which procedure and which measuring equipment?. *European Journal of Gastroenterology & Hepatology* 2001;**13**(7):803–6.

Parente 2002a

Parente F, Maconi G, Porro GB, Caselli M. Stool test with polyclonal antibodies for monitoring Helicobacter pylori eradication in adults: A critical reappraisal. *Scandinavian Journal of Gastroenterology* 2002;**37**(7):747–9.

Parente 2002b

Parente F, Sainaghi M, Sangaletti O, Imbesi V, Maconi G, Anderloni A, et al. Different effects of short-term omeprazole, lansoprazole or pantoprazole on the accuracy of the c-13-urea breath test. *Alimentary Pharmacology & Therapeutics* 2002;**16**(3):553–7.

Park 2001

Park D, Kang D, Jung M, Park H, Kim J. Patients factors, dob value of c-13-urea breath test and clinical diagnosis do not affect eradication of Helicobacter pylori with omeprazole based triple therapy. *Gut* 2001;**49**(suppl):A95.

Park 2006

Park YB. Diagnostic value of rapid urine test (Rapirun) compared with biopsy, C-13-UBT, and serum IgG-ELISA in Helicobacter pylori. *Helicobacter* 2006;**11**:40.

Park 2009

Park S, Park J, Kim Y, Seol S, Moon J, Jee S, et al. The clinical usefulness of the noninvasive rapid urine test to h. Pylori: Rapirun. *Helicobacter* 2009;**14 (4)**:342–3.

Park 2015

Park YH, Kim N, Shim YK, Lee CM, Kyuahn B, Jaepark S, et al. The effect of pre-intake of citric acid on the delta value of the 13C-urea breath test. *Journal of Gastroenterology and Hepatology* 2015;**30**:120.

Parolova 2012

Parolova N, Dmitrienko M. The effectiveness of non-invasive tests in diagnosis of Helicobacter pylori infection in children. *Helicobacter* 2012;**17**:94.

Patel 1994

Patel P, Mendall MA, Khulusi S, Molineaux N, Levy J, Maxwell JD, et al. Salivary antibodies to Helicobacter pylori: Screening dyspeptic patients before endoscopy. *Lancet* 1994;**344**(8921):511–2.

Pathak 1992

Pathak CM, Panigrahi D, Bhasin DK, Rana SV, Malik AK, Mehta SK. Advantage of use of dpm for 14^{C}-urea breath test for the detection of Helicobacter pylori. *American Journal of Gastroenterology* 1992;**87**(12):1887–8.

Pathak 1994

Pathak CM, Bhasin DK, Panigrahi D, Goel RC. Evaluation of 14c-urinary excretion and its comparison with 14co2 in breath after 14c-urea administration in Helicobacter pylori infection. *American Journal of Gastroenterology* 1994;**89**(5):734–8.

Pathak 2008

Pathak CM, Avti PK, Bunger D, Khanduja KL. Kinetics of 14carbon dioxide excretion from 14c-urea by oral commensal flora. *Journal of Gastroenterology and Hepatology* 2008;**23**(10):1603–7.

Pathak 2011

Pathak CM, Kaur B, Bhasin DK, Mittal BR, Sharma S, Khanduja KL. Comparative performance of capsulated vs noncapsulated 14c-urea breath test for the detection of Helicobacter pylori infection. *Indian Journal of Nuclear Medicine* 2011;**26**(Suppl 1):S20.

Pathak 2012

Pathak CM, Kaur B, Bhasin DK, Mittal BR, Sharma S, Khanduja KL, et al. Superiority of non-capsulated 14c-urea breath test over capsule based method for detection of Helicobacter pylori infection - a preliminary report. *Tropical Gastroenterology* 2012;**33**(2):123–8.

Pathak 2013

Pathak CM, Kaur B, Bhasin DK, Mittal BR, Sharma S, Khanduja KL, et al. Comparison of capsulated versus non-capsulated 14c-urea breath test for the detection of Helicobacter pylori infection: A scintigraphy study. *Indian Journal of Gastroenterology* 2013;**32**(1 SUPPL):A18–A9.

Pathak 2014

Pathak CM, Kaur B, Bhasin DK, Mittal BR, Sharma S, Khanduja KL, et al. Comparison of encapsulated versus nonencapsulated (14) c-urea breath test for the detection of Helicobacter pylori infection: A scintigraphy study. *Helicobacter* 2014;**19**(2):116–23.

Pattison 1996

Pattison CP, Marshall L. C-13-urea breath test for Helicobacter pylori: A second look analysis. *American Journal of Gastroenterology* 1996;**91**(11):2447.

Pattison 1997

Pattison CP, Kaczmarski DR, Bruggen JT, Oconnor MC. Comparison of c-14-urea breath test (c-14-ubt) and serology for detection of Helicobacter pylori in hiv positive patients. *Gastroenterology* 1997;**112**(4 (suppl)):A1060.

Pavlitou 1998

Pavlitou K, Pastore F, Moldovanidou K, Gioula G, Routsinas C, Polidorou F, et al. Rapid immunochromatographic assay for detection of Helicobacter pylori antibodies. *Acta Microbiologica Hellenica* 1998;**43**(3):267–70.

Pavlitou 2000

Pavlitou K, Pastore F, Konias A, Chrisohoidou S, Tsintarakis E, Polydorou F, et al. Evaluation of a rapid serological test for the detection of igg antibodies to Helicobacter pylori. [greek]. *Acta Microbiologica Hellenica* 2000;**45**(3):293–7.

Pawar 2014
Pawar S, Reddy SR, Chelluri LK, Prasad CE. Detection of Helicobacter pylori infection in patients with obstructive airway diseases with sero techniques using highly specific igg antibodies for Helicobacter pylori antigen. *Asian Pacific Journal of Tropical Disease* 2014;**4**:S366–S72.

Payne 2006
Payne I, Mold JW. What is the most sensitive non-invasive test for initial diagnosis of h. Pylori infection in adults? . *Journal Oklahoma State Medical Association* 2006;**99**(6): 368–9.

Peitz 2000
Peitz U, Agha-Amiri K, Glasbrenner B, Leodolter A, Kahl S, Maertens D, et al. High specificity, but reduced sensitivity of h-pylori stool test in upper gastrointestinal bleeding. *Gut* 2000;**47**(Suppl 1):A121–A2.

Peitz 2003
Peitz U, Leodolter A, Kahl S, Agha-Amiri K, Wex T, Wolle K, et al. Antigen stool test for assessment of Helicobacter pylori infection in patients with upper gastrointestinal bleeding. *Alimentary Pharmacology & Therapeutics* 2003;**17** (8):1075–84.

Peitz 2004
Peitz U, Leodolter A, Wex T, Schutze D, Wolle K, Welte T, et al. Diagnostics of Helicobacter pylori infection in patients with peptic ulcer bleeding. *Zeitschrift fur Gastroenterologie* 2004;**42**(2):141–6.

Peleteiro 2014
Peleteiro B, Bastos A, Ferro A, Lunet N. Prevalence of Helicobacter pylori Infection worldwide: a systematic review of studies with national coverage. *Digestive Diseases and Sciences* 2014;**59**(8):1698–709.

Pena 1989
Pena AS, Endtz HP, Offerhaus GJ, Hoogenboom-Verdegaal A, Van Duijn W, De Vargas N, et al. Value of serology (ELISA and immunoblotting) for the diagnosis of *campylobacter pylori* infection. *Digestion* 1989;**44**(3): 131–41.

Peng 2000a
Peng NJ, Hsu PI, Lee SC, Tseng HH, Huang WK, Tsay DG, et al. A 15-minute c-13 -urea breath test for the diagnosis of Helicobacter pylori infection in patients with non-ulcer dyspepsia. *Journal of Gastroenterology and Hepatology* 2000;**15**(3):284–9.

Peng 2000b
Peng NJ, Hsu PI, Lee SC, Tsay DW, Lai KH, Lin LC, et al. Ultrarapid endoscopic c-13-urea breath test for the diagnosis of Helicobacter pylori infection. *Journal of Nuclear Medicine* 2000;**41**(5):317P.

Peng 2001a
Peng NJ, Lai KH, Liu RS, Lee SC, Tsay DG, Lo CC, et al. Clinical significance of oral urease in diagnosis of Helicobacter pylori infection by c-13 urea breath test. *Digestive Diseases and Sciences* 2001;**46**(8):1772–8.

Peng 2001b
Peng NJ, Hsu PI, Lee SC, Tsay DG, Lai KH, Liu RS. Ultrarapid capsule-based c-13-urea breath test for the diagnosis of Helicobacter pylori infection. *Journal of Nuclear Medicine* 2001;**42**(5):329P.

Peng 2002
Peng NJ, Hsu PI, Lee SC, Tsay DG, Lai KH, Liu RS. Comparison of 100 mg and 50 mg endoscopic c-13-urea breath test for the diagnosis of Helicobacter pylori infection. *Journal of Nuclear Medicine* 2002;**43**(5):333P.

Peng 2003
Peng NJ, Lai KH, Liu RS, Lee SC, Tsay DG, Lo CC, et al. Endoscopic c-13-urea breath test for the diagnosis of Helicobacter pylori infection. *Digestive and Liver Disease* 2003;**35**(2):73–7.

Peng 2005
Peng NJ, Lai KH, Liu RS, Lee SC, Tsay DG, Lo CC, et al. Capsule 13C-urea breath test for the diagnosis of Helicobacter pylori infection. *World Journal of Gastroenterology* 2005;**11**(9):1361–4.

Peng 2009
Peng NJ, Lai KH, Lo GH, Hsu PI. Comparison of noninvasive diagnostic tests for Helicobacter pylori infection. *Medical Principles & Practice* 2009;**18**(1):57–61.

Perets 2014
Perets TT, Shporn E, Hamouda D, Niv Y, Dickman R. Can we achieve the same results from repetitive testing of 13Co2 breath samples for the diagnosis of Helicobacter pylori?. *Gastroenterology* 2014;**146**(5 (suppl)):S397–S8.

Perets 2015
Perets TT, Shporn E, Dickman R, Niv Y. Stability of 13Co2 breath tests samples over time in the diagnosis of Helicobacter pylori. *Clinical Chemistry and Laboratory Medicine* 2015;**53**:S1268.

Perez 1996
Perez Paramo M, Albillos Martinez A, Calleja Panero JL, Marin Rojas MC, Marcos Moreno ML, Freile Garcia I, et al. Effectiveness of the breath test with ^{14}C-urea in the diagnosis of Helicobacter pylori infection. *Revista Espanola de Medicina Nuclear* 1996;**15**(1):15–20.

Perez 1998
Perez Paramo M, Albillos Martinez A, Ortiz Berrocal J. The breath test with labled urea for the diagnosis of Helicobacter pylori infection. *Revista Espanola de Medicina Nuclear* 1998; **17**(6):455–67.

Perez-Perez 1997
Perez-Perez GI, Cutler AF, Blaser MJ. Value of serology as a noninvasive method for evaluating the efficacy of treatment of Helicobacter pylori infection. *Clinical Infectious Diseases* 1997;**25**(5):1038–43.

Perezperez 1994
Perezperez GI, Brown WR, Cover TL, Dunn BE, Cao P, Blaser MJ. Correlation between serological and mucosal inflammatory responses to Helicobacter-pylori. *Clinical and Diagnostic Laboratory Immunology* 1994;**1**(3):325–9.

Perna 2002

Perna F, Tampieri A, Ricci C, Gatta L, Miglioli M, Vaira D. Evaluation of a new rapid one step stool antigen test for Helicobacter pylori (hp) infection diagnosis. *Gut* 2002;**51** (Suppl):A106.

Perna 2005

Perna F, Ricci C, Gatta L, Bernabucci V, Cavina M, Miglioli M, et al. Diagnostic accuracy of a new rapid urease test (pronto dry) before and after treatment of Helicobacter pylori infection. *Minerva Gastroenterologica e Dietologica* 2005;**51**(3):247–54.

Perri 1994

Perri F, Ghoos Y, Maes B, Annese V, Geypens B, Hiele M, et al. Urea breath test in Helicobacter-pylori infected subjects is influenced by gastric-emptying rate. *Gastroenterology* 1994;**106**(4 (suppl)):A160.

Perri 1995

Perri F, Ghoos Y, Hiele M, Andriulli A, Rutgeerts P. The urea breath test: A non-invasive clinical tool for detecting Helicobacter pylori infection. *Italian Journal of Gastroenterology* 1995;**27**(2):55–63.

Perri 1997a

Perri F, Clemente R, Bisceglia M, Annese V, Niro G, Ghoos Y, et al. The c-13-urea breath test (ubt) predicts intragastric bacterial load and correlates with the depth of inflammation in h-pylori related gastritis. *Gastroenterology* 1997;**112**(4 (suppl)):A256.

Perri 1997b

Perri F, Clemente R, Bisceglia M, Quitadamo M, Festa V, Niro G, et al. The c-13-urea breath test (ubt) correlates with the bacterial load ansi the severity of inflammation in h-pylori (hp) gastritis. *Gut* 1997;**41**(Suppl):A80–A1.

Perri 1998a

Perri F, Clemente R, Pastore M, Quitadamo M, Festa V, Bisceglia M, et al. The c-13-urea breath test as a predictor of intragastric bacterial load and severity of Helicobacter pylori gastritis. *Scandinavian Journal of Clinical & Laboratory Investigation* 1998;**58**(1):19–27.

Perri 1998b

Perri F, Clemente R, Festa V, Quitadamo M, Conoscitore P, Niro G, et al. Relationship between the results of pre-treatment urea breath test and efficacy of eradication of Helicobacter pylori infection. *Italian Journal of Gastroenterology & Hepatology* 1998;**30**(2):146–50.

Perri 1998c

Perri F, Clemente R, Quitadamo M, Annese V, Andriulli A. C-13 urea breath test is a very accurate clinical tool in the diagnosis of intragastric Helicobacter pylori infection. *Gut* 1998;**43**(Suppl 3):S8–9.

Perri 2000

Perri F. Diagnosis of Helicobacter pylori infection: Which is the best test? The urea breath test. *Digestive & Liver Disease* 2000;**32 Suppl 3**:S196–8.

Perri 2002a

Perri F, Manes G, Neri M, Vaira D, Nardone G. Helicobacter pylori antigen stool test and 13C-urea breath test in patients after eradication treatments. *American Journal of Gastroenterology* 2002;**97**(11):2756–62.

Perri 2002b

Perri F, Manes G, Nardone G, Neri M, Vaira D. Helicobacter pylori antigen stool test (HPSA) and 13C-urea breath test (ubt) in patients after eradicating treatments. *Gastroenterology* 2002;**122**(4 (suppl)):A206.

Perri 2002c

Perri F, Ricciardi R, Merla A, Piepoli A, Gasperi V, Quitadamo M, et al. Appropriateness of urea breath test: A prospective observational study based on maastricht 2000 guidelines. *Alimentary Pharmacology & Therapeutics* 2002; **16**(8):1443–7.

Perri 2005

Perri F, Quitadamo M, Ricciardi R, Piepoli A, Cotugno R, Gentile A, et al. Comparison of a monoclonal antigen stool test (hp star) with the c-13-urea breath test (ubt) in monitoring Helicobacter pylori eradication therapy. *World Journal of Gastroenterology* 2005;**11**(37):5878–81.

Perrone 2005

Perrone M, Muñoz L, Camorlinga M, Correnti M, Cavazza ME, Lecuna V, et al. Importance of IgG anti-caga antibodies of *Helicobacter pylori* in Venezuelan patients with gastric diseases. *Investigacion Clinica* 2005;**46**(4):357–67.

Petrovic 2011

Petrovic M, Artiko V, Novosel S, Ille T, Sobic-Saranovic D, Pavlovic S, et al. Relationship between Helicobacter pylori infection estimated by c-14-urea breath test and gender, blood groups and rhesus factor. *Hellenic Journal of Nuclear Medicine* 2011;**14**(1):21–4.

Pettersson 2001

Pettersson A, Rasmusson M, Kyronpalo S, Sipponen P, Rautilin H, Farkkila M, et al. A 10 minutes tablet based 13C-urea breath test for the diagnosis of Helicobacter pylori. *Gastroenterology* 2001;**120**(5 (suppl)):A579.

Pianko 1999

Pianko S, Petterson A, Lundqvist T, Stringer C, Sievert W, Korman M. Evaluation of a novel tablet based carbon 13 urea breath test for the rapid diagnosis of Helicobacter pylori infection. *Gastroenterology* 1999;**116**(4 (Suppl)): A282.

Pilotto 1999

Pilotto A, Franceschi M, Leandro G, Rassu M, Zagari RM, Bazzoli F, et al. The non-invasive diagnosis of h-pylori infection in older subjects: Comparison of c-13-urea breath test with serology. *Gastroenterology* 1999;**116**(4 (suppl)): A283.

Pilotto 2000a

Pilotto A, Franceschi M, Leandro G, Rassu M, Zagari RM, Bozzola L, et al. Noninvasive diagnosis of Helicobacter pylori infection in older subjects: Comparison of the c-13-urea breath test with serology. *Journals of Gerontology*

Series A-Biological Sciences and Medical Sciences 2000;**55**(3): M163–M7.

Pilotto 2000b

Pilotto A, Franceschi M, Rassu M, Novello R, Brusarosco G, Bozzola L, et al. Stool antigen test (HPSA) for detection of h-pylori infection in elderly subjects: Comparison with serology and influence of concomitant treatments on diagnostic accuracy. *Gut* 2000;**47**(Suppl 1):A117–A8.

Pilotto 2002

Pilotto A, Franceschi M, Furlan F, Bozzola L, Fucito L, Rassu M, et al. The noninvasive diagnosis of h-pylori infection in geriatric subjects by the c-13-urea breath test (c-13-ubt) and the stool antigen test (HPSA): The role of disability and cognitive status. *Gut* 2002;**51**(Suppl):A108.

Plebani 1999

Plebani M, Basso D. Diagnosis of Helicobacter pylori infection by HPSA test. *Lancet* 1999;**354**(9185):1210.

Ploier 1995

Ploier R, Rezanka E, Emhofer J, Dorninger L, Feichtinger J, Haidinger R, et al. Predictive value of latex agglutination on Helicobacter pylori in children with recurrent abdominal pain. *Klinische Padiatrie* 1995;**207**(1):8–11.

Ploier 1996

Ploier R, Dorninger L, Emhofer J, Franz V, Feichtinger J. Predictive value of an ELISA for Helicobacter pylori infection in children. *Monatsschrift fur Kinderheilkunde* 1996;**144**(12):1326–9.

Ploier 1997

Ploier R, Doringer I, Emhofer J, Franz V, Feichtinger J. Predictive value of an ELISA for the detection of Helicobacter pylori infection in children - reply. *Monatsschrift fur Kinderheilkunde* 1997;**145**(10):1094.

Polat 2010

Polat TB, Urganci N, Selcukcan F, Yenici FN. Efficacy of non-invasive tests in the diagnosis and post-treatment follow-up of Helicobacter pylori infection in pediatric patients. *Gazi Medical Journal* 2010;**21**(1):17–22.

Pons 2014

Pons C, Maisterra S, Salord S, Pla A, Asensio D, Fernandez FJ, et al. Almagate interference in breath test results for the diagnosis of Helicobacter pylori infection. *Revista Espanola De Enfermedades Digestivas* 2014;**106**(7):448–51.

Porter 2009a

Porter V, Macdonald JC, Zahid MA, Mackie B, McNamara D. Validation of a low dose tablet formulation 13C urea and citric acid breath test employing an automated non dispersive isotope selective infrared spectroscopy analyser (helifan/fan as) for the diagnosis of Helicobacter pylori infection in a Scottish population. *Gastroenterology* 2009; **136**(5 (suppl)):A346.

Porter 2009b

Porter V, Zahid A, Mackie B, McNamara DA. Results of a prospective comparison pilot validation study of a low-dose tablet formulation c-13 urea and citric acid breath test employing a novel automated nondispersive isotope selective infrared spectroscopy analyser for the diagnosis of Helicobacter pylori infection. *European Journal of Gastroenterology & Hepatology* 2009;**21**(11):1321–2.

Portorreal 2002

Portorreal A, Kawakami E. Evaluation of enzyme-linked immunosorbent assay for the diagnosis of Helicobacter pylori infection in children and adolescents. *Arquivos de Gastroenterologia* 2002;**39**(3):198–203.

Posteraro 2006

Posteraro P, Branca G, Sanguinetti M, Ranno S, Cammarota G, Rahimi S, et al. Rapid detection of clarithromycin resistance in Helicobacter pylori using a PCR-based denaturing hplc assay. *Journal of Antimicrobial Chemotherapy* 2006;**57**(1):71–8.

Potashov 1996

Potashov LV, Morozov VP, Kudrevatykh IP, Savranskii VM, Aurtiunian AA, Did-Zurabova ES, et al. The diagnosis of Helicobacter infections in patients with gastric and duodenal peptic ulcers. *Zhurnal Mikrobiologii, Epidemiologii, i Immunobiologii* 1996;**6**:11–3.

Pourakbari 2011a

Pourakbari B, Mirsalehian A, Maleknejad P, Mamishi S, Azhdarkosh H, Daryani NE, et al. Evaluation of a new antigen for diagnosis of Helicobacter pylori infection in stool of adult and children. *Helicobacter* 2011;**16**(1):42–6.

Pourakbari 2011b

Pourakbari B, Mirsalehian A, Mamishi S, Najafi M, Kazemi B, Paknejad M, et al. Diagnosis of Helicobacter pylori infection by invasive and noninvasive methods. *Tropical Medicine and International Health* 2011;**16**:264–5.

Pourakbari 2013

Pourakbari B, Ghazi M, Mahmoudi S, Mamishi S, Azhdarkosh H, Najafi M, et al. Diagnosis of Helicobacter pylori infection by invasive and noninvasive tests. *Brazilian Journal of Microbiology* 2013;**44**(3):795–8.

Prabakaran 1997

Prabakaran K, Fernandes V, McDonald J, Jones RC. Single sample c-14 urea breath test for the diagnosis of Helicobacter pylori infection. *Journal of Nuclear Medicine* 1997;**38**(5 Suppl):Abstract 261.

Prell 2009

Prell C, Osterrieder S, Schwarzer A, Lottspeich C, Rusmann H, Ossiander G, et al. Improved performance of a novel rapid one-step monoclonal chromatographic immunoassay for detection of Helicobacter pylori antigen in stool in children. *Journal of Pediatric Gastroenterology and Nutrition* 2009;**48**(Suppl 3):E47–E8.

Presecki 1997

Presecki V, Katicic M, Kalenic S, Marusic M, Ticak M, Prskalo M, et al. Evaluation of commercial cf and ELISA tests for diagnosis of *H-pylori* infection in gastric carcinoma and non Hodgkin lymphoma patients. *Gut* 1997;**41**:A164.

Prieto 1994
Prieto Bozano G. Clinical diagnosis of Helicobacter pylori infection in the child. *Enfermedades Infecciosas Y Microbiologia Clinica* 1994;**12 Suppl 1**:18–22.

Pronovost 1994
Pronovost AD, Rose SL, Pawlak JW, Robin H, Schneider R. Evaluation of a new immunodiagnostic assay for Helicobacter pylori antibody detection: Correlation with histopathological and microbiological results. *Journal of Clinical Microbiology* 1994;**32**(1):46–50.

Przyklenk 1990
Przyklenk B, Bauernfeind A, Bornschein W, Gabor M. Evaluation of an IgG-ELISA-kit for diagnosing *Helicobacter pylori* associated gastroduodenal disease. *Serodiagnosis and Immunotherapy in Infectious Disease* 1990;**4**(4):263–9.

Pu 2005
Pu XH, Guo XQ, Shi YL, An T, Qiu M, Qiu XX. Values of Helicobacter pylori stool antigen test in the etiological diagnosis of recurrent abdominal pain in children. *Chinese Journal of Contemporary Pediatrics* 2005;**7**(5):426–8.

Puolakkainen 1997
Puolakkainen P, Rautelin H, Sipponen P, Farkkila M, Kosunen T, Haapiainen R, et al. Comparison of histology, c-13 urea breath test (ubt) and serology for detecting h-pylori infection in patients with atrophic gastritis. *Gastroenterology* 1997;**112**(4 (suppl)):A262.

Puz 2006
Puz S, Kovach Z, Hirschl AM, Hafner M, Innerhofer A, Rotter M, et al. Evaluation of the novel *Helicobacter pylori* clarires real-time PCR assay for detection and clarithromycin susceptibility testing of h-pylori in stool specimens and gastric biopsies; comparison with the stool antigen test drug resistance. *Helicobacter* 2006;**11**(4):396.

Puz 2008
Puz S, Innerhofer A, Ramharter M, Haefner M, Hirschl AM, Kovach Z, et al. A novel noninvasive genotyping method of Helicobacter pylori using stool specimens. *Gastroenterology* 2008;**135**(5):1543–51.

Qibi 2008
Qibi EM, Abdulla ZA. Detection of Helicobacter pylori infection in dyspeptic patients by different sero-bacteriological methods. *Qatar Medical Journal* 2008;**17**(2): 17–21.

Quach 2014
Quach DT, Hiyama T, Shimamoto F, Le QD, Ho LX, Vu NH, et al. Value of a new stick-type rapid urine test for the diagnosis of Helicobacter pylori infection in the Vietnamese population. *World Journal of Gastroenterology* 2014;**20**(17): 5087–91.

Queiroz 1999
Queiroz DMM, Mendes EN, Rocha GA, Oliveira AMR, Oliveira CA, Cabral MMDA, et al. Serological and direct diagnosis of Helicobacter pylori in gastric carcinoma: A case-control study. *Journal of Medical Microbiology* 1999;**48** (5):501–6.

Queiroz 2000
Queiroz DMM, Rocha AMC, Rocha GA, Mendes EN, Carvalho AST, Nogueira AMF, et al. Validation of a commercial ELIS to detect anti-caga antibodies in children with *H. pylori* (hp) infection. *Gut* 2000;**47**(Suppl 1):A96.

Queiroz 2013
Queiroz DM, Saito M, Rocha GA, Rocha AM, Melo FF, Checkley W, et al. Helicobacter pylori infection in infants and toddlers in South America: concordance between [13C]urea breath test and monoclonal *H. pylori* stool antigen test. *Journal of Clinical Microbiology* 2013;**51**(11): 3735–40.

Queralt 2005
Queralt N, Bartolome R, Araujo R. Detection of Helicobacter pylori DNA in human faeces and water with different levels of faecal pollution in the north-east of Spain. *Journal of Applied Microbiology* 2005;**98**(4):889–95.

Quesada 2006a
Quesada M, Calvet X, Dosal A, Calvet V, Sanfeliu I, Ribera L, et al. Evaluation of four different fecal tests for determination of cure after Helicobacter pylori treatment. *Journal of Clinical Gastroenterology* 2006;**40**(9):790–4.

Quesada 2006b
Quesada M, Calvet X, Calvet V, Choat T, Fallowfield B, Sanfeliu I, et al. Usefulness of rapid hp star, a new immumochromatographic, monoclonal antigen-based faecal test, for diagnosing Helicobacter pylori infection in dyspeptic patients. *Gastroenterology* 2006;**130**(4 (suppl)): A458.

Rabbe 1988
Rabbe MP, Megraud F. Anti-campylobacter-pylori antibody titer by ELISA. *Gastroenterologie Clinique et Biologique* 1988;**12**(6-7):587–8.

Radke 1997
Radke M. Predictive value of an ELISA for the detection of Helicobacter pylori infection in children. *Monatsschrift fur Kinderheilkunde* 1997;**145**(10):1093.

Rae 1995
Rae AJ, Belzberg A, Cleator IGM, Caglar M. Use of the c-14 breath test in the treatment of Helicobacter-pylori. *Canadian Journal of Gastroenterology* 1995;**9**(4):191–4.

Raedsch 1992
Raedsch R. Serological screening for Helicobacter pylori. *Deutsche Medizinische Wochenschrift* 1992;**117**(21):844–5.

Raguza 2005
Raguza D, Granato CFH, Kawakami E. Evaluation of the stool antigen test for Helicobacter pylori in children and adolescents. *Digestive Diseases and Sciences* 2005;**50**(3): 453–7.

Raguza 2010
Raguza D, MacHado RS, Ogata SK, Granato CFH, Patricio FRS, Kawakami E. Validation of a monoclonal stool antigen test for diagnosing Helicobacter pylori infection in young children. *Journal of Pediatric Gastroenterology and Nutrition* 2010;**50**(4):400–3.

Rahman 2008
Rahman SHZ, Azam MG, Rahman MA, Arfin MS, Alam MM, Bhuiyan TM, et al. Non-invasive diagnosis of h pylori infection: Evaluation of serological tests with and without current infection marker cim. *World Journal of Gastroenterology* 2008;**14**(8):1231–6.

Raju 1994
Raju GS, Smith MJ, Morton D, Bardhan KD. Mini-dose (1-microci) 14c-urea breath test for the detection of Helicobacter pylori. *American Journal of Gastroenterology* 1994;**89**(7):1027–31.

Ramírez-Lázaro 2011
Ramírez-Lázaro MJ, Lario S, Casalots A, Sanfeliu E, Boix L, García-Iglesias P, et al. Real-time PCR improves Helicobacter pylori detection in patients with peptic ulcer bleeding. PLoS ONE 2011; Vol. 6, issue 5:e20009. [DOI: 10.1371/journal.pone.002000

Ramírez-Lázaro 2015
Ramírez-Lázaro MJ, Lario S, Calvet X, Sánchez-Delgado J, Montserrat A, Quilez EM, et al. Occult h-pylori infection partially explains "false-positive' results of c-13-urea breath test. *United European Gastroenterology Journal* 2015;**3**(5): 437–42.

Rao 2001
Rao P, Sarkar A, Shivananda PG, Pai G. Comparison of ELISA for antibody detection and biopsy urease test against h. Pylori in cases of gastroduodenal disorders. *Indian Journal of Medical Sciences* 2001;**55**(7):366–70.

Rapoport 2014
Rapoport SI, Shubina NA. 13-year period of application of the 13C-urease breath test for determining Helicobacter pylori in Russian clinical practice. *Klinicheskaia Meditsina* 2014;**92**(11):59–64.

Rasheed 2014
Rasheed F, Khalid A, Saadia A, Habib S, Khan SM, Saeed F, et al. Correlation of c-13 urea breath test values with Helicobacter pylori load among positive patients. *Hepato-Gastroenterology* 2014;**61**(129):125–8.

Ratnaraj 2015
Ratnaraj F, Hamdeh S, Salih M, Ayan M, Mansour G, Reddymasu S. Urea breath test (ubt) versus stool antigen test in post-treatment eradication of Helicobacter pylori infection: A meta-analysis. *American Journal of Gastroenterology* 2015;**110**:S1038.

Rauws 1987
Rauws EAJ, Langenberg W, Houthoff HJ, Tytgat GN. Histology, culture, breath test and therapeutic attempts in campylobacter pylori gastritis. *Zeitschrift fur Gastroenterologie* 1987;**25**(SUPPl. 4):24–8.

Rauws 1989a
Rauws EAJ. Detecting campylobacter-pylori with the c-13 urea and c-14-urea breath test. *Scandinavian Journal of Gastroenterology* 1989;**24**:25–6.

Rauws 1989b
Rauws EA, Van Royen EA, Tytgat GN. 14c-urea breath test as a method to detect campylobacter pylori colonization. *Gastroenterologie Clinique et Biologique* 1989;**13**(1 Pt 1): 42B–3B.

Rauws 1989c
Rauws EAJ, Royen EAV, Langenberg W, Woensel JV, Vrij AA, Tytgat GN. ^{14}C-urea breath test in *C pylori* gastritis. *Gut* 1989;**30**(6):798–803.

Raymond 1999
Raymond J, Sauvestre C, Kalach N, De Korwin JD, Valverde V. Evaluation of a new serologic test for diagnosis of Helicobacter pylori infection in children. *European Journal of Clinical Microbiology & Infectious Diseases* 1999; **18**(3):192–8.

Raymond 2000
Raymond J, Sauvestre C, Kalach N, Bergeret M, Dupont C. Immunoblotting and serology for diagnosis of Helicobacter pylori infection in children. *Pediatric Infectious Disease Journal* 2000;**19**(2):118–21.

Razaghi 2010
Razaghi M, Boutorabi SM, Mirjalili A, Norolahi S, Hashemi M, Jalalian M. Diagnosis of Helicobacter pylori infection by ELISA stool antigen and comparison with the other diagnostic methods. *Healthmed* 2010;**4**(3):545–51.

Rechcinski 1997
Rechcinski T, Chmiela M, Malecka-Panas E, Planeta-Malecka I, Rudnicka W. Serological indicators of Helicobacter pylori infection in adult dyspeptic patients and healthy blood donors. *Microbiology & Immunology* 1997;**41** (5):387–93.

Redéen 2011
Redéen S, Petersson F, Törnkrantz E, Levander H, Mårdh E, Borch K. Reliability of diagnostic tests for Helicobacter pylori infection. Gastroenterology Research and Practice 2011; Vol. 2011:940650. [DOI: 10.1155/2011/940650

Rehnberg 2001
Rehnberg AS, Bengtsson C, Befrits R, Granstrom M, Hellstrom PM. Refinement of the c-14-urea breath test for detection of Helicobacter pylori. *Scandinavian Journal of Gastroenterology* 2001;**36**(8):822–6.

Reilly 1997
Reilly TG, Poxon V, Sanders DSA, Elliott TSJ, Walt RP. Comparison of serum, salivary, and rapid whole blood diagnostic tests for Helicobacter pylori and their validation against endoscopy based tests. *Gut* 1997;**40**(4):454–8.

Rejchrt 2004
Rejchrt S, Havlasova J, Bures J, Siroky M, Kopacova M, Voxova B, et al. Evaluation of serum anti-Helicobacter pylori IgG antibodies against p120 antigen (caga) and investigation of specific antibody response against Helicobacter pylori by means of western blotting. *Klinicka Biochemie a Metabolismus* 2004;**12**(1):19–23.

Ren 2005
Ren Z, Borody T, Pang G, Dunkley M, Clancy R, Xia HHX, et al. Evaluation of anti-Helicobacter pylori igg2 antibody for the diagnosis of Helicobacter pylori infection in western and Chinese populations. *Alimentary Pharmacology and Therapeutics* 2005;**21**(1):83–9.

Ren 2010
Ren HT, Xu XW, Li AH. Diagnostic value of gene chip test for detection of h.Pylori infection and relationship between H.pylori virulence factors and the severity of gastroduodenal lesions. *World Chinese Journal of Digestology* 2010;**18**(26): 2826–30.

Reshetnikov 2007
Reshetnikov OV, Kurilovich SA, Krotov SA, Krotova VA. Comparison of two ELISA kits for *Helicobacter pylori* detection in Siberian populations. *Helicobacter* 2007;**12**(4): 441.

Reynders 2012
Reynders MBML, Deyi VYM, Dahma H, Scheper T, Hanke M, Decolvenaer M, et al. Performance of individual Helicobacter pylori antigens in the immunoblot-based detection of h. Pylori infection. *FEMS Immunology and Medical Microbiology* 2012;**64**(3):352–63.

Riaz 2011
Riaz S, Munir I, Nawaz MK, Bashir H, Muzahir S, Saadullah M, et al. C-14 - urea breath test in the diagnosis of Helicobacter pylori infection in Pakistani population. *European Journal of Nuclear Medicine and Molecular Imaging* 2011;**38**:S403.

Ricci 2007
Ricci C, Holton J, Vaira D. Diagnosis of Helicobacter pylori: invasive and non-invasive tests. *Best Practice & Research: Clinical Gastroenterology* 2007;**21**(2):299–313.

Richter 2002
Richter J, Stiborova I, Kral V, Jilek D. Direct evidence of the Helicobacter pylori antigen in faeces. *Prakticky Lekar* 2002;**82**(4):205–7.

Riepl 2000
Riepl RL, Folwaczny C, Otto B, Klauser A, Blendinger C, Wiebecke B, et al. Accuracy of c-13-urea breath test in clinical use for diagnosis of Helicobacter pylori infection. *Zeitschrift fur Gastroenterologie* 2000;**38**(1):13–9.

Ritchie 2009
Ritchie B, Brewster D, Tran CD, McNeil Y, Zacharakis B, Davidson GP, et al. Lack of diagnostic accuracy of the monoclonal stool antigen test for detection of Helicobacter pylori infection in young Australian aboriginal children. *Pediatric Infectious Disease Journal* 2009;**28**(4):287–9.

Rocha 1998
Rocha GA, Oliveira AM, Queiroz DM, Mendes EN, Moura SB, Oliveira CA, et al. Serodiagnosis of *Helicobacter pylori* infection by cobas core ELISA in adults from Minas Gerais, Brazil. *Brazilian Journal of Medical & Biological Research* 1998;**31**(10):1263–8.

Rocha 2002
Rocha GA, Cardinali LCC, Queiroz DMM, Rocha AMC, Moura SB, Soares TF, et al. The performance of the c-13-urea breath test for the diagnosis of Helicobacter pylori infection in children from a developing country. *Gut* 2002; **51**(Suppl):A82.

Rocha 2004
Rocha AM, Rocha GA, Leite JL, Lisboa RL, Silva PV, Queiroz DM. Immunoblotting for the serodiagnosis of Helicobacter pylori infection in Brazilian patients with and without gastric carcinoma. *Memorias do Instituto Oswaldo Cruz* 2004;**99**(2):189–93.

Rogge 1995
Rogge JD, Wagner DR, Carrico RJ, Glowinski EA, Mahoney SJ, Boguslaski RC, et al. Evaluation of a new urease reagent strip for detection of Helicobacter-pylori in gastric biopsy specimens. *American Journal of Gastroenterology* 1995;**90**(11):1965–8.

Roggero 2002
Roggero P, Bonfiglio A, Luzzani S, Valade A, Cataliotti E, Corno G, et al. Helicobacter pylori stool antigen test: A method to confirm eradication in children. *Journal of Pediatrics* 2002;**140**(6):775–7.

Rollan 1997
Rollan A, Giancaspero R, Arrese M, Figueroa C, Vollrath V, Schultz M, et al. Accuracy of invasive and noninvasive tests to diagnose Helicobacter pylori infection after antibiotic treatment. *American Journal of Gastroenterology* 1997;**92**(8): 1268–74.

Roma-Giannikou 2010
Roma-Giannikou E, Roubani A, Sgouras DN, Panayiotou J, Van-Vliet C, Polyzos A, et al. Endoscopic tests for the diagnosis of Helicobacter pylori infection in children: Validation of rapid urease test. *Helicobacter* 2010;**15**(3): 227–32.

Romaozinho 2011
Romaozinho JGM, Donato MRSR, Ferreira J, Sofia C. Detection of Helicobacter pylori infection: clinical validation of ^{14}C (37 kbq) urea breath test. *Helicobacter* 2011;**16**:115.

Roth 2001
Roth DE, Taylor DN, Gilman RH, Meza R, Katz U, Bautista C, et al. Posttreatment follow-up of Helicobacter pylori infection using a stool antigen immunoassay. *Clinical & Diagnostic Laboratory Immunology* 2001;**8**(4):718–23.

Rothenbacher 2000a
Rothenbacher D, Marchildon P, Peacock J, Bode G, Brenner H. Diagnosis of h-pylori infection in children: Comparison of a salivary igg antibody test with c-13-urea breath test. *Gut* 2000;**47**(Suppl 1):A116.

Rothenbacher 2000b
Rothenbacher D, Bode G, Brenner H. Diagnosis of Helicobacter pylori infection with a novel stool antigen-based assay in children. *Pediatric Infectious Disease Journal* 2000;**19**(4):364–6.

Rowland 1997a
Rowland M, Lambert I, Gormally S, Thomas JE, Daly LE, Durnin M, et al. C-13-urea breath test for the diagnosis of Helicobacter pylori in children. *Gastroenterology* 1997;**112** (4 (suppl)):A272.

Rowland 1997b
Rowland M, Lambert I, Gormally S, Daly LE, Thomas JE, Hetherington C, et al. Carbon 13-labeled urea breath test for the diagnosis Helicobacter pylori infection in children. *Journal of Pediatrics* 1997;**131**(6):815–20.

Rutter 2001
Rutter CM, Gatsonis CA. A hierarchical regression approach to meta-analysis of diagnostic test accuracy evaluations. *Statistics in Medicine* 2001;**20**(19):2865–84.

Sabbi 2005
Sabbi T, De Angelis P, Colistro F, Dall'Oglio L, Di Abriola GF, Castro M. Efficacy of noninvasive tests in the diagnosis of Helicobacter pylori infection in pediatric patients. *Archives of Pediatrics & Adolescent Medicine* 2005;**159**(3): 238–41.

Sadowski 1998
Sadowski D, Cohen H, Laine L, Greenberg P, Goldstein J, Mihalov M, et al. Evaluation of the flexsure hp whole blood antibody test for diagnosis of Helicobacter pylori infection. *American Journal of Gastroenterology* 1998;**93**(11):2119–23.

Saez 2012
Saez J, Belda S, Santibanez M, Rodriguez JC, Sola-Vera J, Galiana A, et al. Real-time PCR for diagnosing Helicobacter pylori infection in patients with upper gastrointestinal bleeding: Comparison with other classical diagnostic methods. *Journal of Clinical Microbiology* 2012;**50**(10): 3233–7.

Saffari 2003
Saffari M, Motavalii MA, Fazeli A. Immunoblot assay in determination of serum antibody profile of Helicobacter pylori infection. *Iranian Journal of Medical Sciences* 2003; **28**(2):90–2.

Salama 1993
Salama SM, Wefuan JN, Shiro-Koulla S, Mbakop A, Tagni-Sartre M, Ndam EC, et al. Value of whole-cell antigen extracts for serologic detection of Helicobacter pylori. *Journal of Clinical Microbiology* 1993;**31**(12):3331–2.

Salih 2013
Salih BA, Karakus C, Ulupinar Z, Akbas F. A novel lateral flow test strip (lfts) for the detection of Helicobacter pylori infection. *Helicobacter* 2013;**18**:124.

Salles-Montaudon 2001
Salles-Montaudon N, Dertheil S, Broutet N, Monteiro L, Gras N, Pereira E, et al. How should Helicobacter pylori infection be diagnosed in the elderly?. *Revue de Medecine Interne* 2001;**22**(4):339–47.

Salomaa-Rasanen 2004
Salomaa-Rasanen A, Kosunen TU, Mattila J, Sarna S, Rautelin H. Age-dependent accuracy of Helicobacter pylori antibody assays for adults, with special emphasis on atrophic gastritis. *Clinical and Diagnostic Laboratory Immunology* 2004;**11**(6):1185–8.

Saltik 2001
Saltik IN, Ercis S, Kocak N, Hascelik G, Ozen H, Yuce A, et al. *Helicobacter pylori* stool antigen (HpSA) test in children with recurrent abdominal pain. *American Journal of Gastroenterology* 2001;**96**(8):2514–5.

Saltik 2003
Saltik IN, Demir H, Kocak N, Ozen H, Gurakan F, Yuce A. Diagnostic accuracy of c-13-urea breath test for Turkish children with Helicobacter pylori infection. *American Journal of Gastroenterology* 2003;**98**(1):222–3.

Sampson 2008
Sampson M, Shojania KG, McGowan J, Daniel R, Rader T, Iansavichene AE, et al. Surveillance search techniques identified the need to update systematic reviews. *Journal of Clinical Epidemiology* 2008;**61**(8):755–62.

Sanches 2013
Sanches BSF, Martins GM, Pinto HAF, Meira ACD, Alves EJ, Trindade OR, et al. Evaluation of stool antigen test on initial diagnosis and control test of Helicobacter pylori eradication. *Helicobacter* 2013;**18**:122.

Saneian 2013
Saneian H, Rahimi H, Mahmoodi NS. Comparison of the sensitivity and specificity of available methods in Helicobacter pylori infection detection in children. Journal of Isfahan Medical School 2013; Vol. 30, issue 212.

Sano 2004
Sano N, Ohara S, Koike T, Sekine H, Imatani A, Kitagawa Y, et al. Influence of urease activity of the oral cavity and oropharynx on 13C-urea breath test. *Japanese Journal of Gastroenterology* 2004;**101**(12):1302–8.

Santogade 1990
Santogade PJ, Bokkenheuser VD, Faisal MA, Kotler DP, Scholes JV, Holt PR. Evaluation of methods for identification of campylobacter pyloris infection. *New York State Journal of Medicine* 1990;**90**(1):4–7.

Sarker 2003
Sarker SA, Bardhan PK, Rahaman M, Beglinger C, Gyr N. Usefulness of the Helicobacter pylori stool antigen test for detection of Helicobacter pylori infection in young Bangladeshi children. *Gastroenterology* 2003;**124**(4 suppl): A178.

SAS [Computer program]
SAS Institute Inc. SAS. Version 9.4. Cary, NC, USA: SAS Institute Inc, 2013.

Sastry 1997
Sastry A, Flynn K, Mehra M. Development of an ELISA method for the measurement of *H. pylori* in human serum using a single reagent tmb system. *Clinical Chemistry* 1997; **43**(6 (Suppl 2)):628.

Sato 2012
Sato M, Shimoyama T, Takahashi R, Kajiyama H, Sano Y, Sakaedani N, et al. Characterization and usefulness of stool antigen tests using a monoclonal antibody to Helicobacter pylori catalase. *Journal of Gastroenterology and Hepatology (Australia)* 2012;**27**(SUPPL.3):23–8.

Satoh 1993
Satoh K, Yoshida Y, Taniguchi Y, Kimura K. Elisa tests for detection of Helicobacter pylori antibodies. *Nihon Rinsho [Japanese Journal of Clinical Medicine]* 1993;**51**(12):3201–4.

Savarino 1999
Savarino V, Mela GS, Zentilin P, Bisso G, Pivari M, Mansi C, et al. Comparison of isotope ratio mass spectrometry and nondispersive isotope-selective infrared spectroscopy for c-13-urea breath test. *American Journal of Gastroenterology* 1999;**94**(5):1203–8.

Savarino 2000a
Savarino V, Bisso G, Pivari M, Zentilin P, Bilardi C, Dulbecco P, et al. Effect of gastric acid suppression on c-13-urea breath test: Comparison of ranitidine with omeprazole. *Alimentary Pharmacology & Therapeutics* 2000;**14**(3):291–7.

Savarino 2000b
Savarino V, Landi F, Dulbecco P, Ricci C, Tessieri L, Biagini R, et al. Isotope ratio mass spectrometry (irms) versus laser-assisted ratio analyzer (lara) - a comparative study using two doses of c-13 urea and two test meals for pre- and posttreatment diagnosis of Helicobacter pylori infection. *Digestive Diseases and Sciences* 2000;**45**(11):2168–74.

Savarino 2001
Savarino V, Tracci D, Dulbecco P, Mele MR, Zentilin P, Mansi C, et al. Negative effect of ranitidine on the results of urea breath test for the diagnosis of Helicobacter pylori. *American Journal of Gastroenterology* 2001;**96**(2):348–52.

Savio 1999
Savio A, Buffoli F, Landi F, Ricci C, Acciardi C, Gatta L, et al. The value of a new capture ELISA system for the diagnosis and the follow-up of Helicobacter pylori (hp) infection. *Gut* 1999;**45**(Suppl 3):A128.

Sawada 2001
Sawada A, Tajiri H, Yoshimura N, Kozaiwa K, Ida S, Fujisawa T, et al. A simplified C-13-urea breath test in children with Helicobacter pylori infection: Assessment of eradication therapy and follow-up after treatment. *Gastroenterology* 2001;**120**(5 suppl):A579.

Sayed 2011
Sayed MM, Ibrahim WA, Abdel-Bary SA, Abdelhakam SM, El-Masry SA, Ghoraba D. Salivary PCR detection of Helicobacter pylori DNA in Egyptian patients with dyspepsia. *Egyptian Journal of Medical Human Genetics* 2011;**12**(2):211–6.

Schaefer 1999
Schaefer R, Bugno M, Auer P, Ramp U, Gabbert HE, Erckenbrecht JF. Does quantitative c-13-urea breath test reflect intensity of gastric Helicobacter pylori colonization or mucosal inflammation?. *Gastroenterology* 1999;**116**(4 (suppl)):A304.

Scherbakov 2001
Scherbakov PL, Belousov B, Govorun VM, Filin VA, Isakov VA, Kaganov BS, et al. Diagnosis of Helicobacter pylori infection in children by PCR in stool: comparative study with antigen stool test. *Gut* 2001;**49**(suppl):A81.

Schilling 2003
Schilling D, Demel A, Adamek HE, Nusse T, Weidmann E, Riemann JF. A negative rapid urease test is unreliable for exclusion of Helicobacter pylori infection during acute phase of ulcer bleeding - a prospective case control study. *Digestive and Liver Disease* 2003;**35**(4):217–21.

Schmitt 1996
Schmitt B, Bartel J. Comparison of a new rapid blood assay for detection of antibodies to Helicobacter pylori (bm-test Helicobacter pylori rapid assay, boehringer mannheim) with an enzyme-linked immunosorbent assay (enzygnost, behringwerke marburg). *Klinisches Labor* 1996;**42**(7-8): 601–6.

Schuman 1995
Schuman R, Rigas B, Prada A, Minoli G. Diagnosis of Helicobacter-pylori infection by the Lara™ system - towards a simplified breath test. *Gastroenterology* 1995;**108** (4 suppl):A215.

Schumann 2006
Schumann C, Triantafilou K, Rasche FM, Moricke A, Vogt K, Triantafilou M, et al. Serum antibody positivity for distinct Helicobacter pylori antigens in benign and malignant gastroduodenal disease. *Ijmm International Journal of Medical Microbiology* 2006;**296**(4-5):223–8.

Schwarzer 2007
Schwarzer A, Lottspeich C, Russmann H, Ossiander G, Koletzko S. Evaluation of a novel rapid one-step monoclonal chromatographic immunoassay for detection of Helicobacter pylori in stool from children. *European Journal of Clinical Microbiology & Infectious Diseases* 2007; **26**(7):475–80.

Sedlackova 1992
Sedlackova M, Soucek A, Mucksova J. Serologic detection of antibodies to Helicobacter pylori in children and adolescents using ELISA. *Ceskoslovenska Pediatrie* 1992;**47**(10):577–80.

Sen 2005
Sen N, Yilmaz O, Simsek I, Kupelioglu AA, Ellidokuz H. Detection of Helicobacter pylori DNA by a simple stool PCR method in adult dyspeptic patients. *Helicobacter* 2005; **10**(4):353–9.

Sen 2011
Sen N, Demiray-Gurbuz E, Yilmaz O, Kupeliotlu A, Simsek I. Comparing the accuracy of stool antigen tests for the detection of *Helicobacter pylori* infection in Turkish dyspeptic patients. *Helicobacter* 2011;**16**:114–5.

Seo 2004
Seo JK. Diagnostic validity of the Helicobacter pylori stool antigen test before and after eradication treatment. *Taehan Sohwagi Hakhoe Chi [Korean Journal of Gastroenterology]* 2004;**44**(4):229–35.

Seo 2013
Seo JH, Jun JS, Youn HS, Yeom JS, Park JS, Park CH, et al. Development of an ELISA for quantitative detection of immunoglobulin g (IgG) and IgA antibodies to Helicobacter pylori for use in Korean patients with *H. pylori*-associated diseases. *Gut and Liver* 2013;**7**(4):437–42.

Serrano 2008
Serrano CA, Gonzalez CG, Rollan AR, Duarte I, Torres J, Pena AJ, et al. Lack of diagnostic utility of specific

immunoglobulin m in Helicobacter pylori infection in children. *Journal of Pediatric Gastroenterology and Nutrition* 2008;**47**(5):612–7.

Sfarti 2009
Sfarti C, Stanciu C, Cojocariu C, Trifan A. 13C-urea breath test for the diagnosis of Helicobacter pylori infection in bleeding duodenal ulcer. *Revista Medico-Chirurgicala a Societatii de Medici si Naturalisti Din Lasi* 2009;**113**(3): 704–9.

Shaikh 2005
Shaikh S, Khaled MA, Islam A, Kurpad AV, Mahalanabis D. Evaluation of stool antigen test for Helicobacter pylori infection in asymptomatic children from a developing country using 13C-urea breath test as a standard. *Journal of Pediatric Gastroenterology & Nutrition* 2005;**40**(5):552–4.

Sharma 1995
Sharma TK, Cutler AF. Relationship between the magnitude of c-13 urea breath test-results and endoscopic diagnoses in Helicobacter-pylori infected individuals. *Gastroenterology* 1995;**108**(4 (suppl)):A217.

Sharma 1997
Sharma TK, Young EL, Miller S, Cutler AF. Evaluation of a rapid, new method for detecting serum igg antibodies to Helicobacter pylori. *Clinical Chemistry* 1997;**43**(5):832–6.

Sharma 1999
Sharma BC, Bhasin DK, Pathak CM, Sinha SK, Ray P, Vaiphei K, et al. C-14 -urea breath test to confirm eradication of Helicobacter pylori. *Journal of Gastroenterology and Hepatology* 1999;**14**(4):309–12.

Sharma 2015
Sharma U, Rehmani B, Shirazi N, Mittal G. A study of Helicobacter pylori infection in perforated peptic ulcer disease. *International Journal of Surgery* 2015;**23**:S119–S20.

She 2009
She RC, Wilson AR, Litwin CM. Evaluation of Helicobacter pylori immunoglobulin g (igg), iga, and igm serologic testing compared to stool antigen testing. *Clinical and Vaccine Immunology* 2009;**16**(8):1253–5.

Sheikhian 2007
Sheikhian A, Hassan Zuhair M, Mostafaie A. Detection of Helicobacter pylori diagnostic antigens in the stool of infected patients. *Iranian Journal of Medical Sciences* 2007; **32**(4):198–204.

Shepherd 2000
Shepherd AJ, Williams CL, Doherty CP, Hossack M, Preston T, McColl KEL, et al. Comparison of an enzyme immunoassay for the detection of Helicobacter pylori antigens in the faeces with the urea breath test. *Archives of Disease in Childhood* 2000;**83**(3):268–70.

Sheu 1997
Sheu BS, Lee SC, Lin XZ. Quantitative result of c-13 urea breath test can predict the bacterial density of h-pylori. *Gut* 1997;**41**:A84.

Sheu 1999a
Sheu BS, Lee SC, Yang HB, Lin XZ. Quantitative result of c-13 urea breath test at 15 minutes may correlate with the bacterial density of h-pylori in the stomach. *Hepato-Gastroenterology* 1999;**46**(27):2057–62.

Sheu 1999b
Sheu BS, Lee SC, Wang YL, Shiesh SC, Yang HB, Lin XZ. A lower cut-off point of c-13 urea breath test is more suitable to monitor the success of h-pylori eradication. *Gut* 1999;**45**(Suppl 3):A125.

Sheu 2000a
Sheu BS, Lee SC, Yang HB, Kuo AW, Wang YL, Shiesh SC, et al. Selection of lower cutoff point of c-13 urea breath test is helpful to monitor h-pylori eradication after proton pump inhibitor-based triple therapy. *Digestive Diseases and Sciences* 2000;**45**(7):1330–6.

Sheu 2000b
Sheu BS, Lee SC, Yang HB, Wu HW, Wu CS, Lin XZ, et al. Lower-dose c-13-urea breath test to detect Helicobacter pylori infection - comparison between infrared spectrometer and mass spectrometry analysis. *Alimentary Pharmacology & Therapeutics* 2000;**14**(10):1359–63.

Sheu 2000c
Sheu BS, Lee SC, Lin PW, Wang ST, Chang YC, Yang HB, et al. (13)carbon urea breath test is not as accurate as endoscopy to detect Helicobacter pylori after gastrectomy. *Gastrointestinal Endoscopy* 2000;**51**(6):670–5.

Sheu 2002
Sheu BS, Yang HB, Wang YL, Kao AW, Chuang CH, Lin PW, et al. Stool antigen assay to screen h-pylori infection and to assess the success of 3-day and 7-day eradication therapy in the patients with partial gastrectomy. *Helicobacter* 2002;**7**(3):199–204.

Shiba 1998
Shiba K. The rapid method in microbiology using chemical method and immunochemical method. *Rinsho Biseibutsu Jinsoku Shindan Kenkyukai Shi [Journal of the Association for Rapid Method and Automation in Microbiology]* 1998;**9**(2): 73–81.

Shimada 1994
Shimada T, Ogura K, Ota S, Terano A, Takahashi M, Hamada E, et al. Identification of Helicobacter pylori in gastric specimens, gastric juice, saliva, and faeces of Japanese patients. *Lancet* 1994;**343**(8913):1636–7.

Shimizu 2003a
Shimizu T, Yarita Y, Haruna H, Kaneko K, Yamashiro Y, Gupta R, et al. Urine-based enzyme-linked immunosorbent assay for the detection of Helicobacter pylori antibodies in children. *Journal of Paediatrics & Child Health* 2003;**39**(8): 606–10.

Shimizu 2003b
Shimizu T, Fujii T, Haruna H, Shoji H, Kudo T, Yamashiro Y. Effects of stool dilution on the faecal Helicobacter pylori antigen test. *Journal of Paediatrics and Child Health* 2003; **39**(4):286–8.

Shimoyama 1996
Shimoyama T, Fukuda Y, Fukuda S, Munakata A, Yoshida Y, Shimoyama T. Validity of various diagnostic tests to evaluate cure of Helicobacter pylori infection. *Journal of Gastroenterology* 1996;**31**(2):171–4.

Shimoyama 2009a
Shimoyama T, Oyama T, Matsuzaka M, Danjo K, Nakaji S, Fukuda S. Comparison of a stool antigen test and serology for the diagnosis of Helicobacter pylori infection in mass survey. *Helicobacter* 2009;**14**(2):87–90.

Shimoyama 2009b
Shimoyama T, Kato C, Kodama M, Kobayashi I, Fukuda Y. Applicability of a monoclonal antibody-based stool antigen test to evaluate the results of Helicobacter pylori eradication therapy. *Japanese Journal of Infectious Diseases* 2009;**62**(3): 225–7.

Shimoyama 2010
Shimoyama T, Kobayashi I, Kato C, Kodama M, Fukuda Y. Comparison of monoclonal antibody-based stool antigen tests to determine the results of Helicobacter pylori eradication therapy. *Scandinavian Journal of Gastroenterology* 2010;**45**(12):1431–4.

Shimoyama 2011
Shimoyama T, Sawaya M, Ishiguro A, Hanabata N, Yoshimura T, Fukuda S. Applicability of a rapid stool antigen test, using monoclonal antibody to catalase, for the management of Helicobacter pylori infection. *Journal of Gastroenterology* 2011;**46**(4):487–91.

Shimoyama 2014
Shimoyama T, Chinda D, Ebina T, Iwamura H, Fukuda S. Screening of Helicobacter pylori infection using stool antigen test for young adults in a Japanese population with high incidence of gastric cancer. *Helicobacter* 2014;**19**:121.

Shimoyama 2015
Shimoyama T, Sawada Y, Fukuda S. Accuracy of a stick-type kit and enzyme-linked immunosorbent assay for the detection of Helicobacter pylori antibodies in urine. *American Journal of Gastroenterology* 2015;**110**:S1020.

Shirin 2001
Shirin H, Kenet G, Shevah O, Wardi Y, Birkenfeld S, Shahmurov M, et al. Evaluation of a novel continuous real time c-13 urea breath analyser for Helicobacter pylori. *Alimentary Pharmacology & Therapeutics* 2001;**15**(3): 389–94.

Shirin 2003
Shirin H, Frenkel D, Shevah O, Levine A, Bruck R, Moss SF, et al. Effect of proton pump inhibitors on the continuous real time c-13-urea breath test. *American Journal of Gastroenterology* 2003;**98**(1):46–50.

Shirin 2005
Shirin H, Levine A, Shevah O, Shabat-Sehayek V, Aeed H, Wardi J, et al. Eradication of Helicobacter pylori can be accurately confirmed 14 days after termination of triple therapy using a high-dose citric acid-based c-13 urea breath test. *Digestion* 2005;**71**(4):208–12.

Shmuely 2007
Shmuely H, Yahav J, Samra Z, Chodick G, Ofek I. Elevated c-13 urea breath test values females infected with Helicobacter pylori. *Digestive Diseases and Sciences* 2007;**52** (2):402–4.

Shuber 2002
Shuber AP, Ascaño JJ, Boynton KA, Mitchell A, Frierson HF Jr, El-Rifai W, et al. Accurate, noninvasive detection of Helicobacter pylori DNA from stool samples: Potential usefulness for monitoring treatment. *Journal of Clinical Microbiology* 2002;**40**(1):262–4.

Shukla 2012
Shukla S, Pujani M, Agarwal A, Pujani M, Rohtagi A. Correlation of serology with morphological changes in gastric biopsy in Helicobacter pylori infection and evaluation of immunohistochemistry for h. Pylori identification. *Saudi Journal of Gastroenterology* 2012;**18**(6): 369–74.

Sicinschi 2003a
Sicinschi LA, Correa P, Schneider BG. Comparison of genotyping of Helicobacter pylori caga and vaca virulence genes from gastric biopsies and stool specimens. *Helicobacter* 2003;**8**(6):601–7.

Sicinschi 2003b
Sicinschi LA, Correa P, Bravo LE, Schneider BG. Detection and typing of Helicobacter pylori caga/vaca genes by radioactive, one-step polymerase chain reaction in stool samples from children. *Journal of Microbiological Methods* 2003;**52**(2):197–207.

Siddiqui 2010
Siddiqui AA, Ansari MA, Rahman RU, Jabeen R, Qureshi NR, Kashoob MB. Comparison between Helicobacter pylori fecal antigen detection and endoscopic gastric biopsy in diagnosis of h. Pylori infection in 50 adult cases. *Journal of the Liaquat University of Medical and Health Sciences* 2010;**9**(1):23–6.

Silva 2009
Silva DG, Stevens RH, Macedo JMB, Hirata R, Pinto AC, Alves LM, et al. Higher levels of salivary muc5b and muc7 in individuals with gastric diseases who harbor Helicobacter pylori. *Archives of Oral Biology* 2009;**54**(1):86–90.

Sito 1994
Sito E, Karczewska E, Szczeba J, Kaminski K, Oleksy J, Nowak-Sadzikowska J, et al. Comparative evaluation of culture techniques and ELISA test in detection of Helicobacter pylori infection. *Medycyna Doswiadczalna i Mikrobiologia* 1994;**46**(4):301–4.

Slade 1999
Slade PE, Davidson AR, Steel A, Cox RA, Blackburn PA. Reducing the endoscopic workload: Does serological testing for Helicobacter pylori help?. *European Journal of Gastroenterology & Hepatology* 1999;**11**(8):857–62.

Slater 2004
Slater C, Preston T, Weaver LT. Is there an advantage in normalising the results of the Helicobacter pylori c-13 urea

breath test for co2 production rate in children?. *Isotopes in Environmental and Health Studies* 2004;**40**(1):89–98.

Slomianski 1994
Slomianski A, Schubert T, Cutler AF. C-13 urea breath test to confirm eradication of Helicobacter-pylori. *Gastroenterology* 1994;**106**(4 (suppl)):A183.

Slomianski 1995
Slomianski A, Schubert T, Cutler AF. [13C]urea breath test to confirm eradication of Helicobacter pylori. *American Journal of Gastroenterology* 1995;**90**(2):224–6.

Smith 2006
Smith SI, Oyedeji KS, Odeniyi OAM, Arigbabu AO, Coker AO. Diagnosis of Helicobacter pylori infection among patients with dental caries by stool antigen test. *British Journal of Biomedical Science* 2006;**63**(3):144–5.

Smith 2009
Smith SI, Omonigbehin EA, Goodluck HA, Abdulkareem FB, Onyekwere CA, Agomo C, et al. The use of histology as a gold standard for diagnosis of h. Pylori in Nigeria. *Helicobacter* 2009;**14**(4):342.

Smith 2010
Smith SI, Fowora MA, Lesi OA, Agbebaku E, Abdulkareem FB, Contreras M, et al. Application of stool-PCR test for the diagnosis of h. Pylori in Nigeria. *Helicobacter* 2010;**15**(4):363.

Smith 2011
Smith SI, Oyedeji KS, Goodluck HA, Fowora MA, Anomneze E, Lesi OA. The use of Helicobacter pylori stool antigen test for the diagnosis of Helicobacter pylori in Lagos, Nigeria. *West Indian Medical Journal* 2011;**60**(1):33–5.

Smith 2012
Smith SI, Fowora MA, Lesi OA, Agbebaku E, Odeigah P, Abdulkareem FB, et al. Application of stool-PRC for the diagnosis of Helicobacter pylori from stool in Nigeria- a pilot study. *Springerplus* 2012;**1**(1):78. [DOI: 10.1186/2193-1801-1-78

Snyder 1999
Snyder JD, Veldhuyzen Van Zanten S. Novel diagnostic tests to detect Helicobacter pylori infection: A pediatric perspective. *Canadian Journal of Gastroenterology* 1999;**13**(7):585–9.

Sobala 1991
Sobala GM, Crabtree JE, Pentith JA, Rathbone BJ, Shallcross TM, Wyatt JI, et al. Screening dyspepsia by serology to Helicobacter pylori. *Lancet* 1991;**338**(8759):94–6.

Sokucu 2002
Sokucu S, Suoglu OD, Turkkan E, Elkabes B, Ozden T, Saner G. Helicobacter pylori infection in turkish children with gastrointestinal symptoms and evaluation of serology. *Turkish Journal of Pediatrics* 2002;**44**(2):102–8.

Song 2000
Song Q, Lange T, Spahr A, Adler G, Bode G. Characteristic distribution pattern of Helicobacter pylori in dental plaque and saliva detected with nested PCR. *Journal of Medical Microbiology* 2000;**49**(4):349–53.

Song 2014
Song Y, Jiang K, Jin H, Wang BM. The application of methane and hydrogen breath test in the diagnosis and treatment of Helicobacter pylori. *Journal of Digestive Diseases* 2014;**15**:116.

Sonmezoglu 2005
Sonmezoglu M, Baysal B, Ergen A, Barut SG. Detection and evaluation of salivary antibodies to Helicobacter pylori in dyspeptic patients. *International Journal of Clinical Practice* 2005;**59**(4):433–6.

Sorberg 1997
Sorberg M, Engstrand L, Strom M, Jonsson KA, Jorbeck H, Granstrom M. The diagnostic value of enzyme immunoassay and immunoblot in monitoring eradication of Helicobacter pylori. *Scandinavian Journal of Infectious Diseases* 1997;**29**(2):147–51.

Steen 1995
Steen T, Berstad K, Meling T, Berstad A. Reproducibility of the 14c urea breath test repeated after 1 week. *American Journal of Gastroenterology* 1995;**90**(12):2103–5.

Stege 2010
Stege PW, Raba J, Messina GA. Online immunoaffinity assay-ce using magnetic nanobeads for the determination of anti-Helicobacter pylori IgG in human serum. *Electrophoresis* 2010;**31**(20):3475–81.

Stermer 1997
Stermer E, Levy N, Tabak M, Neeman I. Lanzoprazole and ranitidine affect the accuracy of the 14c-urea breath test by a ph-dependent mechanism. *American Journal of Gastroenterology* 1997;**92**(9):1575–6.

Sternberg 1997
Sternberg A, Coscas D, Wagner Y, Auslander L, Kaufshtein M, Fireman Z. Comparison of various Helicobacter pylori detection methods: Serology, histology and bacteriology. *Israel Journal of Medical Sciences* 1997;**33**(3):160–3.

Stirling 1995
Stirling N, McCallion W. Helicobacter pylori gastritis: Non-invasive diagnosis. *Paediatric Nursing* 1995;**7**(2):17–9.

Stojkovic 2011
Stojkovic M, Durutovic DR, Petrovic MN, Stojkovic MV, Petrovic NS, Antic AA, et al. Helicobacter pylori infection in various groups of patients studied, estimated by 14c-urea breath test. *Acta Chirurgica Iugoslavica* 2011;**58**(1):95–8.

Stone 1997
Stone MA, Mayberry JF, Wicks ACB, Livsey SA, Stevens M, Swann RA, et al. Near patient testing for Helicobacter pylori: A detailed evaluation of the cortecs helisal rapid blood test. *European Journal of Gastroenterology & Hepatology* 1997;**9**(3):257–60.

Storskrubb 2005
Storskrubb T, Aro P, Ronkainen J, Vieth M, Stolte M, Wreiber K, et al. A negative Helicobacter pylori serology test is more reliable for exclusion of premalignant gastric

conditions than a negative test for current h. Pylori infection: A report on histology and h. Pylori detection in the general adult population. *Scandinavian Journal of Gastroenterology* 2005;**40**(3):302–11.

Stray-Pedersen 2007
Stray-Pedersen A, Gaustad P, Stray-Pedersen B, Rognum TO. Detection rate of Helicobacter pylori stool antigen in newborn infants and small children. *Journal of Perinatal Medicine* 2007;**35**(2):155–8.

Stuppy 2010
Stuppy W, Everitt M. Correlation of salivary antibody (HPSAigg) and stool antigen (hpstag) in Helicobacter pylori infection. *American Journal of Gastroenterology* 2010;**105**: S46.

Stuppy 2011
Stuppy W, El Khoury M. Pre- and post-treatment correlation of salivary antibody with stool antigen in Helicobacter pylori infection. *American Journal of Gastroenterology* 2011;**106**:S49.

Sudraba 2010
Sudraba A, Funka K, Tolmanis I, Vanags A, Daugule I, Janciauskas D, et al. Gastric biomarkers in h. Pylori positive and negative patients. *Helicobacter* 2010;**15**(4):353.

Sudraba 2011
Sudraba A, Daugule I, Rudzite D, Funka K, Tolmanis I, Engstrand L, et al. Performance of routine Helicobacter pylori tests in patients with atrophic gastritis. *Journal of Gastrointestinal & Liver Diseases* 2011;**20**(4):349–54.

Sue 1996
Sue M, Peura D, Charles C, Doobay R, Reid H, Morris E, et al. Comparison of two treatment strategies for the eradication of h-pylori utilizing a screening antibody serum blot test and confirmatory c 14 breath test. *Gastroenterology* 1996;**110**(4 (suppl)):A266.

Sugiyama 1991
Sugiyama T, Imai K, Yoshida H, Takayama Y, Yabana T, Yokota K, et al. A novel enzyme immunoassay for serodiagnosis of Helicobacter pylori infection. *Gastroenterology* 1991;**101**(1):77–83.

Sujatha 2013
Sujatha R, Arunagiri D, Singh DN, Hariomsharan. Diagnosis of Helicobacter pylori associated acid peptic disease by serology and rapid urease test. *Journal of Pure and Applied Microbiology* 2013;**7**(1):691–5.

Sukhanov 2011
Sukhanov AV, Pikerskii IE, Saifutdinov RG, Makarov AA, Frolov SV. Comparison of various diagnostic methods of Helicobacter infection. *Eksperimental'naia i Klinicheskaia Gastroenterologiia [Experimental & Clinical Gastroenterology]* 2011;**5**:8–15.

Sumona 2009
Sumona AA, Hossain MA, Musa AK, Shamsuzzaman AK, Mahmud MC, Khan MS, et al. Anti h.Pylori igm in symptomatic and asymptomatic population. *Mymensingh Medical Journal: MMJ* 2009;**18**(1):18–20.

Sunnerstam 1999
Sunnerstam B, Kjerstadius T, Jansson L, Giesecke J, Bergstrom M, Ejderhamn J. Detection of Helicobacter pylori antibodies in a pediatric population: Comparison of three commercially available serological tests and one in-house enzyme immunoassay. *Journal of Clinical Microbiology* 1999;**37**(10):3328–31.

Surveyor 1988
Surveyor I, Goodwin CS, Warren JR, Geelhoed E, Murray RN, Waters TE. Further experience of the c-14 urea breath test for the detection of c-pylori infection. *Australian and New Zealand Journal of Medicine* 1988;**18**(3):505.

Suto 1997a
Suto H, Azuma T, Ito S, Ito Y, Miyaji H, Yamazaki Y, et al. Evaluation of the endoscopic c-13-urea breath test: A new accurate diagnostic test of Helicobacter pylori infection. *Gastroenterology* 1997;**112**(4 (suppl)):A301.

Suto 1997b
Suto H, Azuma T, Ito S, Ito Y, Miyaji H, Yamazaki Y, et al. A trial of ^{13}C-urea breath test combined with endoscopic phenol red test for detection of Helicobacter pylori infection. *Digestive Endoscopy* 1997;**9**(4):283–9.

Suto 1999
Suto H, Azuma T, Ito S, Ito Y, Miyaji H, Yamazaki Y, et al. Evaluation of endoscopic c-13-urea breath test for assessment of Helicobacter pylori eradication. *Journal of Gastroenterology* 1999;**34**(Suppl 11):67–71.

Suto 2000a
Suto H, Azuma T, Ito S, Ito Y, Miyaji H, Yamazaki Y, et al. Endoscopic^{13}C-urea breath test for quantification of Helicobacter pylori infection. *Journal of Gastroenterology and Hepatology (Australia)* 2000;**15**(2):161–7.

Suto 2000b
Suto G, Vincze A, Pakodi F, Hunyady B, Karadi O, Garamszegi M, et al. C-13-urea breath test is superior in sensitivity to detect Helicobacter pylori infection than either antral histology or rapid urease test. *Journal of Physiology-Paris* 2000;**94**(2):153–6.

Suzuki 2010
Suzuki K, Shimoyama T, Kobayashi I, Kato C, Kodama M, Fukuda Y. Comparison of monoclonal antibody-based stool antigen tests to determine the results of h. Pylori eradication therapy. *Helicobacter* 2010;**15 (4)**:358.

Syam 2005
Syam AF, Rani AA, Abdullah M, Manan C, Makmun D, Simadibrata M, et al. Accuracy of Helicobacter pylori stool antigen for the detection of Helicobacter pylori infection in dyspeptic patients. *World Journal of Gastroenterology* 2005; **11**(3):386–8.

Sykora 2002
Sykora J, Valeckova K, Hejda V, Varvarovska J, Stozicky F. Accurate noninvasive diagnosis of Helicobacter pylori infection using antigen determination in the feces in the pediatric population. *Casopis Lekaru Ceskych* 2002;**141**(13): 425–7.

Sykora 2003
Sykora J, Valeckova K, Stozicky F, Schwarz J, Varvarovska J. Revealing of the Helicobacter pylori infection in children by detection of stool antigen by a novel enzyme immunoassay using monoclonal antibodies (hpstar). *Casopis Lekaru Ceskych* 2003;**142**(11):687–90.

Taha 1992
Taha AS, Boothman P, Nakshabendi I, Reid J, Morran C, Gemmell CG, et al. Diagnostic tests for Helicobacter pylori: Comparison and influence of non-steroidal anti-inflammatory drugs. *Journal of Clinical Pathology* 1992;**45**(8):709–12.

Taha 1993
Taha AS, Reid J, Boothmann P, Gemmell CG, Lee FD, Sturrock RD, et al. Serological diagnosis of Helicobacter pylori--evaluation of four tests in the presence or absence of non-steroidal anti-inflammatory drugs. *Gut* 1993;**34**(4):461–5.

Takagi 1993
Takagi A, Suyama T, Kida M, Matsuda M, Matsumoto H, Kojima K, et al. Comparison between ELISA and culture method for detection of Helicobacter pylori. *Rinsho Byori [Japanese Journal of Clinical Pathology]* 1993;**41**(12):1333–7.

Takagi 2002
Takagi A, Mine T. Serodiagnosis of Helicobacter pylori infection. *Nihon Rinsho [Japanese Journal of Clinical Medicine]* 2002;**60**(Suppl 2):324–7.

Takagi 2003
Takagi A. Detection of h. Pylori by serum and urine-based ELISA. *Nihon Rinsho [Japanese Journal of Clinical Medicine]* 2003;**61**(1):88–91.

Takahashi 2010
Takahashi R, Shimoyama T, Abe D, Nakabayashi N, Okuda M, Fukuda Y. Determining cut-off values for serodiagnosis of Helicobacter hepaticus infection by hrii-51-hh-15 capture enzyme-linked immunosorbent assay. *Helicobacter* 2010;**15**(4):362.

Takwoingi 2013
Takwoingi Y, Leeflang MM, Deeks JJ. Empirical evidence of the importance of comparative studies of diagnostic test accuracy. *Annals of internal medicine* 2013;**158**(7):544–54. [PUBMED: 23546566]

Takwoingi 2017
Takwoingi Y, Guo B, Riley RD, Deeks JJ. Performance of methods for meta-analysis of diagnostic test accuracy with few studies or sparse data. Statistical Methods in Medical Research 2017; Vol. 26, issue 4:1896–911.

Talebkhan 2009
Talebkhan Y, Ebrahimzadeh F, Esmaeili M, Oghalaie A, Sadeghi M, Mohammadi M. H. Pylori immunoreactive antigens and their screening applications. *Helicobacter* 2009;**14 (4)**:338.

Talebkhan 2010
Talebkhan Y, Esmaili M, Hassanpour P, Morakabati A, Rakhshani N, Mohagheghi M, et al. Comparison of routinely used invasive and non invasive approaches in diagnosis of h. Pylori infection. *Helicobacter* 2010;**15**(4):358–9.

Talley 1991
Talley NJ, Newell DG, Ormand JE, Carpenter HA, Wilson WR, Zinsmeister AR, et al. Serodiagnosis of Helicobacter pylori: Comparison of enzyme-linked immunosorbent assays. *Journal of Clinical Microbiology* 1991;**29**(8):1635–9.

Talley 1992
Talley NJ, Kost L, Haddad A, Zinsmeister AR. Comparison of commercial serological tests for detection of Helicobacter pylori antibodies. *Journal of Clinical Microbiology* 1992;**30**(12):3146–50.

Talley 1998
Talley NJ, Lambert JR, Howell S, Xia HH, Lin SK, Agreus L. An evaluation of whole blood testing for Helicobacter pylori in general practice. *Alimentary Pharmacology & Therapeutics* 1998;**12**(7):641–5.

Talley 2008
Talley NJ, Fock KM, Moayyedi P. Gastric Cancer Consensus conference recommends Helicobacter pylori screening and treatment in asymptomatic persons from high-risk populations to prevent gastric cancer. *American Journal of Gastroenterology* 2008;**103**(3):510–4.

Tamura 2001
Tamura S, Yokoyama Y, Morita T, Tadokoro T, Higashidani Y, Onishi S. Stool test for Helicobacter pylori. *American Journal of Gastroenterology* 2001;**96**(6):1936–8.

Tanahashi 1998
Tanahashi T, Kodama T, Yamaoka Y, Sawai N, Tatsumi Y, Kashima K, et al. Analysis of the c-13-urea breath test for detection of Helicobacter pylori infection based on the kinetics of delta-(co2)-c-13 using laser spectroscopy. *Journal of Gastroenterology and Hepatology* 1998;**13**(7):732–7.

Tanaka 2001
Tanaka A, Watanabe K, Tokunaga K, Hoshiya S, Imase K, Sugano H, et al. Evaluation of Helicobacter pylori stool antigen test before and after eradication therapy. *Gut* 2001;**49**(suppl):A101.

Tanaka 2003
Tanaka A, Watanabe K, Tokunaga K, Hoshiya S, Imase K, Sugano H, et al. Evaluation of Helicobacter pylori stool antigen test before and after eradication therapy. *Journal of Gastroenterology & Hepatology* 2003;**18**(6):732–8.

Tanaka 2004
Tanaka A, Takahashi S. Helicobacter pylori stool antigen test. *Nihon Rinsho [Japanese Journal of Clinical Medicine]* 2004;**62**(3):464–9.

Tanaka 2005
Tanaka A, Tokunaga K, Imase K, Sugano H, Ishida H, Takahashi S. Evaluation of rapid h-pylori stool antigen test before and after eradication therapy. *American Journal of Gastroenterology* 2005;**100**(9):S69–70.

Tanigawa 1996
Tanigawa T, Mizo-oku Y, Moriguchi K, Suzuki T, Osumi T, Odomi M. Simple and rapid quantitative assay of 13C-labelled urea in human serum using liquid chromatography-atmospheric pressure chemical ionization mass spectrometry. *Journal of Chromatography B: Biomedical Applications* 1996; **683**(2):135–42.

Taniguchi 1995
Taniguchi Y, Kimura K, Satoh K, Kawada H, Sohara H, Yamamoto H, et al. Substitute, inexpensive diagnosis of Helicobacter-pylori infection by infrared (ir) spectrophotometer in c-13-urea breath test. *Gastroenterology* 1995;**108**(4 (Suppl)):A235.

Taylor 1987
Taylor DE, Chang N. Immunoblot and enzyme-linked immunosorbent assays of campylobacter major outer-membrane protein and application to the differentiation of campylobacter species. *Molecular & Cellular Probes* 1987;**1** (3):261–74.

Taylor 2014
Taylor J, Hafner M, Yerushalmi E, Smith R, Bellasio J, Vardavas R, et al. Estimating the economic costs of antimicrobial resistance. Model and Results. www.rand.org/pubs/research_reports/RR911.html 2014 (accessed 15 December 2016).

Teich 1997
Teich M, Bohn I, Niessen KH. Validation of a children's c-13-urea breath test for diagnosis of Helicobacter pylori. *Monatsschrift Kinderheilkunde* 1997;**145**(3):242–8.

Temelli 2011
Temelli B, Velipasaoglu Z, Akdemir E, Bozkurt MF. Efficacy of carbon-14 urea breath test in the diagnosis of Helicobacter pylori infection in children: Comparison among different tests to find out the best. *European Journal of Nuclear Medicine and Molecular Imaging* 2011;**38**: S190–S1.

Teo 1997
Teo EK, Fock KM, Ng TM, Khor CJL, Lee YM, Sim CS. 13 carbon-urea breath test for detection of h-pylori infection. *Gastroenterology* 1997;**112**(4 suppl):A311.

Tepes 2015
Tepes B, Malfertheiner P, Labenz J, Aygen S. The accuracy of a new c-13 urea breath test meal (refex (r)) for Helicobacter pylori in patients taking proton pump inhibitors. *Helicobacter* 2015;**20**:81.

Tereshchenko 2014
Tereshchenko S, Gorbacheva N, Anisimova E, Babushkin V. The diagnostic accuracy of Helicobacter pylori antigen detection in duodenal juice. *Helicobacter* 2014;**19**:125–6.

Tewari 2001
Tewari V, Nath G, Gupta H, Dixit VK, Jain AK. 14c-urea breath test for assessment of gastric Helicobacter pylori colonization and eradication. *Indian Journal of Gastroenterology* 2001;**20**(4):140–3.

Tham 1993
Tham TCK, McLaughlin N, Hughes DF, Ferguson M, Crosbie JJ, Madden M, et al. Evaluation of a commercial ELISA for the serodiagnosis of Helicobacter-pylori infection. *Gastroenterology* 1993;**104**(4 suppl):A210.

Tham 1994
Tham TCK, McLaughlin M, Hughes DF, Ferguson M, Crosbie JJ, Madden M, et al. Possible role of Helicobacter pylori serology in reducing endoscopy workload. *Postgraduate Medical Journal* 1994;**70**(829):809–12.

Thijs 1994
Thijs JC, Van Zwet AA, Meyer BC, Berrelkamp RJP. Serology to monitor the efficacy of anti-Helicobacter pylori treatment. *European Journal of Gastroenterology & Hepatology* 1994;**6**(7):579–83.

Thijs 1995a
Thijs WJ, Thijs JC, Kleibeuker JH, Elzinga H, Stellaard F. Evaluation of clinical and home performance of the 13C-urea breath test for the detection of Helicobacter pylori. *European Journal of Gastroenterology & Hepatology* 1995;**7** (7):603–7.

Thijs 1995b
Thijs WJ, Thijs JC, Kleibeuker JH, Elzinga H, Stellaard F. The c-13-urea breath test for the detection of Helicobacter-pylori - an analysis of the test performed clinically and at home. *Gastroenterology* 1995;**108**(4 (suppl)):A241.

Thijs 1996
Thijs JC, Van Zwei AA, Thijs WJ, Oey HB, Karrenbeld A, Stellaard F, et al. Diagnostic tests for Helicobacter pylori: A prospective evaluation of their accuracy, without selecting a single test as the gold standard. *American Journal of Gastroenterology* 1996;**91**(10):2125–9.

Thillainayagam 1991
Thillainayagam AV, Arvind AS, Cook RS, Harrison IG, Tabaqchali S, Farthing MJG. Diagnostic efficiency of an ultrarapid endoscopy room test for Helicobacter-pylori. *Gut* 1991;**32**(5):467–9.

Thomas 1990
Thomas JE, Whatmore AM, Barer MR, Eastham EJ, Kehoe MA. Serodiagnosis of Helicobacter pylori infection in childhood. *Journal of Clinical Microbiology* 1990;**28**(12): 2641–6.

Thomas 1999
Thomas JE, Dale A, Harding M, Coward WA, Cole TJ, Sullivan PB, et al. Interpreting the c-13-urea breath test among a large population of young children from a developing country. *Pediatric Research* 1999;**46**(2):147–51.

Thongbai 2007
Thongbai T, Thong-Ngam D, Mahachai V, Kullavanijaya P. Effect of antiulcer drugs used on the detection of Helicobacter pylori using urea breath test. *Helicobacter* 2007;**12**(4):443.

Tindberg 2001
Tindberg Y, Bengtsson C, Bergstrom M, Granstrom M. Phe accuracy of serologic diagnosis of Helicobacter pylori

infection in school-aged children of mixed ethnicity. *Helicobacter* 2001;**6**(1):24–30.

Tinnert 1998

Tinnert A, Hamlet A, Svennerholm AM. Antibodies against Helicobacter pylori in feces and saliva before and after eradication therapy. *Clinical Microbiology and Infection* 1998;**4**(11):634–43.

Tiryaki 2010

Tiryaki Z, Yilmaz-Ciftdogan D, Kasirga E. Diagnostic value of stool antigen and antibody tests for Helicobacter pylori infection in Turkish children with upper gastrointestinal complaints before and after eradication. *Turkish Journal of Pediatrics* 2010;**52**(5):505–11.

Togashi 2006

Togashi A, Matsukura N, Kato S, Masuda G, Ohkawa K, Tokunaga A, et al. Simple and accurate c-13-urea breath test for detection of Helicobacter pylori in the remnant stomach after surgery. *Journal of Gastroenterology* 2006;**41** (2):127–32.

Tokunaga 1998

Tokunaga Y, Shirahase H, Yamamoto E, Gouda Y, Kanaji K, Ohsumi K. Semiquantitative evaluation for diagnosis of Helicobacter pylori infection in relation to histological changes. *American Journal of Gastroenterology* 1998;**93**(1): 26–9.

Tokunaga 2000

Tokunaga Y, Shirahase H, Yamamoto E, Inao R, Hamaguchi S, Kanaji K, et al. Modified rapid urease test for Helicobacter pylori detection in relation to an immunohistochemical stain. *Journal of Gastroenterology and Hepatology* 2000;**15** (6):617–21.

Tokunaga 2005

Tokunaga K, Watanabe K, Tanaka A, Sugano H, Imase K, Ishida H, et al. Evaluation of ^{13}C-urea breath test to confirm eradication of Helicobacter pylori. *Japanese Journal of Gastroenterology* 2005;**102**(2):176–82.

Toporowska-Kowalska 2005

Toporowska-Kowalska E, Wasowska-Krolikowska K, Kurnatowski M, Gebora-Kowalska B. Clinical applicability of non-invasive testing of Helicobacter pylori infection in children - stool antygen (HPSA) and urea breath test. *Pediatria Wspolczesna* 2005;**7**(3):177–9.

Tormo 2013

Tormo R. Urea c-13 test is not enough to diagnose a Helicobacter pylori infection. *Journal of Pediatric Gastroenterology and Nutrition* 2013;**56**(6):e53.

Torres 2001

Torres J, Camorlinga M, Perez-Perez G, Gonzalez G, Muñoz O. Validation of the string test for the recovery of Helicobacter pylori from gastric secretions and correlation of its results with urea breath test results, serology, and gastric ph levels. *Journal of Clinical Microbiology* 2001;**39** (4):1650–1.

Toyama 1999

Toyama J, Kato C, Sato K, Sato S. The 13C-urea breath test efficacy in determining Helicobacter pylori eradication. *Nihon Rinsho [Japanese Journal of Clinical Medicine]* 1999; **57**(1):93–6.

Trautmann 1994

Trautmann M, Moldrzyk M, Vogt K, Korber J, Held T, Marre R. Use of a receiver operating characteristic in the evaluation of two commercial enzyme immunoassays for detection of Helicobacter pylori infection. *European Journal of Clinical Microbiology & Infectious Diseases* 1994;**13**(10): 812–9.

Treiber 2000

Treiber G, Malfertheiner P. Usefulness of serology for diagnosis and follow-up of h.pylori infection - comparison of third vs. second generation ELISA. *Gastroenterology* 2000;**118**(4 Part 2):A1316.

Trevisani 1998

Trevisani L, Sartori S, Galvani F, Rossi MR, Ruina M, Caselli M. Detection of Helicobacter pylori in faeces with a new enzyme immunoassay method: Preliminary results. *Scandinavian Journal of Gastroenterology* 1998;**33**(8):893–4.

Trevisani 1999a

Trevisani L, Sartori S, Ruina M, Caselli M, Rossi MR, Costa F, et al. Helicobacter pylori stool antigen test - clinical evaluation and cost analysis of a new enzyme immunoassay. *Digestive Diseases and Sciences* 1999;**44**(11):2303–6.

Trevisani 1999b

Trevisani L, Sartori S, Galvani F, Rossi MR, Ruina M, Chiamenti C, et al. Evaluation of a new enzyme immunoassay for detecting Helicobacter pylori in feces: A prospective pilot study. *American Journal of Gastroenterology* 1999;**94**(7):1830–3.

Trevisani 2002

Trevisani L, Sartori S. The accuracy of the Helicobacter pylori stool antigen test in diagnosing h-pylori in treated patients. *European Journal of Gastroenterology & Hepatology* 2002;**14**(1):89.

Tseng 2005

Tseng CA, Wang WM, Wu DC. Comparison of the clinical feasibility of three rapid urease tests in the diagnosis of Helicobacter pylori infection. *Digestive Diseases and Sciences* 2005;**50**(3):449–52.

Tu 1999

Tu TC, Lee CL, Wu CH, Chen TK, Chan CC, Huang SH, et al. Comparison of invasive and noninvasive tests for detecting Helicobacter pylori infection in bleeding peptic ulcers. *Gastrointestinal Endoscopy* 1999;**49**(3 I):302–6.

Tucci 1996

Tucci A, Poli L, Donati M, Mazzoni C, Cevenini R, Sambri V, et al. Value of serology (ELISA) for the diagnosis of Helicobacter pylori infection: evaluation in patients attending endoscopy and in those with fundic atrophic gastritis. *Italian Journal of Gastroenterology* 1996;**28**(7): 371–6.

Tummala 2007

Tummala S, Sheth SG, Goldsmith JD, Goldar-Najafi A, Murphy CK, Osburne MS, et al. Quantifying gastric

Helicobacter pylori infection: A comparison of quantitative culture, urease breath testing, and histology. *Digestive Diseases & Sciences* 2007;**52**(2):396–401.

Uchida 2011
Uchida T, Vilaichone R, Ratanachu-Ek T, Mahachai V, Tshering L, Fujioka T, et al. Evaluation of diagnostic tests for h. Pylori infection in the Bhutanese population. *Helicobacter* 2011;**16**:114.

Ueda 2014
Ueda J, Okuda M, Nishiyama T, Lin YS, Fukuda Y, Kikuchi S. Diagnostic accuracy of the e-plate serum antibody test kit in detecting Helicobacter pylori infection among Japanese children. *Journal of Epidemiology* 2014;**24**(1):47–51.

Uematsu 2002
Uematsu T, Matsuno H, Tanba M, Kozawa O, Ikei N, Kawasaki J, et al. Clinical pharmacology study of c-13 ubt tablet for the in vivo diagnosis of Helicobacter pylori infection. *Japanese Journal of Clinical Pharmacology and Therapeutics* 2002;**33**(3):81–4.

Urita 2000
Urita Y, Miki K. Endoscopic ^{13}C-urea breath test. *Digestive Endoscopy* 2000;**12**(1):29–32.

Urita 2002
Urita Y, Torii N, Hike K, Kikuchi Y, Kanda E, Sasajima M, et al. Proteinuria reduces the diagnostic accuracy of urine-based enzyme-linked immunosorbent assay for detection of antibody to Helicobacter pylori. *American Journal of Gastroenterology* 2002;**97**(9):S49.

Urita 2004a
Urita Y, Hike K, Torii N, Kikuchi Y, Kurakata H, Kanda E, et al. Comparison of serum iga and igg antibodies for detecting Helicobacter pylori infection. *Internal Medicine* 2004;**43**(7):548–52.

Urita 2004b
Urita Y, Kikuchi Y, Hike K, Torii N, Kanda E, Kurakata H, et al. Endoscopic 13C-urea breath test for detection of Helicobacter pylori infection after partial gastrectomy. *Gastrointestinal Endoscopy* 2004;**59**(5):AB153.

Urita 2004c
Urita Y, Hike K, Torii N, Kikuchi Y, Kanda E, Kurakata H, et al. Breath sample collection through the nostril reduces false-positive results of c-13-urea breath test for the diagnosis of Helicobacter pylori infection. *Digestive and Liver Disease* 2004;**36**(10):661–5.

Urita 2006
Urita Y, Hike K, Torii N, Kikuchi Y, Kanda E, Kurakata H, et al. Influence of urease activity in the intestinal tract on the results of c-13-urea breath test. *Journal of Gastroenterology and Hepatology* 2006;**21**(4):744–7.

Urita 2007a
Urita Y, Maeda T, Ishihara S, Sugimoto M, Watanabe T, Domon K, et al. Endoscopic c-13-urea breath test for detection of Helicobacter pylori infection after partial gastrectomy. *Hepato-Gastroenterology* 2007;**54**(78):1891–4.

Urita 2007b
Urita Y, Hike K, Torii N, Kikuchi Y, Watanabe T, Kurakata H, et al. Ten-second endoscopic breath test using a 20-mg dose of c-13-urea to detect Helicobacter pylori infection. *Hepato-Gastroenterology* 2007;**54**(75):951–4.

Us 2002
Us D, Engin D, Hascelik G. Evaluation of western blot methods for serologic diagnosis of Helicobacter pylori infections. *Mikrobiyoloji Bulteni* 2002;**36**(2):153–60.

Uyub 1994
Uyub AM, Anuar AK, Aiyar S. Reliability of two commercial serological kits for serodiagnosing Helicobacter pylori infection. *Southeast Asian Journal of Tropical Medicine & Public Health* 1994;**25**(2):316–20.

Vafaeimanesh 2014
Vafaeimanesh J, Bagherzadeh M. Noninvasive stool antigen assay for screening of Helicobacter pylori infection and assessing success of eradication therapy in patients on hemodialysis. *Journal of Gastroenterology and Hepatology (Australia)* 2014;**29**:236.

Vaira 1989
Vaira D, Holton J. Serum immunoglobulin g antibody levels for campylobacter pylori diagnosis. *Gastroenterology* 1989;**97**(4):1069–70.

Vaira 1996
Vaira D, Stanghellini V, Miglioli M, Corinaldesi R. IgG ELISA antibodies and detection of Helicobacter pylori in elderly patients. Italian Helicobacter pylori Study Group. *Lancet* 1996;**347**(8996):269–70.

Vaira 1999a
Vaira D, Malfertheiner P, Megraud F, Axon AT. Diagnosis of Helicobacter pylori infection by HPSA test. European Helicobacter pylori HPSA study group. *Lancet* 1999;**354**(9191):1732.

Vaira 1999b
Vaira D, Malfertheiner P, Megraud F, Axon AT, Deltenre M, Hirschl AM, et al. Diagnosis of Helicobacter pylori infection with a new non-invasive antigen-based assay. Hpsa European Study Group. *Lancet* 1999;**354**(9172):30–3.

Vaira 1999c
Vaira D, Malferteiner P, Megraud F, Moayyedi P, Axon ATR, Deltenre M, et al. Accuracy of a new antigen based stool test for Helicobacter pylori (hp) in 117 endoscoped patients before and after treatment. European Multicentre Study. *Gut* 1999;**44**(Suppl 3):A96.

Vaira 2000a
Vaira D, Menegatti M, Ricci C, Gatta L, Berardi S, Miglioli M. Accurate diagnosis of Helicobacter pylori stool tests. *Gastroenterology Clinics of North America* 2000;**29**(4):917–23.

Vaira 2000b
Vaira D, Ricci C, Menegatti M, Gatta L, Geminiani A, Miglioli M. Clinical role of fecal antigen determination in the diagnosis of Helicobacter pylori infection. *Clinical Laboratory* 2000;**46**(9-10):487–91.

Vaira 2000c

Vaira D, Malfertheiner P, Megraud F, Axon AT, Deltenre M, Gasbarrini G, et al. Noninvasive antigen-based assay for assessing Helicobacter pylori eradication: A European multicenter study. The European Helicobacter pylori HPSA Study Group. *American Journal of Gastroenterology* 2000;**95**(4):925–9.

Vaira 2002

Vaira D, Vakil N, Menegatti M, Van't Hoff B, Ricci C, Gatta L, et al. The stool antigen test for detection of Helicobacter pylori after eradication therapy [summary for patients in Annals of Internal Medicine. feb 19 2002;136(4):I36; pmid: 11848739]. *Annals of Internal Medicine* 2002;**136**(4):280–7.

Vaira 2009

Vaira D, Gatta L, Ricci C, Di Mario F, Lanzini A. Accuracy of urea breath tests tablets after 10 minutes compared with standard 30 minutes to diagnose and monitoring Helicobacter pylori infection: A randomized controlled trial. *Journal of Clinical Gastroenterology* 2009;**43**(7):693–4.

Vaira 2010a

Vaira D, Vakil N, Gatta L, Ricci C, Perna F, Saracino I, et al. Accuracy of a new ultrafast rapid urease test to diagnose Helicobacter pylori infection in 1000 consecutive dyspeptic patients. *Alimentary Pharmacology & Therapeutics* 2010;**31**(2):331–8.

Vaira 2010b

Vaira D, Gatta L, Ricci C, Perna F, Saracino I, Fiorini G, et al. A comparison amongst three rapid urease tests to diagnose Helicobacter pylori infection in 375 consecutive dyspeptic. *Internal & Emergency Medicine* 2010;**5**(1):41–7.

Vakil 1999

Vakil N, Affi A, Sundaram M, Robinson J, Dunn B, Phadnis S. Prospective, blinded evaluation of the accuracy of a stool test for the detection of h-pylori. *Gastroenterology* 1999;**116**(4 (suppl)):A342.

Vakil 2000a

Vakil N, Affi A, Robinson J, Sundaram M, Phadnis S. Prospective blinded trial of a fecal antigen test for the detection of Helicobacter pylori infection. *American Journal of Gastroenterology* 2000;**95**(7):1699–701.

Vakil 2000b

Vakil N. Is the stool test out of breath?. *Digestive & Liver Disease* 2000;**32**(4):291–3.

Valdeperez 2003

Valdeperez J, Vicente R, Novella MP, Valle L, Sicilia B, Yus C, et al. Is the breath test reliable in primary care diagnosis of Helicobacter pylori infection?. *Atencion Primaria* 2003;**31**(2):93–7.

Valentine 1991

Valentine JL, Arthur RR, Mobley HLT, Dick JD. Detection of Helicobacter-pylori by using the polymerase chain-reaction. *Journal of Clinical Microbiology* 1991;**29**(4):689–95.

Valle 1997

Valle J, Vazquez MA, Zomeno M, FernandezSalazar L, JimenezAlonso I, Lara S, et al. Direct correlation between the c-13-urea breath test values and the density of Helicobacter pylori in antrum biopsies. *Gut* 1997;**41**:A87.

Valle 2013

Valle PC, Breckan RK, Mortensen L, Amin A, Kildahl-Andersen O, Paulssen EJ. Managing dyspepsia in the young adult patient: Effects of different tests for Helicobacter pylori in a "test-and-scope" approach. *Scandinavian Journal of Gastroenterology* 2013;**48**(8):913–20.

Van Bohemen 1988

Van Bohemen CG, Langenberg ML, Rauws EAJ, Weterings E, Zanen HC. Assay-igg to campylobacter pylori in histological chronic and biopsy campylobacter positive gastritis. *FEMS Microbiology Letters* 1988;**55**(3):321–6.

Van Bohemen 1989

Van Bohemen CG, Langenberg ML, Rauws EAJ, Oudbier J, Weterings E, Zanen HC. Rapidly decreased serum igg to campylobacter pylori following elimination of campylobacter in histological chronic biopsy campylobacter-positive gastritis. *Immunology Letters* 1989;**20**(1):59–61.

Van de Wouw 1995

Van de Wouw BA, De Boer WA, Jansz AR, Staals AP, Roymans RT. Serodiagnosis of Helicobacter pylori infection: an evaluation of a commercially available ELISA-IgG. *Netherlands Journal of Medicine* 1995;**47**(6):272–7.

Van de Wouw 1996

Van de Wouw BA, De Boer WA, Jansz AR, Roymans RT, Staals AP. Comparison of three commercially available enzyme-linked immunosorbent assays and biopsy-dependent diagnosis for detecting Helicobacter pylori infection. *Journal of Clinical Microbiology* 1996;**34**(1):94–7.

Van de Wouw 1997

Van de Wouw BA, De Boer WA, Hermsen HW, Valkenburg JG, Geuskens LM, Tytgat GN. Usefulness of the 14c urea breath test as a semi-quantitative monitoring instrument after therapy for Helicobacter pylori infection. *Scandinavian Journal of Gastroenterology* 1997;**32**(2):112–7.

Van Den 1991

Van Den Oever HLA, Loffeld RJLF, Stobberingh EE. Usefulness of a new serological test (bio-rad) to diagnose Helicobacter pylori-associated gastritis. *Journal of Clinical Microbiology* 1991;**29**(2):283–6.

Van Der Ende 1999

Van Der Ende A, Van Der Hulst RWM, Roorda P, Tytgat GNJ, Dankert J. Evaluation of three commercial serological tests with different methodologies to assess Helicobacter pylori infection. *Journal of Clinical Microbiology* 1999;**37**(12):4150–2.

Van der Est 1990

Van der Est MMC, Veenendaal RA, Pena AS, Van Duijn W, Kuiper I, Lamers CBHW. ELISA analysis of IgA subclass antibodies to Helicobacter pylori. Elevated serum IgA1 antibodies in Helicobacter pylori infected patients.

Journal of Clinical Nutrition and Gastroenterology 1990;**5**(1): 185–90.

Van Der Hulst 1999
Van Der Hulst RWM, Lamouliatte H, Megraud F, Pounder RE, Stolte M, Vaira D, et al. Laser assisted ratio analyser ^{13}C-urea breath testing, for the detection of H. pylori: A prospective diagnostic European multicentre study. *Alimentary Pharmacology & Therapeutics* 1999;**13**(9): 1171–7.

Van der Hulst 1999
Van der Hulst RW, Hensen EF, Van der Ende A, Kruizinga SP, Homan A, Tytgat GN. Laser-assisted 13C-urea breath test; a new noninvasive detection method for Helicobacter pylori infection. *Nederlands Tijdschrift voor Geneeskunde* 1999;**143**(8):400–4.

Van der Voort 1998
Van der Voort PHJ, Van der Hulst RWM, Zandstra DF, Geraedts AAM, Tytgat GNJ. Detection of h-pylori in mechanically ventilated intensive care patients using the lara-c-13-urea breath test. *Gastroenterology* 1998;**114**(4 (suppl)):A319.

Van der Voort 1999
Van der Voort PHJ, Van der Hulst RWM, Zandstra DF, Van der Ende A, Geraedts AAM, Tytgat GNJ. Detection of Helicobacter pylori in mechanically ventilated patients: The lara-^{13}C-urea breath test and serology. *Clinical Intensive Care* 1999;**10**(3):91–5.

Van der Wouden 1999
Van der Wouden ET, Thijs JC, Van Zwet AA, Oey HB, Kleibeuker JH. Reliability of biopsy-based diagnostic tests for Helicobacter pylori after treatment aimed at its eradication. *European Journal of Gastroenterology & Hepatology* 1999;**11**(11):1255–8.

Van Doorn 2000
Van Doorn LJ, Henskens Y, Nouhan N, Verschuuren A, Vreede R, Herbink P, et al. The efficacy of laboratory diagnosis of Helicobacter pylori infections in gastric biopsy specimens is related to bacterial density and vacA, cagA, and iceA genotypes. *Journal of Clinical Microbiology* 2000;**38** (1):13–7.

Van Doorn 2001
Van Doorn OJ, Bosman DK, Van THBW, Taminiau JA, Ten Kate FJ, Van der Ende A. Helicobacter pylori stool antigen test: A reliable non-invasive test for the diagnosis of Helicobacter pylori infection in children. *European Journal of Gastroenterology & Hepatology* 2001;**13**(9):1061–5.

Van Leerdam 2002
Van Leerdam ME, Van der Ende A, Ten Kate F, Rauws EAJ, Tytgat GNJ. Lack of accuracy of the non-invasive Helicobacter pylori stool antigen test in patients with gastroduodenal ulcer bleeding. *Gastroenterology* 2002;**122**(4 (suppl)):A46.

Van Leerdam 2003
Van Leerdam ME, Van der Ende A, Ten Kate FJW, Rauws EAJ, Tytgat GNJ. Lack of accuracy of the noninvasive Helicobacter pylori stool antigen test in patients with gastroduodenal ulcer bleeding. *American Journal of Gastroenterology* 2003;**98**(4):798–801.

Van Zanten 1998
Van Zanten SV, Bleau BL, Best L, Hutchison D, Blevins J, Thee D. Use of the Helicobacter pylori stool antigen test (HPSAt) for detection of h-pylori (hp) infection. *Gut* 1998; **43**(Suppl 2):A49.

Van Zanten 1999
Van Zanten S, Bleau BL, Best LM, Hutchison DM, Blevins J, Thee D. Helicobacter pylori stool antigen test (HPSA): Use for detection of infection and eradication. *Gastroenterology* 1999;**116**(4 (suppl)):A837.

Van Zwet 1992
Van Zwet AA, Meyer BC, Berrelkamp RJ, Thijs JC. Serological tests to monitor treatment of Helicobacter pylori. *Lancet* 1992;**340**(8810):51.

Van Zwet 1994
Van Zwet AA, Thijs JC, Kooistra-Smid AMD, Schirm J, Snijder JAM. Use of PCR with feces for detection of Helicobacter pylori infections in patients. *Journal of Clinical Microbiology* 1994;**32**(5):1346–8.

Van't Hoff 2000
Van't Hoff BW, Vaira D, Vakil NB, Gasbarrini G, Quina M, Garcia JMP, et al. Early diagnosis of failed Helicobacter pylori (hp) eradication using a stool antigen test. *Gastroenterology* 2000;**118**(4):A697.

Vannella 2009
Vannella L, Gianni D, Lahner E, Amato A, Grossi E, Delle Fave G, et al. Pre-endoscopic screening for Helicobacter pylori and celiac disease in young anemic women. *World Journal of Gastroenterology* 2009;**15**(22):2748–53.

Vargas 2013
Vargas J, Lopez-Sanchez M, Pabon M, Lamas E, Parra M, CastroFernandez M. Evaluation of a novel chemiluminiscent inmunoassay for the detection of Helicobacter pylori antigen and their correlation with immunochromatographic rapid test in stools samples from adults patients. *Helicobacter* 2013;**18**:121.

Vaz Coelho 2005
Vaz Coelho LG, De Castro Boechat L, Rocha Z, Almeida Aguiar RO, Andrade Aragao AL, Silva Dias EE, et al. ^{13}C-urea breath test for the detection of h. pylori infection in children: determination of the cut-off point by a graphic method not depending on the gold standard. *Gastroenterologia Endoscopia Digestiva* 2005;**24**(1):15–20.

Vecsei 2010
Vecsei A, Innerhofer A, Binder C, Gizci H, Hammer K, Bruckdorfer A, et al. Stool polymerase chain reaction for Helicobacter pylori detection and clarithromycin susceptibility testing in children. *Clinical Gastroenterology & Hepatology* 2010;**8**(3):309–12.

Veenendaal 1995
Veenendaal RA, Gotz JM, Schroijen V, Kurban F, Bernards AT, Veselic M, et al. Diagnosis of Helicobacter pylori infection by specific gastric mucosal iga and igg pylori

antibodies. *Journal of Clinical Pathology* 1995;**48**(11): 990–3.

Veijola 2005a
Veijola L, Myllyluoma E, Korpela R, Rautelin H. Stool antigen tests in the diagnosis of Helicobacter pylori infection before and after eradication therapy. *World Journal of Gastroenterology* 2005;**11**(46):7340–4.

Veijola 2005b
Veijola L, Oksanen A, Lofgren T, Sipponen P, Karvonen AL, Rautelin H. Comparison of three stool antigen tests in confirming Helicobacter pylori eradication in adults. *Scandinavian Journal of Gastroenterology* 2005;**40**(4): 395–401.

Veijola 2008
Veijola L, Oksanen A, Sipponen P, Rautelin H. Evaluation of a commercial immunoblot, helicoblot 2.1, for diagnosis of Helicobacter pylori infection. *Clinical & Vaccine Immunology: CVI* 2008;**15**(11):1705–10.

Velayos 2012
Velayos B, Fernandez-Salazar L, Pons-Renedo F, Muñoz MF, Almaraz A, Aller R, et al. Accuracy of urea breath test performed immediately after emergency endoscopy in peptic ulcer bleeding. *Digestive Diseases & Sciences* 2012;**57** (7):1880–6.

Veldhuyzen 1990
Veldhuyzen van Zanten SJO, Tytgat KMAJ, Hollingsworth J, Jalali S, Rashid FA, Bowen BM, et al. ^{14}C-urea breath test for the detection of Helicobacter pylori. *American Journal of Gastroenterology* 1990;**85**(4):399–403.

Veldhuyzen 1991
Veldhuyzen van Zanten SJO, Tytgat DeGara KMAJCJ, Goldie J, Rashid FA, Bowen BM, Cook RJ, et al. A prospective comparison of symptoms and five diagnostic tests in patients with Helicobacter pylori positive and negative dyspepsia. *European Journal of Gastroenterology & Hepatology* 1991;**3**(6):463–8.

Vesna 2005
Vesna Vukadinovic M, Prohaska Potocnik C. Specific igg decline after successful treatment of Helicobacter pylori infection according to treatment protocol with azithromycin. *Infektoloski Glasnik* 2005;**25**(4):137–42.

Vincent 1999
Vincent P, Michaud L, Martin de Lasalle E, Benon B, Turck D, Gottrand F. 13C-urea breath test and gastric mucosal colonization by Helicobacter pylori in children: Quantitative relation and usefulness for diagnosis of infection. *Helicobacter* 1999;**4**(4):233–7.

Vinette 2004
Vinette KMB, Gibney KM, Proujansky R, Fawcett PT. Comparison of PCR and clinical laboratory tests for diagnosing h-pylori infection in pediatric patients. *BMC Microbiology* 2004;**4**:5.

Vivas 1993
Vivas J, Contreras M, Mathew C, Peraza S, Maury de Tami I, Oliver W, et al. The use of urea carbon 14 in breath tests as diagnostic method for Helicobacter pylori infections. *GEN* 1993;**47**(3):150–6.

Von Wulffen 1988a
Von Wulffen H, Grote HJ, Laufs R. Serodiagnosis of campylobacter pylori-related antrum gastritis by ELISA and immunoblot methods. *Zentralblatt fur Bakteriologie, Mikrobiologie, und Hygiene. Series A, Medical Microbiology, Infectious Diseases, Virology, Parasitology* 1988;**268**(4):499.

Von Wulffen 1988b
Von Wulffen H, Grote HJ. Enzyme-linked immunosorbent assay for detection of immunoglobulin a and g antibodies to campylobacter pylori. *European Journal of Clinical Microbiology & Infectious Diseases* 1988;**7**(4):559–65.

Von Wulffen 1989
Von Wulffen H, Grote HJ. Serodiagnosis of campylobacter pylori infection using an enzyme-linked immunosorbent assay. Gastroduodenal pathology and Campylobacter pylori: European Campylobacter Pylori Study Group ICS847. 1989:231–6.

Von Wulffen 1993
Von Wulffen H, Gatermann S, Windler E, Gabbe E, Heinrich HC. Performance of Helicobacter pylori acid extract and urease enzyme-linked immunosorbent assays in relation to 14c-urea breath test. *Zentralblatt fur Bakteriologie* 1993;**280**(1-2):203–13.

Vorobjova 1991
Vorobjova T, Maaroos HI, Uibo R, Wadstrom T, Wood WG, Sipponen P. Helicobacter pylori: Histological and serological study on gastric and duodenal ulcer patients in Estonia. *Scandinavian Journal of Gastroenterology - Supplement* 1991;**186**:84–9.

Vyas 1994
Vyas SK, Sharpstone D, Treasure J, Fine D, Hawtin PR. Pre-endoscopy screening using serodiagnosis of Helicobacter pylori infection. *European Journal of Gastroenterology & Hepatology* 1994;**6**(9):783–5.

Wadstrom 1994
Wadstrom T, Bolin I, Fandriks L, Gad A, Carling L. Diagnosis of Helicobacter pylori infection. *Lakartidningen* 1994;**91**(19):1926–7.

Wallace 2006
Wallace RA, Schluter P, Webb P. Stool antigen testing for the diagnosis and confirmation of eradication of Helicobacter pylori infection. *Internal Medicine Journal* 2006;**36**(2): 139–41.

Wang 1998
Wang WM, Lee SC, Ding HJ, Jan CM, Chen LT, Wu DC, et al. Quantification of Helicobacter pylori infection: Simple and rapid c-13-urea breath test in Taiwan. *Journal of Gastroenterology* 1998;**33**(3):330–5.

Wang 2000
Wang WM, Lee SC, Wu DC, Chen LT, Liu CS, Peng CF, et al. Simplified 13C-urea breath test for the diagnosis of Helicobacter pylori infection--the availability of without fasting and without test meal. *Kaohsiung Journal of Medical Sciences* 2000;**16**(12):607–13.

Wang 2001
Wang YL, Sheu BS, Huang JJ, Yang HB. Noninvasive stool antigen assay can effectively screen Helicobacter pylori infection and assess success of eradication therapy in hemodialysis patients. *American Journal of Kidney Diseases* 2001;**38**(1):98–103.

Wang 2002
Wang L, Zhou L, Tian R. Helicobacter pylori antigen and its igg, iga-type specific immunocomplexes in sera from patients with Helicobacter pylori infection. *Chinese Medical Journal* 2002;**115**(3):381–3.

Wang 2003
Wang SW, Yu FJ, Lo YC, Yang YC, Wu MT, Wu IC, et al. The clinical utility of string-PCR test in diagnosing Helicobacter pylori infection. *Hepato-Gastroenterology* 2003;**50**(53):1208–13.

Wang 2015a
Wang H, Zou WJ. Comparison of different methods for detecting Helicobacter pylori.. *World Chinese Journal of Digestology* 2015;**23**(3):525–9.

Wang 2015b
Wang Z, Xie L, Liu C, Zhao H. Reliability of stool antigen test for clinical diagnosis of Helicobacter pylori infection.. *Chinese Journal of Gastroenterology* 2015;**20**(2):78–80.

Watanabe 2001
Watanabe K, Joh T, Seno K, Sasaki M, Todoroki I, Miyashita M, et al. Development and clinical application of an immunoassay using intact Helicobacter pylori attached to a solid phase as an antigen. *Clinical Biochemistry* 2001; **34**(4):291–5.

Watanabe 2013
Watanabe K, Nagata N, Shimbo T, Nakashima R, Furuhata E, Sakurai T, et al. Accuracy of endoscopic diagnosis of Helicobacter pylori infection according to level of endoscopic experience and the effect of training. *BMC Gastroenterology* 2013;**13**:128.

Weijnen 2001a
Weijnen CF, De Wit NJ, Numans ME, Kuipers EJ, Hoes AW, Verheij TJM. Helicobacter pylori testing in the primary care setting: Which diagnostic test should be used? . *Alimentary Pharmacology and Therapeutics* 2001;**15**(8): 1205–10.

Weijnen 2001b
Weijnen CF, Hendriks HA, Hoes AW, Verweij WM, Verheij TJM, De Wit NJ. New immunoassay for the detection of Helicobacter pylori infection compared with urease test, c-13 breath test and histology: Validation in the primary care setting. *Journal of Microbiological Methods* 2001;**46**(3): 235–40.

Weingart 2003
Weingart V, Ruessmann H, Koletzko S, Weingart J, Hoechter W, Sackmann M. A novel monoclonal stool antigen test for the detection of h. Pylori before and after eradication therapy: A prospective study in outpatients. *Gastroenterology* 2003;**124**(4 (suppl)):A177.

Weingart 2004
Weingart V, Russmann H, Koletzko S, Weingart J, Hochter W, Sackmann M. Sensitivity of a novel stool antigen test for detection of Helicobacter pylori in adult outpatients before and after eradication therapy. *Journal of Clinical Microbiology* 2004;**42**(3):1319–21.

Werdmuller 1998
Werdmuller BFM, Van der Putten A, Veenendaal RA, Lamers C, Loffeld R. Can screening for igg antibodies against Helicobacter pylori be used in clinical practice? Omit endoscopy in seropositive or seronegative patients?. *Digestive Diseases and Sciences* 1998;**43**(10):2296–300.

Westblom 1992
Westblom TU, Madan E, Gudipati S, Midkiff BR, Czinn SJ. Diagnosis of Helicobacter pylori infection in adult and pediatric patients by using Pyloriset, a rapid latex agglutination test. *Journal of Clinical Microbiology* 1992;**30** (1):96–8.

Westblom 1999
Westblom TU, Bhatt BD. Diagnosis of Helicobacter pylori infection. *Current Topics in Microbiology & Immunology* 1999;**241**:215–35.

Whiting 2006
Whiting PF, Weswood ME, Rutjes AW, Reitsma JB, Bossuyt PN, Kleijnen J. Evaluation of QUADAS, a tool for the quality assessment of diagnostic accuracy studies. *BMC Medical Research Methodology* 2006;**6**:9.

Whiting 2011
Whiting PF, Rutjes AW, Westwood ME, Mallett S, Deeks JJ, Reitsma JB, et al. QUADAS-2: a revised tool for the quality assessment of diagnostic accuracy studies. *Annals of Internal Medicine* 2011;**155**(8):529–36.

Wilcox 1996
Wilcox MH, Dent THS, Hunter JO, Gray JJ, Brown DFJ, Wight DGD, et al. Accuracy of serology for the diagnosis of Helicobacter pylori infection - a comparison of eight kits. *Journal of Clinical Pathology* 1996;**49**(5):373–6.

Wildgrube 1995
Wildgrube HJ. C-12 urea breath test in Helicobacter-pylori infection of the gastric-mucosa. *Deutsche Medizinische Wochenschrift* 1995;**120**(25-26):940–1.

Wildner-Christensen 2002
Wildner-Christensen M, Lassen AT, Lindebjerg J, Schaffalitzky De Muckadell OB. Diagnosis of Helicobacter pylori in bleeding peptic ulcer patients, evaluation of urea-based tests. *Digestion* 2002;**66**(1):9–13.

Wilson 2008
Wilson RB, Lam VWT, Trinh LK. Clo test in Helicobacter gastritis. *ANZ Journal of Surgery* 2008;**78**(8):722.

Winiarski 2003a
Winiarski M, Bielanski W, Plonka M, Dobrzanska M, Kaminska A, Bobrzynski A, et al. The usefulness of capsulated 13C-urea breath test in diagnosis of Helicobacter pylori infection in patients with upper gastrointestinal bleeding.[erratum appears in Journal of

Clinical Gastroenterology 2003;37(2):198]. *Journal of Clinical Gastroenterology* 2003;**37**(1):34–8.

Winiarski 2003b
Winiarski M, Bielanski W, Plonka M, Dobrzanska M, Kaminska A, Bobrzynski A, et al. Erratum: The usefulness of capsulated ^{13}C-urea breath test in diagnosis of Helicobacter pylori infection in patients with upper gastrointestinal bleeding (Journal of Clinical Gastroenterology (2003) 37 (34-38)). *Journal of Clinical Gastroenterology* 2003;**37**(2):198.

Wirtheim 2001
Wirtheim E, Yahav J, Maoz E, Dickman R, Braun M, Fraser GM, et al. Evaluation of novel enzyme immunoassay for detection of Helicobacter pylori antigen in stool. *European Journal of Clinical Microbiology and Infectious Diseases* 2001; **20**(4):293–4.

Wisniewska 2002a
Wisniewska M, Bak-Romaniszyn L, Planeta-Malecka I, Rechcinski T, Plonka M, Bielanski W, et al. The detection of Helicobacter pylori antigens in stool with premier platinum HPSA test. *Pediatria Wspolczesna* 2002;**4**(3): 373–6.

Wisniewska 2002b
Wisniewska M, Nilsson HO, Bak-Romaniszyn L, Rechcinski T, Bielanski W, Planeta-Malecka I, et al. Detection of specific Helicobacter pylori DNA and antigens in stool samples in dyspeptic patients and healthy subjects. *Microbiology & Immunology* 2002;**46**(10):657–65.

Wisniewska 2006
Wisniewska M, Grebowska A, Rechcinski T, Bak-Romaniszyn L, Czkwianianc E, Planeta-Malecka I, et al. Usefulness of selected noninvasive tests in detection of Helicobacter pylori infections. *Gastroenterologia Polska* 2006;**13**(4):265–8.

Witt 1990
Witt CS, Anderson J, McShane LA, Montgomery JM, Stiel D, Clancy RL, et al. False positive with campylobacter-pylori antibody ELISA. Advances in mucosal immunology. Fifth international congress of mucosal immunology; July 1989; London. Dordrecht: Kluwer Academic, 1990:793–4. [250]

Wong 1999
Wong CY, Wong KW, Lam SK, Lai KC, Hu WHC, Lau GKK, et al. A simplified c13-urea breath test for detection of Helicobacter pylori (hp) infection. *Gastroenterology* 1999; **116**(4 (suppl)):A356–A7.

Wong 2000a
Wong WM, Wong BC, Wong KW, Fung FM, Lai KC, Hu WH, et al. (13)c-urea breath test without a test meal is highly accurate for the detection of Helicobacter pylori infection in Chinese. *Alimentary Pharmacology & Therapeutics* 2000;**14**(10):1353–8.

Wong 2000b
Wong BC, Wong W, Tang VS, Lai K, Yuen S, Hu WH, et al. An evaluation of whole blood testing for Helicobacter pylori infection in the Chinese population. *Alimentary Pharmacology & Therapeutics* 2000;**14**(3):331–5.

Wong 2000c
Wong WM, Wong BCY, Wong KW, Fung FMY, Lai KC, Hu WHC, et al. C-13-urea breath test without a test meal is highly accurate for the detection of Helicobacter pylori infection in Chinese. *Alimentary Pharmacology & Therapeutics* 2000;**14**(10):1353–8.

Wong 2001a
Wong BC, Wong WM, Wang WH, Tang VS, Young J, Lai KC, et al. An evaluation of invasive and non-invasive tests for the diagnosis of Helicobacter pylori infection in Chinese. *Alimentary Pharmacology & Therapeutics* 2001;**15** (4):505–11.

Wong 2001b
Wong WM, Wong BCY, Li TM, Wong KW, Cheung KL, Fung FMY, et al. Twenty-minute 50 mg c-13-urea breath test without test meal for the diagnosis of Helicobacter pylori infection in Chinese. *Alimentary Pharmacology & Therapeutics* 2001;**15**(9):1499–504.

Wong 2003a
Wong WM, Lam SK, Lai KC, Chu KM, Xia HHX, Wong KW, et al. A rapid-release 50-mg tablet-based c-13-urea breath test for the diagnosis of Helicobacter pylori infection. *Alimentary Pharmacology & Therapeutics* 2003;**17**(2):253–7.

Wong 2003b
Wong BCY, Xia HHX, Cheung HKL, Ng FH, Wong SY, Chow KC, et al. Evaluation of two stool antigen tests for the detection of Helicobacter pylori infection in the Chinese population. *Journal of Gastroenterology and Hepatology (Australia)* 2003;**18**(1):26–31.

Wong 2003c
Wong WM, Lam SK, Tong TSM, Cheung KL, Tang VSY, Xia HHX, et al. Evaluation of a rapid stool antigen test for the diagnosis of Helicobacter pylori infection in Chinese patients. *Chinese Journal of Digestive Diseases* 2003;**4**(3): 132–5.

Wu 1992
Wu JC, Liu GL, Zhang ZH, Mou YL, Chen Q, Wu JC, et al. (nh4+)-n-15 excretion test - a new method for detection of Helicobacter-pylori infection. *Journal of Clinical Microbiology* 1992;**30**(1):181–4.

Wu 2001a
Wu DC, Kuo CH, Lu CY, Su YC, Yu FJ, Lee YC, et al. Evaluation of an office-based urine test for detecting Helicobacter pylori: A prospective pilot study. *Hepato-Gastroenterology* 2001;**48**(39):614–7.

Wu 2001b
Wu S, Gao Q, Zhang D, Xiao S. 13C-urea breath test with infrared heterodyne ratiometry in the diagnosis of Helicobacter pylori infection. *Chinese Journal of Gastroenterology* 2001;**6**(4):206–8.

Wu 2003
Wu IC, Ke HL, Lo YC, Yang YC, Chuang CH, Yu FJ, et al. Evaluation of a newly developed office-based stool test

for detecting Helicobacter pylori: An extensive pilot study. *Hepato-Gastroenterology* 2003;**50**(54):1761–5.

Wu 2004
Wu IC, Wu DC, Lu CY, Kuo CH, Su YC, Yu FJ, et al. Comparison of serum and urine ELISA methods for the diagnosis of Helicobacter pylori - a prospective pilot study. *Hepato-Gastroenterology* 2004;**51**(60):1736–41.

Wu 2006a
Wu DC, Wu IC, Wang SW, Lu CY, Ke HL, Yuan SSF, et al. Comparison of stool enzyme immunoassay and immunochromatographic method for detecting Helicobacter pylori antigens before and after eradication. *Diagnostic Microbiology and Infectious Disease* 2006;**56**(4): 373–8.

Wu 2006b
Wu IC, Wang SW, Yang YC, Yu FJ, Kuo CH, Chuang CH, et al. Comparison of a new office-based stool immunoassay and c-13-ubt in the diagnosis of current Helicobacter pylori infection. *Journal of Laboratory and Clinical Medicine* 2006; **147**(3):145–9.

Wu 2013
Wu Q, Yang ZP, Xu P, Gao LC, Fan DM. Association between Helicobacter pylori infection and the risk of colorectal neoplasia: a systematic review and meta-analysis. *Colorectal Disease* 2013;**15**(7):e352–64.

Xia 2000a
Xia HH, Kalantar JS, Wyatt JM, Adams S, Cheung K, Eslick GD, et al. High sensitivity and specificity of a laboratory-based serological test, pylori dtect ELISA, for detection of Helicobacter pylori infection. *Diagnostic Microbiology & Infectious Disease* 2000;**36**(2):69–74.

Xia 2000b
Xia HHX, Kalantar JS, Mitchell HM, Talley NJ. Can Helicobacter pylori serology still be applied as a surrogate marker to identify peptic ulcer disease in dyspepsia?. *Alimentary Pharmacology and Therapeutics* 2000;**14**(5): 615–24.

Xia 2002
Xia HHX, Wong BCY, Wong WM, Tang VSY, Cheung HKL, Sham FNF, et al. Optimal serological tests for the detection of Helicobacter pylori infection in the Chinese population. *Alimentary Pharmacology and Therapeutics* 2002;**16**(3):521–6.

Xiao 1991
Xiao SD, Pan ZJ, Zhang ZH, Jiang SJ. Enzyme-linked immunosorbent assay for detection of immunoglobulin g antibody against Helicobacter pylori. *Chinese Medical Journal* 1991;**104**(11):904–8.

Xiao 2013
Xiao M, Wang Y, Gao Y. Association between Helicobacter pylori infection and pancreatic cancer development: a meta-analysis. *PloS One* 2013;**8**(9):e75559.

Xie 2008a
Xie F, Luo N, Blackhouse G, Goeree R, Lee HP. Cost-effectiveness analysis of Helicobacter pylori screening in prevention of gastric cancer in Chinese. *International Journal of Technology Assessment in Health Care* 2008;**24**(1): 87–95.

Xie 2008b
Xie F, Luo N, Lee HP. Cost effectiveness analysis of population-based serology screening and 13C-urea breath test of Helicobacter pylori to prevent gastric cancer: A Markov model. *World Journal of Gastroenterology* 2008;**14** (19):3021–7.

Xue 2001
Xue FB, Xu YY, Wan Y, Pan BR, Ren J, Fan DM. Association of H. pylori infection with gastric carcinoma: a meta analysis. *World Journal of Gastroenterology* 2001;**7**(6): 801–4.

Yachi 1991
Yachi A, Yabana T, Imai K, Sugiyama T, Takayama Y, Yoshida H, et al. Novel ELISA for serodiagnosis of Helicobacter-pylori (campylobacter-pylori) infection-associated gastritis. *Frontiers of Mucosal Immunology* 1991; **939**:697–700.

Yakoob 2008
Yakoob J, Jafri W, Abbas Z, Abid S, Islam M, Ahmed Z. The diagnostic yield of various tests for Helicobacter pylori infection in patients on acid-reducing drugs. *Digestive Diseases and Sciences* 2008;**53**(1):95–100.

Yakoob 2014
Yakoob J, Abbas Z. Agreement between serology and histology for detection of Helicobacter pylori infection. *Journal of the College of Physicians & Surgeons - Pakistan* 2014;**24**(10):779–80.

Yamakawa 1993
Yamakawa O, Takemori Y, Noda Y, Ohta G. Availability of determination of serum anti-Helicobacter pylori igg antibody in diagnosis of Helicobacter pylori infection. *Japanese Journal of Gastroenterology* 1993;**90**(9):2090–6.

Yamamoto 1995
Yamamoto Y, Kouda M, Abe K, Sakurabayashi S, Sezai S, Hirano M, et al. Detection of Helicobacter pylori by culture and the 13C-urea breath test using an automated breath 13C analyzer. *Japanese Journal of Gastroenterology* 1995;**92**(11):1839–45.

Yamamoto 1996
Yamamoto Y, Koda M, Abe K, Sakurabayashi M, Sezai H, Hirano M, et al. The detection of Helicobacter pylori by the 13C-urea breath test (13C-ubt) using automated breath 13C analyser. *Nippon Shokakibyo Gakkai Zasshi [Japanese Journal of Gastroenterology]* 1996;**93**(1):68.

Yamamoto 2000
Yamamoto S, Uemura N, Okamoto S, Yamaguchi S, Mashiba H, Tachikawa T. A new rapid test for detecting anti-Helicobacter pylori antibody excreted into urine. *Helicobacter* 2000;**5**(3):160–4.

Yamamoto 2003
Yamamoto T, Tamura M, Ishii T, Anjiki H, Hattori K, Saitoh M, et al. Urinary antibody titers to Helicobacter

pylori and an impact of clinical characteristics. *Journal of Clinical Gastroenterology* 2003;**36**(4):329–31.

Yamamoto 2005
Yamamoto T, Ishii T, Kawakami T, Sase Y, Horikawa C, Aoki N, et al. Reliability of urinary tests for antibody to Helicobacter pylori in patients with pulmonary tuberculosis. *World Journal of Gastroenterology* 2005;**11**(3):412–4.

Yamamoto 2008
Yamamoto T, Ishii T, Sanaka M, Kuyama Y. Diagnosis of Helicobacter pylori infection using rapirun h. Pylori antibody detection kit. *Expert Review of Molecular Diagnostics* 2008;**8**(5):565–9.

Yamaoka 1998
Yamaoka Y, Kodama T, Graham DY, Kashima K. Comparison of four serological tests to determine the caga or vaca status of Helicobacter pylori strains. *Journal of Clinical Microbiology* 1998;**36**(11):3433–4.

Yamasaki 2004
Yamasaki T, Kume K, Yamasaki M, Yoshikawa I, Otsuki M. Light meal decreased false-positive in the 13C-urea breath test for the diagnosis of Helicobacter pylori infection. *Gastroenterology* 2004;**126**(4 (suppl)):A187.

Yamashiro 1995
Yamashiro Y, Oguchi S, Otsuka Y, Nagata S, Shioya T, Shimizu T. Helicobacter pylori colonization in children with peptic ulcer disease iii. Diagnostic value of the 13C-urea breath test to detect gastric h. Pylori colonization. *Acta Paediatrica Japonica (Overseas Edition)* 1995;**37**(1):12–6.

Yan 2010
Yan J, Yamaguchi T, Odaka T, Suzuki T, Ohyama N, Hara T, et al. Stool antigen test is a reliable method to detect Helicobacter pylori in the gastric remnant after distal gastrectomy for gastric cancer. *Journal of Clinical Gastroenterology* 2010;**44**(1):73–4.

Yanez 2000
Yanez P, Madrazo-de la Graz A, Perez-Perez G, Cabrera L, Muñoz O, Torres J. Comparison of invasive and noninvasive methods for the diagnosis and evaluation of eradication of Helicobacter pylori infection in children. *Archives of Medical Research* 2000;**31**(4):415–21.

Yang 2005
Yang HR, Seo JK. Diagnostic accuracy of the c-13-urea breath test in children: Adjustment of the cut-off value according to age. *Journal of Gastroenterology and Hepatology* 2005;**20**(2):264–9.

Yang 2007
Yang YJ, Sheu BS, Lee SC, Wu JJ. More economic 25 mg c-13-urea breath test can be effective in detecting primary Helicobacter pylori infection in children. *Journal of Gastroenterology and Hepatology* 2007;**22**(3):335–9.

Yang 2008a
Yang HR, Seo JK. Helicobacter pylori stool antigen (HpSA) tests in children before and after eradication therapy: comparison of rapid immunochromatographic assay and HpSA ELISA. *Digestive Diseases & Sciences* 2008;**53**(8): 2053–8.

Yang 2008b
Yang HR, Ko JS, Seo JK. Does the diagnostic accuracy of the 13C-urea breath test vary with age even after the application of urea hydrolysis rate?. *Helicobacter* 2008;**13** (4):239–44.

Yang 2015
Yang BL, Yeh C, Kwong WG, Lee SD. A novel one-step Helicobacter pylori saliva antigen test. *Journal of the Chinese Medical Association* 2015;**78**(2):96–100.

Yasuda 2009
Yasuda A, Uchida T, Nguyen LT, Kawazato H, Tanigawa M, Murakami K, et al. A novel diagnostic monoclonal antibody specific for Helicobacter pylori caga of east Asian type. *APMIS; Acta Pathologica, Microbiologica, et Immunologica Scandinavica* 2009;**117**(12):893–9.

Ye 2005
Ye WM, Held M, Enroth H, Kraaz W, Engstrand L, Nyren O. Histology and culture results among subjects with antibodies to caga but no evidence of Helicobacter pylori infection with IgG ELISA. *Scandinavian Journal of Gastroenterology* 2005;**40**(3):312–8.

Ye 2014
Ye CL, Liao GP, He S, Pan YN, Kang YB, Zhang ZY. Levofloxacin and proton pump inhibitor-based triple therapy versus standard triple first-line therapy for Helicobacter pylori eradication. *Pharmacoepidemiology and Drug Safety* 2014;**23**(5):443–55.

Yee 2002
Yee YK, Yip KT, Que TL, Chang KK, Li KF, Lee CK, et al. Efficacy of enzyme immunoassay for the detection of Helicobacter pylori antigens in frozen stool specimens: Local validation. *Alimentary Pharmacology and Therapeutics* 2002;**16**(10):1739–42.

Yilmaz 2006
Yilmaz O, Sen N, Kupelioglu AA, Simsel I. Detection of *h pylori* infection by ELISA and western blot techniques and evaluation of anti caga seropositivity in adult Turkish dyspeptic patients. *World Journal of Gastroenterology* 2006; **12**(33):5375–8.

Yin 2015
Yin SM, Zhang F, Shi DM, Xiang P, Xiao L, Huang YQ, et al. Effect of posture on c-13-urea breath test in partial gastrectomy patients. *World Journal of Gastroenterology* 2015;**21**(45):12888–95.

Yokota 1990
Yokota K, Oguma K, Yoshida H, Takayama Y, Sugiyama T, Yabana T, et al. Comparison of three methods for detecting campylobacter pylori and measurement of human antibody titers against the whole organisms. *Kansenshogaku Zasshi [Journal of the Japanese Association for Infectious Diseases]* 1990;**64**(5):597–603.

Yong 2006
Yong CS, Kim YI, Park SM, Kwon R, Han HH, Park JG, et al. Trials of novel c-13-urea-containing capsule for more

economic and sensitive diagnosis of Helicobacter pylori infection in human subjects. *Archives of Pharmacal Research* 2006;**29**(10):879–83.

Yoo 2007
Yoo JY, Kim N, Park YS, Hwang JH, Kim JW, Jeong SH, et al. Detection rate of Helicobacter pylori against a background of atrophic gastritis and/or intestinal metaplasia. *Journal of Clinical Gastroenterology* 2007;**41**(8): 751–5.

Yoshida 1993
Yoshida J, Asaka M. 13C-urea breath test. *Nippon Rinsho [Japanese Journal of Clinical Medicine]* 1993;**51**(12): 3196–200.

Yoshida 2000
Yoshida H, Hirota K, Ogura K, Maeda S, Shiratori Y, Sasaki Y, et al. Determination of the optimal cut-off value for the c-13 -urea breath test based on a Helicobacter pylori-specific polymerase chain reaction assay. *Journal of Gastroenterology and Hepatology* 2000;**15**(2):155–60.

Young 1995
Young EL, Cutler AF. Use of the c-13 urea breath test to evaluate a new rapid urease test for Helicobacter-pylori. *Gastroenterology* 1995;**108**(4 (suppl)):A265.

Young 1996
Young EL, Sharma TK, Cutler AF. Prospective evaluation of a new urea-membrane test for the detection of Helicobacter pylori in gastric antral tissue. *Gastrointestinal Endoscopy* 1996;**44**(5):527–31.

Zagari 1998
Zagari RM, Pozzato P, Bazzoli F, Fossi S, Ricciardiello L, Nicolini G, et al. A comparative trial to optimize the protocol of the c-13 urea breath test for the diagnosis of Helicobacter pylori infection. *Gastroenterology* 1998;**114** (4):A344.

Zagari 2003
Zagari RM, Bazzoli F. Helicobacter pylori testing in patients with peptic ulcer bleeding. *Digestive & Liver Disease* 2003; **35**(4):215–6.

Zagari 2005
Zagari RM, Pozzato P, Martuzzi C, Fuccio L, Martinelli G, Roda E, et al. C-13-urea breath test to assess Helicobacter pylori bacterial load. *Helicobacter* 2005;**10**(6):615–9.

Zagari 2012
Zagari RM, Eusebi LH, Rabitti S, Bazzoli F. 13C-urea breath-id system for the real-time diagnosis of Helicobacter pylori infection. *Digestive and Liver Disease* 2012;**44**:S208.

Zalabska 2010
Zalabska E. The evidence of Helicobacter pylori in gastric biopsy and stool samples. *Klinicka Mikrobiologie a Infekcni Lekarstvi* 2010;**16**(6):203–5.

Zambon 2004
Zambon CF, Basso D, Navaglia F, Mazza S, Razetti M, Fogar P, et al. Non-invasive diagnosis of Helicobacter pylori infection: Simplified c-13-urea breath test, stool antigen testing, or DNA PCR in human feces in a clinical laboratory setting?. *Clinical Biochemistry* 2004;**37**(4):261–7.

Zanetti 2002
Zanetti M, Vendramin R, Pieramico O. Stool antigen test for non-invasive post-treatment assessment of Helicobacter pylori infection: A comparative study between immunoenzymatic and immunochromatographic tests. *Gut* 2002;**51**(Suppl):A111.

Zaremba 1995
Zaremba M, Rozkiewicz M, Pydzinska J, Stasiewicz J, Szalaj W, Musiatowicz B, et al. Diagnostic value of the latex test (Pyloriset) for detection of Helicobacter pylori antibodies in adult patients with upper digestive tract diseases. *Medycyna Doswiadczalna i Mikrobiologia* 1995;**47**(1-2):11–6.

Zawadzka-Gralec 2009
Zawadzka-Gralec A, Wroblewska M, Szaflarska PA, Mierzwa G, Parzecka M, Bala G, et al. The analysis of usefulness different diagnostic methods in children and adolescents with Helicobacter pylori infection. *Polski Merkuriusz Lekarski* 2009;**26**(151):24–8.

Zhang 1990
Zhang QB, Zhang SJ, Jia BQ. Enzyme-linked immunosorbent assay for the serodiagnosis of campylobacter pylori infection. *Zhonghua Nei Ke Za Zhi [Chinese Journal of Internal Medicine]* 1990;**29**(8):457-60, 509.

Zhang 2002
Zhang WD, Xu ZM. Immunophenotyping of Helicobacter pylori. *World Chinese Journal of Digestology* 2002;**10**(5): 509–12.

Zhang 2006
Zhang C, Guan Y, Yuan Z, Wu Y, Yamada N, Wen M, et al. Analysis of histological detection of Helicobacter pylori before and after eradication therapy: Compared with the results of 13C-urea breath test. *Chinese Journal of Gastroenterology* 2006;**11**(4):215–8.

Zhang 2007
Zhang L, Zhang JZ. Analysis of different diagnostic methods of Helicobacter pylori infection in China. *World Chinese Journal of Digestology* 2007;**15**(6):649–54.

Zhelezova 2006
Zhelezova GZ, Boyanova L. Stool antigen test for diagnosis of Helicobacter pylori infection. *Problems of Infectious and Parasitic Diseases* 2006;**34**(2):16–8.

Zheng 2004
Zheng Q, Chen X, Pan Y, Shi Y. Comparison of reliability of 13C-urea breath tests using two different reagents for clinical diagnosis of Helicobacter pylori infection. *Chinese Journal of Gastroenterology* 2004;**9**(4):210–2.

Zhou 1996
Zhou DY, Xu KQ, Yang HT, Hoffman S, Marshall B. Microdose c-14-urea breath test for the detection of h-pylori in Chinese patients. *Gastroenterology* 1996;**110**(4 (suppl)):A307.

Zhou 2000
Zhou H, Chan KL, Chu KM, Tam PKH. Intrafamilial spread of Helicobacter pylori: A prospective study using urea breath test. *Journal of Pediatric Surgery* 2000;**35**(11): 1672–5.

Zhou 2014
Zhou XY, Su J, Xu GX, Zhang GX. Accuracy of stool antigen test for the diagnosis of Helicobacter pylori infection in children: A meta-analysis. *Clinics and Research in Hepatology and Gastroenterology* 2014;**38**(5):629–38.

Zhou 2017
Zhou Q, Li L, Ai Y, Pan Z, Guo M, Han J. Diagnostic accuracy of the 14c-urea breath test in Helicobacter pylori infections: A meta-analysis. Wiener Klinische Wochenschrift 2017; Vol. 129, issue 1–2:38–45. [DOI: 10.1007/s00508-016-1117-3

Zhu 2002a
Zhu Y, Lin J, Li D, Du Q, Qian K, Wu Q, et al. Helicobacter pylori antigen and its igg, iga -type specific immunocomplexes in sera from patients with Helicobacter pylori infection. *Chinese Medical Journal* 2002;**115**(3): 381–3.

Zhu 2002b
Zhu YY, Wu JC, Zhang ZH. Emissive spectral analysis applied in n-15 excretion test of Helicobacter pylori. *Society of Photo-optical Instrumentation Engineers (SPIE): Optics in health care and biomedical optics: Diagnostics and treatment* 2002;**4916**:194–6.

Zhukhovitskii 2005
Zhukhovitskii VG, Gorbacheva AP, Golovkin BA, Gidaiatova LA. Serological diagnosis of Helicobacter infection: Comparison of the analytical capacities of three test systems for enzyme immunoassay. *Klinicheskaia Laboratornaia Diagnostika* 2005;**11**:12–4.

Zhuo 2008
Zhuo XL, Wang Y, Zhuo WL, Zhang XY. Possible association of Helicobacter pylori infection with laryngeal cancer risk: an evidence-based meta-analysis. *Archives of Medical Research* 2008;**39**(6):625–8.

Zipser 2000
Zipser RD, Parikh MV. Is repeat testing needed for Helicobacter pylori?. *Journal of the American Board of Family Practice* 2000;**13**(6):449–50.

Zubillaga 1997
Zubillaga M, Oliveri P, Calcagno ML, Goldman C, Caro R, Mitta A, et al. Min 14c ubt: A combination of gastric basal transit and 14c-urea breath test for the detection of Helicobacter pylori infection in human beings. *Nuclear Medicine & Biology* 1997;**24**(6):565–9.

Zubillaga 1999
Zubillaga M, Oliveri P, Panarello H, Buzurro M, Adami J, Goldman C, et al. Stable isotope techniques for the detection of Helicobacter pylori infection in clinical practice. 13C-urea breath test in different experimental conditions. *Acta Physiologica, Pharmacologica et Therapeutica Latinoamericana* 1999;**49**(2):101–7.

References to other published versions of this review

Gurusamy 2016
Gurusamy KS, Yaghoobi M, Davidson BR. Non-invasive diagnostic tests for Helicobacter pylori infection. *Cochrane Database of Systematic Reviews* 2016, Issue 2. [DOI: 10.1002/14651858.CD012080

* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Adamopoulos 2009a

Study characteristics			
Patient sampling	Type of study: prospective study Consecutive or random sample: consecutive patients		
Patient characteristics and setting	Sample size: 73 Female: 24 (33%) Age: 63 years Presentation: 1. People who had undergone endoscopy (for various indications) Setting: secondary care, Greece		
Index tests	Index test: urea breath test -^{13}C Further details: Technical specifications: manufacturer - Infai Institut für Biomedizinische; Analytik & NMR-Imaging GmbH, Bochum Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4.0% (30 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and histopathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		

Adamopoulos 2009a (*Continued*)

Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Unclear**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Low	

Adamopoulos 2009b

Study characteristics			
Patient sampling	Type of study: prospective study Consecutive or random sample: consecutive patients		
Patient characteristics and setting	Sample size: 31 Female: 8 (25.8%) Age: 71 years Presentation: 1. People who had undergone Billroth II gastrectomy and endoscopy (for various indications) Setting: secondary, Greece		
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: manufacturer - Infai Institut für Biomedizinische; Analytik & NMR-Imaging GmbH, Bochum Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4.0% (30 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and histopathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**High**

Adamopoulos 2009b (*Continued*)

DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Unclear**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Low	

Aguilar 2007

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 31 Female: 5 (16.1%)

Aguilar 2007 (*Continued*)

	Age: not stated Presentation: 1. Dyspepsia Setting: secondary care, Peru		
Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: Not stated Performed by: Not stated Criteria for positive diagnosis: disintegrations per minute > 200 (10 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: Not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		

If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Al-Fadda 2000

Study characteristics	
Patient sampling	Type of study: prospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 64 Female: not stated Age: not stated Presentation: 1. Patients with upper gastroinstestinal symptoms Setting: secondary care, Peru

Al-Fadda 2000 (*Continued*)

Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: Not stated Performed by: Not stated Criteria for positive diagnosis: CO^2 recovery > 0.55 (20 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: Not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**

Al-Fadda 2000 (*Continued*)

DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Allardyce 1997

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 63 Female: 26 (41.3%) Age: not stated Presentation: 1. Dyspepsia Setting: secondary care, New Zealand
Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: Not stated Performed by: Not stated Criteria for positive diagnosis: disintegrations per minute > 49 (time not stated)

Allardyce 1997 (*Continued*)

Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: Not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		

Allardyce 1997 (*Continued*)

Were the reference standard results interpreted without knowledge of the results of the index tests?	No		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Argentieri 2007

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 215 Female: not stated Age: not stated Presentation: 1. Children undergoing upper gastrointestinal endoscopy Exclusion: 1. Recent *H pylori* treatment Setting: secondary care, Italy
Index tests	Index test: stool antigen test Further details: Technical specifications: Premier Platinum HpSA Performed by: Not stated Criteria for positive diagnosis: Not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: Not stated Performed by: endoscopist and pathologist

	Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		

Argentieri 2007 (*Continued*)

		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Arikan 2004

Study characteristics	
Patient sampling	Type of study: prospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 100 Female: not stated Age: not stated Presentation: 1. Patients undergoing endoscopy Exclusion: 1. Malignancy 2. Taken antibiotics or proton pump inhibitors in last 2 weeks Setting: secondary care, Turkey
Index tests	Index test: stool antigen test Further details: Technical specifications: Premier Platinum HpSA Performed by: Not stated Criteria for positive diagnosis: Not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: Not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated

Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			

Arikan 2004 (*Continued*)

Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Atli 2012

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 100 Female: 57 (57%) Age: 71 years Presentation: 1. Patients with dyspepsia and symptoms or signs related to peptic ulcer > 65 years of age Exclusion: 1. Patients who had taken antibiotics or anti-ulcer treatment in the past 2 weeks 2. Advanced dementia 3. Cerbrovascular disease 4. Advanced respiratory problems 5. Alarm symptoms for malignancy Setting: secondary setting, Turkey
Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: counts per minute > 50 (10 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated

Atli 2012 (*Continued*)

Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			

Atli 2012 (*Continued*)

Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Behrens 1999

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 252 Female: not stated Age: not stated Presentation: 1. Children (3 years to 18 years) with abdominal pain, nausea, or vomiting Exclusion criteria: 1. Previous treatment with antibiotics or proton pump inhibitors 2. WBC < 3500/microlitre or platelets < 100,000/microlitre Setting: secondary setting, Germany
Index tests	Index test: urea breath test -^{13}C Further details: Technical specifications: Promochem, Wesel Performed by: not stated Criteria for positive diagnosis: delta over baseline > 5.0% (30 minutes and 60 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Behrens 1999 (*Continued*)

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		

Behrens 1999 (*Continued*)

Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Bosso 2000

Study characteristics			
Patient sampling	Type of study: retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 95 Female: not stated Age: not stated Presentation: 1. Patients with upper abdominal symptoms Exclusion: 1. Patients with previous gastric surgery Setting: secondary care, France		
Index tests	Index test: urea breath test -^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4.0% (30 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**

Bosso 2000 (*Continued*)

DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	No		
		High	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		

Bosso 2000 (*Continued*)

		Unclear	

Ceken 2011

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 100 Female: 67 (67%) Age: 48 years Presentation: 1. Patients with dyspepsia Exclusion: 1. Antibiotics or anti-ulcer treatment within last 4 weeks 2. Gastric surgery Setting: secondary care, France		
Index tests	Index test: stool antigen test Further details: Technical specifications: Helicobacter Antigen Quick Castte Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		

Ceken 2011 (*Continued*)

Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Chen 1991

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients		
Patient characteristics and setting	Sample size: 96 Female: not stated Age: not stated Presentation: 1. Adult patients with dyspepsia Setting: secondary care, China		
Index tests	Index test: serology Further details: Technical specifications: Pyloriset Performed by: not stated Criteria for positive diagnosis: presence of agglutination (within 3 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**

Chen 1991 (*Continued*)

DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Chey 1998

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process

Chey 1998 (*Continued*)

Patient characteristics and setting	Sample size: 287 Female: 140 (48.8%) Age: 53 years Presentation: 1. People undergoing endoscopy Exclusion: 1. Recent treatment for *H pylori* or anti-ulcer treatment Setting: Variable settings, USA
Index tests	Index test 1a: serology Further details: Technical specifications: HM-CAP (Enteric Products Inc.) Performed by: not stated Criteria for positive diagnosis: not stated Index test 1b: serology (serum) Further details: Technical specifications: Hp Chek (Chem Trak) Performed by: not stated Criteria for positive diagnosis: 2 red lines Index test 1c: serology (whole blood) Further details: same as for index test 2
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		

Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Czerwionka-Szaflarska 2007

Study characteristics			
Patient sampling	Type of study: retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 100 Female: 66 (66%) Age: 13 years Presentation: 1. Children with gastrointestinal disorders Setting: secondary care, Poland		
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4.0 % (time not stated)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**

Czerwionka-Szaflarska 2007 (*Continued*)

DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

D'Elios 2000

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 256 Female: not stated

	Age: not stated Presentation: 1. Patients with dyspepsia Exlusion: 1. Gastric surgery 2. Recent treatment for ulcer or *H pylori* 3. Pulmonary failure Setting: secondary care, Italy
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: AB Analitica Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4.0% (30 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{13}C			

Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Debongnie 1991

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients with previous gastric surgery excluded
Patient characteristics and setting	Sample size: 230 Female: not stated Age: not stated Presentation:

Debongnie 1991 (*Continued*)

	1. Patients referred for upper gastrointestinal surgery Excluded: 1. Gastric surgery 2. Haematologic disease 3. Immunodeficiency 4. Gastric cancer 5. Recent treatment for ulcer or *H pylori* 6. Atrophic gastritis Setting: secondary care, Belgium		
Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: specific activity > 0.3% (10 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Cresyl Violet stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 27 (11.7%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			

Debongnie 1991 (*Continued*)

Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	No		
		High	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Dede 2015

Study characteristics	
Patient sampling	Type of study: prospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 30 Female: 8 (26.7%) Age: 55 years Presentation:

Dede 2015 (*Continued*)

	1. Patients who had undergone partial gastrectomy Setting: secondary care, Turkey
Index tests	Index test 1: stool antigen test Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated Index test 2: urea breath test-^{14}C Further details: Technical specifications: Heliprobe System, Kibion AB Performed by: not stated Different criteria for positive diagnosis: • Counts per minute > 23 (10 minutes) • Counts per minute > 29 (30 minutes) • Counts per minute > 35 (20 minutes) • Counts per minute > 50 (10 minutes) • Counts per minute > 50 (20 minutes) • Counts per minute > 50 (30 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and modified Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		

		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	No		
		High	**Low**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	No		
Did all patients receive the same reference standard?	Yes		

Were all patients included in the analysis?	Unclear		
		High	

Delvin 1999

Study characteristics	
Patient sampling	Type of study: prospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 79 Female: not stated Age: not stated Presentation: 1. Children with gastrointestinal symptoms Exclusion: 1. Chilren with functional abdominal pain 2. Anti-ulcer or *H pylori* treatment in last 6 weeks Setting: secondary care, Canada
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: Dia 13-Helico; Dianatec iso Performed by: not stated Different criteria for positive diagnosis: • Delta over baseline > 2.0% (30 minutes) • Delta over baseline > 2.5% (30 minutes) • Delta over baseline > 3.0% (30 minutes) • Delta over baseline > 3.5% (30 minutes) • Delta over baseline > 4.0% (30 minutes) • Delta over baseline > 4.5% (30 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	

Delvin 1999 (*Continued*)

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Yes		
If a threshold was used, was it pre-specified?	No		
		High	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		

Delvin 1999 (*Continued*)

Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Dinler 1999

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 77 Female: 48 (62.3%) Age: 13 years Presentation: 1. Children with recurrent abdominal pain Setting: secondary care, Turkey		
Index tests	Index test: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		

		Unclear	

Duan 1999

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 149 Female: 35 (23.5%) Age: 44 years Presentation: 1. Patients with gastritis or gastric ulcer Exclusion: 1. Treatment with antibiotics or bismuth in the previous 2 months 2. Previous gastric surgery or gastric cancer Setting: secondary care, China		
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: Finniga, MAT-252, USA Performed by: not stated Criteria for positive diagnosis: delta over baseline > 5 per thousand (30 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		

Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Eggers 1990

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 100 Female: not stated Age: not stated Presentation: 1. Patients undergoing endoscopy Setting: secondary care, Germany		
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 8 (7.4%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**

Eggers 1990 (*Continued*)

DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Yes		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Yes		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Ekesbo 2006

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients with previous gastric surgery excluded

Patient characteristics and setting	Sample size: 126 Female: not stated Age: not stated Presentation: 1. Patients undergoing gastroscopy for dyspepsia or gastrointestinal bleeding Setting: primary care, Sweden
Index tests	Index test: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: staining of a 120 kilodalton protein gel band and/or at least 2 of 5 proteins between 28 - 33 kilodaltons
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with immunostaining Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 40 (24.1%)
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test Serology			

Ekesbo 2006 (*Continued*)

Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

El-Din 2013

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients without pathologic data excluded
Patient characteristics and setting	Sample size: 19 Female: 6 (31.6%) Age: 47 years Presentation:

El-Din 2013 (*Continued*)

	1. Patients with upper gastrointestinal disorders Setting: secondary care, Egypt		
Index tests	Index test 1: serology Further details: Technical specifications: Ridascreen Performed by: not stated Criteria for positive diagnosis: not stated Index test 2: stool antigen test Further details: Technical specifications: Immunodiagnostik AG Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 33 (63.5%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			

Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

El-Mekki 2011

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients		
Patient characteristics and setting	Sample size: 55 Female: 35 (63.6%) Age: 37 years Presentation: 1. Patients with dyspepsia Setting: secondary care, Saudi Arabia		
Index tests	Index test: serology Further details: Technical specifications: HeliSAL TM serum Performed by: not stated Criteria for positive diagnosis: > 1 units/ml		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**

El-Mekki 2011 (*Continued*)

DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

El-Nasr 2003

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 50 Female: 16 (32%)

	Age: 36 years Presentation: 1. Patients with dyspepsia Setting: secondary care, Egypt
Index tests	Index test: stool antigen test Further details: Technical specifications: Premier Platinum HpSA, Meridien Diagnostics Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		

If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Eltumi 1999

Study characteristics	
Patient sampling	Type of study: prospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 50 Female: 17 (34%) Age: 11 years Presentation: 1. Children referred for endoscopy Exclusion: 1. Recent treatment for *H pylori* Setting: Tertiary care, UK

Eltumi 1999 (*Continued*)

Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: delta over baseline > 5 units/ml (40 minutes) Index test 2: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		

If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Epple 1997

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 126 Female: 70 (55.6%) Age: 48 years Presentation: 1. Patients undergoing routine endoscopy Exclusion: 1. Gastric cancer 2. Previous gastric surgery Setting: secondary care, Germany
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: > Mean + 2 standard deviations above normal level (30 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		

Epple 1997 (*Continued*)

		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	No		
		High	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Low	

Fallone 1995

Study characteristics	
Patient sampling	Type of study: prospective study Consecutive or random sample: consecutive patients

Fallone 1995 (*Continued*)

Patient characteristics and setting	Sample size: 50 Female: not stated Age: not stated Presentation: 1. Patients undergoing endoscopy Exclusion 1. Conditions that would make gastric biopsy dangerous 2. Lactating 3. Pregnant or women of child-bearing potential who were not using adequate control Setting: secondary care, Canada
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: > 1.5% excretion (15 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Silver stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 4 (7.4%)
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			

Fallone 1995 (*Continued*)

Were the index test results interpreted without knowledge of the results of the reference standard?	Yes		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Fallone 1996

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 106 Female: 51 (48.1%) Age: 54 years Presentation:

Fallone 1996 (*Continued*)

	1. Patients undergoing endoscopy Exclusion: 1. Recent treatment for *H pylori* Setting: secondary care, Canada		
Index tests	Index test: serology Further details: Technical specifications: HeliSAL TM serum Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		

Fallone 1996 (*Continued*)

If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Low	

Fanti 1999

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 84 Female: 45 (53.6%) Age: 50 years Presentation: 1. Patients with dyspepsia 2. Not on current treatment for *H pylori* or ulcers Setting: secondary care, Italy

Fanti 1999 (*Continued*)

Index tests	Index test: stool antigen test Further details: Technical specifications: Premier Platinum HpSA (Meridian Diagnostics) Performed by: not stated Criteria for positive diagnosis: Absorbance 450/630 nm > 0.150
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**

Fanti 1999 (*Continued*)

DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Faruqui 2007

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 50 Female: 26 (52%) Age: 36 years Presentation: 1. Patients with dyspepsia despite anti-ulcer treatment Exclusion: 1. Myocardial infarction in the last 6 months 2. Cardiac failure 3. Bleeding diathesis Setting: secondary care, Pakistan
Index tests	Index test: stool antigen test Further details: Technical specifications: not stated

	Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			

Faruqui 2007 (*Continued*)

Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Ferrara 1998

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 100 Female: 56 (56%) Age: not stated Presentation: 1. Patients with dyspepsia 2. Not on current treatment for *H pylori* Setting: secondary care, Italy
Index tests	Index test: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated

Ferrara 1998 (*Continued*)

Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		

Ferrara 1998 (*Continued*)

Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Formichella 2013

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 500 Female: 263 (52.6%) Age: 50 years Presentation: 1. Patients undergoing routine endoscopy Exclusion: 1. Undergone *H pylori* eradication therapy 2. Active immunosuppressive therapy 3. Suffering from malignant diseases Setting: secondary care, Germany
Index tests	Index test 1a: serology Further details: Technical specifications: recomWell ELISA (Mikrogen) Performed by: not stated Criteria for positive diagnosis: not stated Index test 1b: serology Further details: Technical specifications: not stated Performed by: not stated

	Criteria for positive diagnosis: 2 or more antigens Index test 1c: serology Further details: Technical specifications: Immunoblot Helicobacter (Mikrogen) Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain, Warthin-Starry stain, and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**

Formichella 2013 (*Continued*)

DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Germana 2001

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 100 Female: 52 (52%) Age: 51 years Presentation: 1. Patients with dyspepsia 2. Not on current treatment for *H pylori* Setting: secondary care, Italy
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: Wagner Analysen - Tecturik Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4.0% (30 minutes)

Germana 2001 (*Continued*)

Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and immunohistochemical stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		

Germana 2001 (*Continued*)

Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Graham 1996a

Study characteristics	
Patient sampling	Type of study: retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 75 Female: not stated Age: not stated Presentation: 1. Patients undergoing screening for *H pylori* and who underwent endoscopy Setting: secondary care, USA
Index tests	Index test: serology Further details: Technical specifications: FlexSure HP Performed by: not stated Criteria for positive diagnosis: pink line
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy

Graham 1996a (*Continued*)

Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 476 (86.4%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**

Graham 1996a (*Continued*)

DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Gramley 1999

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 22 Female: not stated Age: not stated Presentation: 1. Patients undergoing endoscopy Setting: secondary care, USA
Index tests	Index test: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	

Gramley 1999 (*Continued*)

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		

Gramley 1999 (*Continued*)

Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Guo 2011

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 328 Female: 90 (27.4%) Age: 47 years Presentation: 1. Patients with gastrointestinal symptoms 2. No previous treatment or stopped treatment for *H pylori* Setting: secondary care, China		
Index tests	Index test: stool antigen test Further details: Technical specifications: Kyowa pharmaceutical Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with silver stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Gurbuz 2005

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients with previous gastric surgery excluded		
Patient characteristics and setting	Sample size: 65 Female: 45 (69.2%) Age: not stated Presentation: 1. Patients undergoing routine endoscopy Exclusion: 1. Undergone *H pylori* eradication therapy 2. Pregnancy or lactation 3. Prior gastric surgery Setting: secondary care, Turkey		
Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: Heliprobe system Performed by: not stated Criteria for positive diagnosis: Counts per minute > 50 (10 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 3 (4.4%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		

Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Hafeez 2007

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients with inadequate breath samples excluded		
Patient characteristics and setting	Sample size: 60 Female: not stated Age: not stated Presentation: 1. Children with gastrointestinal symptoms Setting: secondary care, Pakistan		
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4.0% (10 minutes, 20 minutes, and 30 minutes) Index test 2: stool antigen test Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 6 (10%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		

Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		

Hafeez 2007 (*Continued*)

Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Han 2012

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 99 Female: not stated Age: not stated Presentation: 1. Patients who had undergone urea breath tests and endoscopy Setting: secondary care, South Korea		
Index tests	Index test: urea breath test - unknown isotope Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test - unknown isotope			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Inelmen 2004

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients		
Patient characteristics and setting	Sample size: 122 Female: 81 (66.4%) Age: 80 years Presentation: 1. Patients undergoing upper gastrointestinal endoscopy Setting: secondary care, Italy		
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: BreathQuality-UBT 13C-Urea Kit, Zeta Farmaceutici SpA Performed by: not stated Criteria for positive diagnosis: delta over baseline > 5.0% (30 minutes) Index test 2: stool antigen test Further details: Technical specifications: Premier Platinum HpSA (Meridian Diagnostics) Performed by: not stated Criteria for positive diagnosis: definite yellow colour		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)		
Comparative			
Notes			

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		

Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		

Inelmen 2004 (*Continued*)

Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Iqbal 2013

Study characteristics			
Patient sampling	Type of study: retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 50 Female: 19 (38%) Age: 41 years Presentation: 1. Patients who underwent upper gastrointestinal endoscopy Setting: secondary care, Pakistan		
Index tests	Index test: serology Further details: Technical specifications: HpG screen ELISA kit Performed by: not stated Criteria for positive diagnosis: > 7 units/ml		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Islam 2005

Study characteristics			
Patient sampling	Type of study: prospective study Consecutive or random sample: neither - patients without stool samples excluded		
Patient characteristics and setting	Sample size: 112 Female: not stated Age: not stated Presentation: 1. Patients undergoing upper gastrointestinal endoscopy Setting: secondary care, New Zealand		
Index tests	Index test: stool antigen test Further details: Technical specifications: Premier Platinum HpSA (Meridian Diagnostics) Performed by: pathologists Criteria for positive diagnosis: Absorbance 450/630 nm > 0.120		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Immunoperoxidase stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 15 (11.8%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**

Islam 2005 (*Continued*)

DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Yes		
If a threshold was used, was it pre-specified?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Yes		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Ivanova 2010

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process

Patient characteristics and setting	Sample size: 33 Female: 16 (48.5%) Age: 42 years Presentation: 1. Patients undergoing upper gastrointestinal endoscopy Setting: secondary care, Bulgaria
Index tests	Index test: serology Further details: Technical specifications: Rapid HP, US Meds Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference stan-	Unclear		

Ivanova 2010 (*Continued*)

dard?			
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Jekarl 2013

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients with a recent antibiotic treatment were excluded
Patient characteristics and setting	Sample size: 209 Female: 85 (40.7%) Age: not stated Presentation: 1. Patients undergoing routine health check-up and upper gastrointestinal endoscopy Exclusion: 1. Recent ulcer or *H pylori* treatment 2. Previous gastric surgery

	3. Previous gastric cancer Setting: secondary care, Korea		
Index tests	Index test: stool antigen test Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: Absence of yellow		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 57 (21.4%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		

Jekarl 2013 (*Continued*)

		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Jensen 1998

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear
Patient characteristics and setting	Sample size: 35 Female: not stated Age: not stated Presentation: 1. Patients referred for endoscopy Exclusion: Recent *H pylori* treatment Setting: secondary care, USA
Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: not stated

	Performed by: not stated Criteria for positive diagnosis: disintegrations per minute > 200 (10 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 7 (16.7%)
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			

Jensen 1998 (*Continued*)

Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Yes		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Jordaan 2008

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients with previous gastrointestinal surgery excluded
Patient characteristics and setting	Sample size: 103 Female: not stated Age: not stated Presentation: 1. Patients with dyspepsia Exclusion criteria: 1. Recent *H pylori* therapy 2. Major gastrointestinal surgery Setting: secondary care, South Africa
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4.5% (time not stated)

Jordaan 2008 (*Continued*)

Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 8 (7.2%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		

Jordaan 2008 (*Continued*)

Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Kalach 1998a

Study characteristics	
Patient sampling	Type of study: prospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 100 Female: 35 (35%) Age: 11 years Presentation: 1. Children undergoing upper gastrointestinal endoscopy for recurrent epigastric pain or upper GI tract disorders Exclusion: 1. Recent *H pylori* treatment Setting: secondary care, France
Index tests	Index test: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: > 6 IU /ml
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: not stated

Kalach 1998a (*Continued*)

	Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Yes		

Kalach 1998a (*Continued*)

		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Kamel 2011

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 55 Female: not stated Age: 67 years Presentation: 1. Older adults with dyspepsia and no gastrointestinal bleeding Setting: secondary care, Egypt
Index tests	Index test: stool antigen test Further details: Technical specifications: CerTest *H pylori* Card Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	

Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		

Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Kim 2016

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 107 Female: 56 (52.3%) Age: 41 years Presentation: 1. Patients undergoing upper gastrointestinal endoscopy Exclusion: 1. Recent *H pylori* treatment Setting: secondary care, South Korea		
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: UbiT-IR300 apparatus Performed by: not stated Criteria for positive diagnosis: delta over baseline > 2.5% (20 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**

Kim 2016 (*Continued*)

DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		

Kim 2016 (*Continued*)

		Unclear	

Korstanje 2006

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 20 Female: 9 (45%) Age: 68 years Presentation: 1. Patients with atrophic gastritis Setting: primary care, Netherlands		
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: INFAI, Bochum, Germany Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4.0% (30 minutes) Index test 2: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: Absorbance (wavelength not stated) > 0.320		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**High**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			

Korstanje 2006 (*Continued*)

Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Kuloglu 2008

Study characteristics	
Patient sampling	Type of study: prospective study Consecutive or random sample: neither - patients without a either a stool sample or a breath sample excluded
Patient characteristics and setting	Sample size: 109 Female: 58 (53.2%) Age: 12 years Presentation: 1. Children with symptoms suggestive of *H pylori* infection Exclusion criteria: 1. Recent *H pylori* treatment Setting: secondary care, Turkey
Index tests	Index test 1: urea breath test-^{14}C Further details: Technical specifications: Heliprobe BreathCard Performed by: not stated Criteria for positive diagnosis: Counts per minute > 50 (10 minutes) Index test 2: stool antigen test Further details: Technical specifications: Rapid HpSA test (Li NEAR Chemical) Performed by: not stated Criteria for positive diagnosis: pinkish red band (within 10 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy

Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 16 (12.8%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Yes		
If a threshold was used, was it pre-specified?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			

Kuloglu 2008 (*Continued*)

Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Yes		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Ladas 2002a

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 130 Female: 48 (36.9%) Age: 50 years Presentation: 1. Patients with dyspepsia Exclusion: 1. Recent *H pylori* therapy 2. Malignancy 3. Pregnancy 4. Gastric surgery Setting: secondary care, Greece
Index tests	Index test 1a: serology Further details: Technical specifications: Pyloriset EIA-G Performed by: not stated

	Criteria for positive diagnosis: ≥ 300 Index test 1b: serology Further details: Technical specifications: Milenia H Pylori IgG Performed by: not stated Criteria for positive diagnosis: ≥ 44
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa and Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Yes		
If a threshold was used, was it pre-specified?	Yes		
		Low	**Low**

Ladas 2002a (*Continued*)

DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Lahner 2004

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 27 Female: 19 (70.4%) Age: 52 years Presentation: 1. Patients with atrophic gastritis Exclusion criteria: 1. Gastric surgery 2. Gastric malignancy 3. Recent *H pylori* treatment 4. Diarrhoea 5. Constipation Setting: not stated

Lahner 2004 (*Continued*)

Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4.5% (15 minutes and 30 minutes) Index test 2: stool antigen test Further details: Technical specifications: HpSA, Meridian Performed by: not stated Criteria for positive diagnosis: Absorbance 450 nm ≥ 0.160
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		

If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Low	

Lee 1998

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients		
Patient characteristics and setting	Sample size: 71 Female: not stated Age: not stated Presentation: 1. Patients undergoing endoscopy for duodenitis, gastritis, duodenal ulcer, gastric ulcer Exclusion criteria: 1. Recent *H pylori* treatment Setting: secondary care, Singapore		
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: delta over baseline > 6% (30 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		

Lee 1998 (*Continued*)

		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Yes		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Yes		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Low	

Logan 1991a

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process

Logan 1991a (*Continued*)

Patient characteristics and setting	Sample size: 50 Female: 24 (48%) Age: 51 years Presentation: 1. Patients undergoing upper gastrointestinal endoscopy Exclusion criteria: 1. Recent *H pylori* infection 2. Previous gastric surgery Setting: secondary care, UK
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: > Mean + 3 standard deviations above normal level (60 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			

Logan 1991a (*Continued*)

Were the index test results interpreted without knowledge of the results of the reference standard?	No		
If a threshold was used, was it pre-specified?	No		
		High	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Lombardo 2003

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - histology performed in a subset of patients
Patient characteristics and setting	Sample size: 28 Female: not stated Age: not stated Presentation:

	1. Patients who had undergone gastrectomy Setting: secondary care, Italy		
Index tests	Index test: urea breath test - unknown isotope Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4 per ml (at 5-minute intervals up to 30 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 72 (72%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		High	**High**
DOMAIN 2: Index Test Urea breath test - unknown isotope			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		

Lombardo 2003 (*Continued*)

		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	No		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Lottspeich 2007

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients with recent antibiotic treatment were excluded
Patient characteristics and setting	Sample size: 56 for urea breath test, 100 for stool antigen test Female: not stated Age: 10 years Presentation: 1. Children with abdominal symptoms undergoing endoscopy Exclusion criteria: 1. Recent *H pylori* treatment Setting: secondary care, Germany
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: not stated

	Performed by: not stated Criteria for positive diagnosis: delta over baseline > 5.0% (30 minutes) Index test 2: stool antigen test Further details: Technical specifications: IDEIA HpStAR assay (DakoCytomation) Performed by: not stated Criteria for positive diagnosis: Absorbance 450/620 nm to 650 nm ≥ 0.150
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain or Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 44 (44%) for urea breath test; 0 (0%) for stool antigen test
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		

Lottspeich 2007 (*Continued*)

		Unclear	**Low**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Luthra 1998

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process

Luthra 1998 (*Continued*)

Patient characteristics and setting	Sample size: 240 Female: not stated Age: not stated Presentation: 1. Patients undergoing upper gastrointestinal endoscopy Excluded: 1. People with upper GI bleeding 2. People with coagulation abnormalities Setting: not stated
Index tests	Index test: serology Further details: Technical specifications: Pyloristat (BioWhittaker) Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain, immunostain, or Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			

Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Mana 2001a

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 182 Female: not stated Age: not stated Presentation:

Mana 2001a (*Continued*)

	1. Patients undergoing upper gastrointestinal endoscopy 2. People not taking *H pylori* medication Setting: secondary care, Belgium
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Multiple criteria for positive diagnosis: • Delta over baseline > 3.0% (10 minutes) • Delta over baseline > 3.0% (20 minutes) • Delta over baseline > 3.0% (30 minutes) • Delta over baseline > 3.5% (10 minutes) • Delta over baseline > 3.5% (20 minutes) • Delta over baseline > 3.5% (30 minutes) • Delta over baseline > 4.0% (10 minutes) • Delta over baseline > 4.0% (20 minutes) • Delta over baseline > 4.0% (30 minutes) • Delta over baseline > 4.5% (10 minutes) • Delta over baseline > 4.5% (20 minutes) • Delta over baseline > 4.5% (30 minutes) • Delta over baseline > 5.0% (10 minutes) • Delta over baseline > 5.0% (20 minutes) • Delta over baseline > 5.0% (30 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with immunohistochemistry and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		

Mana 2001a (*Continued*)

Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	No		
		High	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Mansour-Ghanaei 2011

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients		
Patient characteristics and setting	Sample size: 125 Female: 65 (52%) Age: 36 years Presentation: 1. Patients with dyspepsia Exclusion: 1. Recent or past *H pylori* eradication 2. Pregnancy 3. Severe cardiopulmonary disorders or other life-threatening illnesses Setting: secondary care, Iran		
Index tests	Index test 1: urea breath test-^{14}C Further details: Technical specifications: Heliprobe BreathCard Performed by: not stated Criteria for positive diagnosis: Counts per minute > 50 (15 minutes) Index test 2: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: > 11 IU		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		

Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	No		
		High	**Low**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			

Mansour-Ghanaei 2011 (*Continued*)

Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Low	

Mion 1994

Study characteristics	
Patient sampling	Type of study: retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 95 Female: not stated Age: not stated Presentation: 1. Patients with upper abdominal symptoms Exclusion: 1. Patients with previous gastric surgery Setting: secondary care, France
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: > + 3 delta 0/00 (30 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Mion 1994 (*Continued*)

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	No		
		High	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		

Mion 1994 (*Continued*)

Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Misawa 1998

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 114 Female: 46 (40.4%) Age: not stated Presentation: 1. Patients with gastritis, gastric, or duodenal ulcers Setting: secondary care, Japan
Index tests	Index test 1a: serology (IgA) Further details: Technical specifications: GAP-IgA (BioMerica) Performed by: not stated Criteria for positive diagnosis: not stated Index test 1b: serology (IgG) Further details: Technical specifications: GAP-IgG (BioMerica) Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with immunostaining (Carnoy's solution) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	
Methodological quality	

Misawa 1998 (*Continued*)

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		

Were all patients included in the analysis?	Unclear		
		Unclear	

Mohammadian 2007

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 179 Female: 108 (60.3%) Age: 54 years Presentation: 1. Patients undergoing endoscopy for gastrointestinal problems Setting: secondary care, Iran		
Index tests	Index test: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		

Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Monteiro 2001a

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 104 Female: not stated Age: not stated Presentation: 1. Patients undergoing endoscopy Exclusion criteria: 1. Recent *H pylori* therapy 2. Bleeding disorders or other conditions with contraindication for endoscopy or biopsy Setting: secondary care, France
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: ABCA, Europa Scientific Performed by: not stated Criteria for positive diagnosis: not stated Index test 2a: serology Further details: Technical specifications: Pyloriset EIA Kit (Orion Diagnostica) Performed by: not stated Criteria for positive diagnosis: > = 300 Index test 2b: serology Further details: Technical specifications: Helicoblot Immunoblot kit Performed by: not stated Criteria for positive diagnosis: not stated Index test 3: stool antigen test Further details: Technical specifications: Premier Platinum HpSA, Meridian Performed by: not stated Criteria for positive diagnosis: Absorbance (wavelength not reported) > = 0.160
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	

Monteiro 2001a (*Continued*)

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		

Monteiro 2001a (*Continued*)

If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Morales 1995

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 104 Female: 52 (50%) Age: 50 years Presentation: 1. Patients with upper abdominal symptoms Setting: Outpatients, Mexico

Morales 1995 (*Continued*)

Index tests	Index test 1: urea breath test-^{14}C Further details: Technical specifications: not stated Performed by: not stated Multiple criteria for positive diagnosis: First criterion: ≥ 1.6% excretion (time not stated) Second criterion: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	No		

		High	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Noguera 1998

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear
Patient characteristics and setting	Sample size: 38 Female: not stated Age: not stated Presentation: 1. Patients undergoing urea breath tests and endoscopic biopsy Setting: secondary care, Argentina
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Multiple criteria for positive diagnosis:

	• > 1% excretion (10 minutes) • > 1% excretion (20 minutes) • > 1% excretion (30 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 87 (69.6%)
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			

Noguera 1998 (*Continued*)

Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Novis 1991

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 76 Female: not stated Age: not stated Presentation: 1. Patients undergoing endoscopy for gastrointestinal symptoms Setting: secondary care, Israel
Index tests	Index test 1: urea breath test-^{14}C Further details: Technical specifications: not stated Performed by: not stated Multiple criteria for positive diagnosis: • > 4.7% excretion (5 minutes) • > 4.7% excretion (10 minutes) • > 4.7% excretion (15 minutes) • > 4.7% excretion (20 minutes)

Novis 1991 (*Continued*)

	• > 4.7% excretion (25 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	No		
		High	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target	Yes		

Novis 1991 (*Continued*)

condition?			
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Ogata 2001

Study characteristics	
Patient sampling	Type of study: prospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 47 Female: 27 (57.4%) Age: 12 years Presentation: 1. Children with dyspepsia undergoing endoscopy Exclusion: 1. Recent *H pylori* treatment 2. Immunosuppressive treatment or chemotherapy 3. Extradigestive disease Setting: secondary care, Brazil
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: Isomed Performed by: not stated Criteria for positive diagnosis: > 3% excretion (time not stated) Index test 2: serology Further details: Technical specifications: Cobas Core II (Roche)

	Performed by: not stated Criteria for positive diagnosis: > 7 U/ml		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**High**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Serology			

Ogata 2001 (*Continued*)

Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Ozturk 2003

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 73 Female: 56 (74.6%) Age: 41 years Presentation:

	1. Patients with dyspepsia Setting: secondary care, Turkey
Index tests	Index test 1a: urea breath test-^{14}C Further details: Technical specifications: Heliprobe BreathCard Performed by: not stated Criteria for positive diagnosis: Counts per minute > 50 (10 minutes) Index test 1b: urea breath test-^{14}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: disintegrations per minute > 100 (10 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			

Ozturk 2003 (*Continued*)

Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Peitz 2001

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 145 Female: 87 (60%) Age: 59 years Presentation: 1. Patients with dyspepsia

	Exclusion criteria: 1. Recent *H pylori* treatment 2. Recent NSAID treatment 3. Previous gastric surgery 4. Clotting disorders Setting: secondary care, Germany
Index tests	Index test: serology Further details: Technical specifications: Helisa Rapid Whole Blood Test (Cortecs Diagnostics Ltd) Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference stan-	Unclear		

Peitz 2001 (*Continued*)

dard?			
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Peura 1996

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 200 Female: 118 (59%) Age: not stated Presentation: 1. Patients undergoing endoscopy Exclusion criteria: 1. Recent *H pylori* treatment 2. Gastric surgery

Peura 1996 (*Continued*)

	Setting: secondary care, USA		
Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: disintegrations per minute > 200 (10 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		

Peura 1996 (*Continued*)

		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Puspok 1999

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 72 Female: 42 (58.3%) Age: 55 years Presentation: 1. Patients undergoing endoscopy Exclusion criteria: 1. Recent *H pylori* treatment Setting: secondary care, Austria
Index tests	Index test: stool antigen test Further details: Technical specifications: Premier Platinum HpSA (Meridian Diagnostics)

	Performed by: not stated Criteria for positive diagnosis: Absorbance 450/620 nm ≥ 0.100
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			

Puspok 1999 (*Continued*)

Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Qadeer 2009

Study characteristics	
Patient sampling	Type of study: prospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 100 Female: 50 (50%) Age: 39 years Presentation: 1. Patients with dyspepsia Exlusion criteria: 1. Recent *H pylori* therapy 2. Not on anti-coagulant therapy 3. Oral anticoagulants or NSAID treatment Setting: secondary care, Pakistan
Index tests	Index test: stool antigen test Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: pink-red band

Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		

Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Rafeey 2007

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 96 Female: 31 (32.3%) Age: 8 years Presentation: 1. Children with dyspepsia or abdominal pain Exclusion criteria: 1. Recent *H pylori* treatment 2. Diarrhoea Setting: secondary care, Iran
Index tests	Index test: stool antigen test Further details: Technical specifications: Equipar HPSA test Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated

	Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		

Rafeey 2007 (*Continued*)

		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Rasool 2007

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 94 Female: 34 (36.2%) Age: 41 years Presentation: 1. Patients with dyspepsia Exclusion criteria: 1. Recent *H pylori* treatment 2. Pregnancy 3. Gastric surgery Setting: secondary care, Pakistan
Index tests	Index test: urea breath test Further details: Technical specifications: Heliprobe BreathCard Performed by: not stated Criteria for positive diagnosis: Counts per minute > 50 (10 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy

Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**

Rasool 2007 (*Continued*)

DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Rathbone 1986

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 73 Female: not stated Age: not stated Presentation: 1. Patients with dyspepsia Setting: secondary care, UK
Index tests	Index test: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: > Mean + 2 standard deviations above normal level
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Rathbone 1986 (*Continued*)

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	No		
		High	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		

Rathbone 1986 (*Continued*)

Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Safe 1993

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 100 Female: 59 (59%) Age: 72 years Presentation: 1. Elderly dyspeptic patients Setting: secondary care, UK		
Index tests	Index test: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: > 10 units/ml		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

Safe 1993 (*Continued*)

Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Yes		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Salles-Montaudon 2002

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 107 Female: 71 (66.4%) Age: 85 years Presentation: 1. Adults > 75 years Exclusion criteria: 1. Contraindication to biopsy Setting: secondary care, Switzerland		
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: ABCA, Europa Scientific Performed by: not stated Criteria for positive diagnosis: delta over baseline > 3.5% (30 minutes) Index test 2: serology Further details: Technical specifications: Pyloriset EIA Kit (Orion Diagnostica) Performed by: not stated Criteria for positive diagnosis: > 300 Units Index test 3: stool antigen test Further details: Technical specifications: Premier Platinum HpSA, Meridian Performed by: not stated Criteria for positive diagnosis: Absorbance (wavelength not reported) > 0.160		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 3: Reference Standard			

Salles-Montaudon 2002 (*Continued*)

Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Schilling 2001

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 68 Female: 20 (29.4%) Age: 62 years Presentation: 1. Patients with partial gastric resection Exclusion criteria: Recent *H pylori* treatment Setting: secondary care, Germany
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: delta over baseline > 4.0% (30 minutes)

Schilling 2001 (*Continued*)

Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**High**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		

Schilling 2001 (*Continued*)

Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Scuderi 2000

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 250 Female: 127 (50.8%) Age: 58 years Presentation: 1. Patients with dyspeptic symptoms Setting: secondary care, Italy
Index tests	Index test: stool antigen test Further details: Technical specifications: Premier Platinum HpSA (Meridian Diagnostics) Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy

Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**

Scuderi 2000 (*Continued*)

DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Segamwenge 2014

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients with recent antibiotic treatment were excluded
Patient characteristics and setting	Sample size: 160 Female: not stated Age: not stated Presentation: 1. Patients with dyspepsia Exclusion criteria 1. Could not tolerate endoscopy 2. Recent *H pylori* treatment 3. Pain attributable to pancreas or liver 4. NSAID-related dyspepsia Setting: secondary care, Italy
Index tests	Index test: stool antigen test Further details: Technical specifications: Rapid strip HPSA (Meridian Bioscience) Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated

Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			

Segamwenge 2014 (*Continued*)

Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Selcukcan 2011

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 100 Female: 47 (47%) Age: not stated Presentation: 1. Infants undergoing endoscopy Exclusion criteria: 1. No recent H pylori treatment Setting: secondary care, Turkey
Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		

Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Sharbatdaran 2013

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 61 Female: 36 (59%) Age: 31 years Presentation: 1. Patients with dyspepsia Exclusion criteria: 1. Recent *H pylori* infection 2. Gastric cancer 3. Bleeding during endoscopy Setting: secondary care, Iran
Index tests	Index test: stool antigen test Further details: Technical specifications: GA Generic Assay Performed by: not stated Criteria for positive diagnosis: Absorbance 450 nm > + 0.1 of negative control
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	
Methodological quality	

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Yes		
If a threshold was used, was it pre-specified?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Yes		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		

Were all patients included in the analysis?	Yes		
		Unclear	

Sheu 1998a

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 135 Female: not stated Age: not stated Presentation: 1. Patients with dyspepsia Setting: secondary care, Mexico		
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not clearly stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		

Sheu 1998a (*Continued*)

Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Sheu 1998b

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 66 Female: not stated Age: not stated Presentation: 1. Patients with gastrectomy Setting: secondary care, Mexico		
Index tests	Index test: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not clearly stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**High**

Sheu 1998b (*Continued*)

DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Shin 2009

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 651 Female: 254 (39%)

Shin 2009 (*Continued*)

	Age: 58 years Presentation: 1. Patients undergoing endoscopy Exclusion criteria: 1. Recent *H pylori* treatment 2. Chronic medication 3. Gastric surgery Setting: secondary care, South Korea
Index tests	Index test: serology Further details: Technical specifications: Genedia *H pylori* Performed by: not stated Criteria for positive diagnosis: Absorbance 450 nm > 0.406
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			

Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Soomro 2012

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 100 Female: 44 (44%) Age: not stated Presentation: 1. Patients undergoing endoscopic biopsy for dyspepsia or gastritis

	Setting: secondary care, Pakistan
Index tests	Index test: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated Index test: stool antigen test Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference stan-	Unclear		

dard?			
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Surveyor 1989

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients		
Patient characteristics and setting	Sample size: 63 Female: 30 (47.8%) Age: 59 years Presentation: 1. Patients with symptoms related to upper gastrointestinal tract undergoing endoscopy Setting: secondary care, Australia		
Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain, Warthin-Starry stain, and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**

Surveyor 1989 (*Continued*)

DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Thobani 1995

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 26 Female: not stated

Thobani 1995 (*Continued*)

	Age: not stated Presentation: 1. Patients with upper gastrointestinal symptoms Setting: secondary care, Pakistan		
Index tests	Index test: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: > 2		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		

Thobani 1995 (*Continued*)

If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Tiwari 2014

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 30 Female: 25 (83.3%) Age: not stated Presentation: 1. Patients undergoing endoscopy Exclusion criteria: 1. Recent *H pylori* treatment Setting: secondary care, India

Tiwari 2014 (*Continued*)

Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: disintegrations per minute > 200 (10 minutes)
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy (staining not reported, probably H & E) Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**

Tiwari 2014 (*Continued*)

DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Trevisani 2005

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 105 Female: 50 (47.6%) Age: 58 years Presentation: 1. Patients referred to endoscopy centre Exclusion criteria: 1. Recent *H pylori* treatment 2. Pregnancy or lactation 3. Steroids or NSAID treatment 4. Prior gastric surgery 5. Bleeding peptic ulcer 6. Severe concomitant diseases Setting: secondary care, Italy

Trevisani 2005 (*Continued*)

Index tests	Index test 1a: stool antigen test Further details: Technical specifications: Amplified IDEA Hp StAR Performed by: doctor Criteria for positive diagnosis: Absorbance 450 nm ≥ 0.190 Index test 1b: stool antigen test Further details: Technical specifications: Immunocard Stat Performed by: doctor Criteria for positive diagnosis: pink red band (5 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Yes		

If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Vandenplas 1992

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: consecutive patients
Patient characteristics and setting	Sample size: 95 Female: 50 (52.6%) Age: 9 years Presentation: 1. Children with chronic abdominal pain Exclusion criteria: 1. Recent *H pylori* treatment Setting: secondary care, Belgium

Vandenplas 1992 (*Continued*)

Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not clearly stated Index test 2: serology Further details: Technical specifications: Malakit Helicobacter pylori (Biolab) Performed by: not stated Criteria for positive diagnosis: > Mean + 3 standard deviations above normal level		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)		
Comparative			
Notes			

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		

Vandenplas 1992 (*Continued*)

If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

Villalobos 1992

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 105 Female: 69 (65.7%) Age: not stated Presentation: 1. Patients with dyspepsia Excluded: 1. Recent *H pylori* treatment 2. Patients taking steroids 3. Patients with coagulopathy 4. Patients allergic to penicillin 5. Pregnancy or lactation Setting: secondary care, Mexico		
Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: disintegrations per minute > 1.6% (60 minutes)		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		

Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Wang 2008

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients with recent antibiotic treatment were excluded		
Patient characteristics and setting	Sample size: 123 Female: 69 (56.1%) Age: 48 years Presentation: 1. Asymptomatic individuals Exclusion criteria: 1. Recent *H pylori* therapy 2. Gastric surgery Setting: secondary care, Italy		
Index tests	Index test: serology Further details: Technical specifications: Assure *H pylori* Rapid Test (CIM-test, Genelabs Diagnostics Ltd) Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain, Warthin-Starry stain, and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 214 (63.5%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		

		High	**Unclear**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Wardi 2012

Study characteristics			
Patient sampling	Type of study: retrospective study Consecutive or random sample: unclear sampling process		
Patient characteristics and setting	Sample size: 76 Female: 15 (19.7%) Age: 70 years Presentation: 1. Patients with partial gastrectomy Setting: secondary care, Israel		
Index tests	Index test: urea breath test - C13 Further details: Technical specifications: BreathID Performed by: not stated Criteria for positive diagnosis: not clearly stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**High**

Wardi 2012 (*Continued*)

DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	No		
		High	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Weiss 1994

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 95 Female: not stated

	Age: not stated Presentation: 1. Patients with abdominal pain Exclusion criteria: 1. Recent *H pylori* treatment Setting: secondary care, USA
Index tests	Index test 1a: serology Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated Index test 1b: serology Further details: Technical specifications: Cobas Core anti-*H pylori* (Roche) Performed by: not stated Criteria for positive diagnosis: not stated
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**

Weiss 1994 (*Continued*)

DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Yan 2003

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients with recent antibiotic treatment were excluded

Yan 2003 (*Continued*)

Patient characteristics and setting	Sample size: 31 Female: not stated Age: not stated Presentation: 1. Patients undergoing endoscopy Exclusion criteria: 1. Recent *H pylori* treatment Setting: secondary care, China
Index tests	Index test: stool antigen test Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: Absorbance 450/630 nm $\geq$ 0.120
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 32 (50.8%)
Comparative	
Notes	

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test Stool Antigen Test			

Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	Yes		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Yoshimura 2001

Study characteristics	
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: unclear sampling process
Patient characteristics and setting	Sample size: 72 Female: 34 (47.2%) Age: 13 years Presentation:

	1. Children undergoing endoscopy for symptoms such as anaemia and abdominal pain Exclusion criteria: 1. Recent *H pylori* treatment Setting: secondary care, Japan
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: delta over baseline > 3.0% (20 minutes and 30 minutes) Index test 2: serology Further details: Technical specifications: HM-CAP Anti-*H pylori*-EIA; Kyowa Medics Performed by: not stated Criteria for positive diagnosis: ≥ 1.8
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Giemsa stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: not stated
Comparative	
Notes	

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		
		Unclear	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{13}C			

Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 2: Index Test Serology			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Unclear		
		Unclear	

Yu 1999

Study characteristics			
Patient sampling	Type of study: unclear whether prospective or retrospective study Consecutive or random sample: neither - patients with recent antibiotic treatment were excluded		
Patient characteristics and setting	Sample size: 88 Female: not stated Age: not stated Presentation: 1. Patients undergoing endoscopy Exclusion criteria: 1. Recent *H pylori* treatment Setting: secondary care, Singapore		
Index tests	Index test: urea breath test-^{14}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: not stated		
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain and Warthin-Starry stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy		
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 16 (16.5%)		
Comparative			
Notes			
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was a case-control design avoided?	Yes		
Did the study avoid inappropriate exclusions?	Unclear		

Yu 1999 (*Continued*)

		High	**Unclear**
DOMAIN 2: Index Test Urea breath test-^{14}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		
Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	No		
		High	

Yu 2001

Study characteristics	
Patient sampling	Type of study: retrospective study Consecutive or random sample: consecutive patients

Yu 2001 (*Continued*)

Patient characteristics and setting	Sample size: 32 Female: 14 (43.8%) Age: 51 years Presentation: 1. Patients undergoing endoscopy Exclusion criteria: 1. Recent *H pylori* treatment 2. Gastric surgery Setting: secondary care, Taiwan, China
Index tests	Index test 1: urea breath test-^{13}C Further details: Technical specifications: not stated Performed by: not stated Criteria for positive diagnosis: delta over baseline > 2.8% (15 minutes) Index test 2: stool antigen test Further details: Technical specifications: Premier Platinum HpSA, Meridian Performed by: not stated Multiple criteria for positive diagnosis: • Absorbance 450 nm > 0.140 • Visual assessment by gastroenterologists
Target condition and reference standard(s)	Target condition: *H pylori* infection Reference standard: endoscopic biopsy with H & E stain Further details: Technical specifications: not stated Performed by: endoscopist and pathologist Criteria for positive diagnosis: presence of *H pylori* in biopsy
Flow and timing	Number of indeterminates for whom the results of reference standard was available: not stated Number of patients who were excluded from the analysis: 0 (0%)
Comparative	
Notes	

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was a case-control design avoided?	Yes		

Did the study avoid inappropriate exclusions?	Yes		
		Low	**Low**
DOMAIN 2: Index Test Urea breath test-^{13}C			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Yes		
		Unclear	**Low**
DOMAIN 2: Index Test Stool Antigen Test			
Were the index test results interpreted without knowledge of the results of the reference standard?	Unclear		
If a threshold was used, was it pre-specified?	Unclear		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Is the reference standards likely to correctly classify the target condition?	No		
Were the reference standard results interpreted without knowledge of the results of the index tests?	Unclear		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was there an appropriate interval between index test and reference standard?	Unclear		

Yu 2001 (*Continued*)

Did all patients receive the same reference standard?	Yes		
Were all patients included in the analysis?	Yes		
		Unclear	

CO2 - carbon dioxide;
H & E stain - haematoxylin and eosin stain;
HpSA - *H pylori* stool antigen;
IgA - immunoglobulin A;
IgG - immunoglobulin G;
NMR - nuclear magnetic resonance;
NSAID - non-steroidal anti-inflammatory
WBC - white blood cell
All other acronyms and abbreviations are the full title of either products or companies producing products included in the study.

Characteristics of studies awaiting classification *[ordered by study ID]*

Buhigas-Garcia 2008

Study characteristics	
Patient sampling	
Patient characteristics and setting	
Index tests	urea breath test-^{13}C
Target condition and reference standard(s)	
Flow and timing	
Comparative	
Notes	

Fazeli 2004

Study characteristics	
Patient sampling	
Patient characteristics and setting	
Index tests	salivary test, potential index tests of interest
Target condition and reference standard(s)	
Flow and timing	
Comparative	
Notes	

Fuke 2009

Study characteristics	
Patient sampling	
Patient characteristics and setting	
Index tests	serology
Target condition and reference standard(s)	
Flow and timing	
Comparative	
Notes	

Glupczynski 1991

Study characteristics	
Patient sampling	
Patient characteristics and setting	

Glupczynski 1991 (*Continued*)

Index tests	urea breath test-^{13}C
Target condition and reference standard(s)	
Flow and timing	
Comparative	
Notes	

Karczewska 1997

Study characteristics	
Patient sampling	
Patient characteristics and setting	
Index tests	serology
Target condition and reference standard(s)	
Flow and timing	
Comparative	
Notes	

Kushch 2014

Study characteristics	
Patient sampling	
Patient characteristics and setting	
Index tests	unclear
Target condition and reference standard(s)	
Flow and timing	

Kushch 2014 (*Continued*)

Comparative	
Notes	

Lappas 1997

Study characteristics	
Patient sampling	
Patient characteristics and setting	
Index tests	salivary test, potential index tests of interest
Target condition and reference standard(s)	
Flow and timing	
Comparative	
Notes	

Lee 1999a

Study characteristics	
Patient sampling	
Patient characteristics and setting	
Index tests	urea breath test-^{13}C
Target condition and reference standard(s)	
Flow and timing	
Comparative	
Notes	

Martin-de-Argila 1997

Study characteristics	
Patient sampling	
Patient characteristics and setting	
Index tests	serology
Target condition and reference standard(s)	
Flow and timing	
Comparative	
Notes	

Mason 1997

Study characteristics	
Patient sampling	
Patient characteristics and setting	
Index tests	urea breath test
Target condition and reference standard(s)	
Flow and timing	
Comparative	
Notes	

Thong-Ngam 2011

Study characteristics	
Patient sampling	
Patient characteristics and setting	

Thong-Ngam 2011 (*Continued*)

Index tests	serology
Target condition and reference standard(s)	
Flow and timing	
Comparative	
Notes	

Tokunaga 2005a

Study characteristics	
Patient sampling	
Patient characteristics and setting	
Index tests	urea breath test
Target condition and reference standard(s)	
Flow and timing	
Comparative	
Notes	

Xu 1995

Study characteristics	
Patient sampling	
Patient characteristics and setting	
Index tests	urea breath test-^{13}C
Target condition and reference standard(s)	
Flow and timing	

Xu 1995 (*Continued*)

Comparative	
Notes	

DATA

Presented below are all the data for all of the tests entered into the review.

Tests. Data tables by test

Test	No. of studies	No. of participants
1 Urea breath test-^{13}C	34	3139
2 Urea breath test-^{14}C	21	1810
3 Urea breath test - Unknown isotope	2	127
4 Serology	34	4242
5 Stool antigen test	29	2988
6 Urea breath test-^{13}C (delta over baseline > 3% (20 minutes))	2	254
7 Urea breath test-^{13}C (delta over baseline > 3% (30 minutes))	3	333
8 Urea breath test-^{13}C (delta over baseline > 3.5% (30 minutes))	3	368
9 Urea breath test-^{13}C (delta over baseline > 4% (10 minutes))	2	236
10 Urea breath test-^{13}C (delta over baseline > 4% (20 minutes))	2	236
11 Urea breath test-^{13}C (delta over baseline > 4% (30 minutes))	10	958
12 Urea breath test-^{13}C (delta over baseline > 4.5% (30 minutes))	3	288
13 Urea breath test-^{13}C (delta over baseline > 5% (30 minutes))	4	601
14 Urea breath test-^{14}C (counts per minute > 50)	6	471
15 Urea breath test-^{14}C (disintegrations per minute > 200)	4	296
16 Serology > 7 units/ml	2	97
17 Serology ≥300 units	2	234

ADDITIONAL TABLES

Table 1. Summary of results at thresholds commonly reported for urea breath test-^{13}C, urea breath test-^{14}C and serology

Threshold	Studies	Number of participants (cases)	Sensitivity (95% CI)	Specificity (95% CI)
Urea breath test-^{13}C				
Delta over baseline > 3% (20 minutes)	2	254 (128)	0.98 (0.90 to 1.00)	0.92 (0.82 to 0.97)
Delta over baseline > 3% (30 minutes)	3	333 (140)	0.99 (0.92 to 1.00)	0.95 (0.90 to 0.98)
Delta over baseline > 3. 5% (30 minutes)	3	368 (120)	0.75 to 1.00	0.77 to 1.00
Delta over baseline > 4% (10 minutes)	2	236 (118)	0.91 to 1.00	0.60 to 0.95
Delta over baseline > 4% (20 minutes)	2	236 (118)	0.91 to 1.00	0.60 to 0.96
Delta over baseline > 4% (30 minutes)	10	958 (423)	0.95 (0.79 to 0.99)	0.95 (0.87 to 0.98)
Delta over baseline > 4. 5% (30 minutes)	3	288 (106)	0.50 to 0.96	0.82 to 0.96
Delta over baseline > 5% (30 minutes)	4	601 (315)	0.95 (0.49 to 1.00)	0.94 (0.84 to 0.98)
Urea breath test-^{14}C				
Counts per minute > 50 (10 minutes)	6	471 (231)	0.89 (0.55 to 0.98)	0.91 (0.79 to 0.96)
Disintegrations per minute > 200 (10 minutes)	4	296 (132)	0.95 (0.33 to 1.00)	0.95 (0.80 to 0.99)
Serology				
> 7 units/ml	2	97 (48)	0.98 (0.74 to 1.00)	0.71 (0.51 to 0.86)
≥ 300 unit	2	234 (143)	0.91 (0.82 to 0.96)	0.86 (0.72 to 0.93)

Tests evaluated at the same threshold by more than one study are presented in the table. When there were two or three studies at the same threshold, and little or no heterogeneity was observed in ROC space, estimates of summary sensitivity and summary specificity were obtained by using univariate fixed-effect logistic regression models to pool sensitivities and specificities separately. When there

were two or three studies and we observed heterogeneity, we did not perform meta-analysis but report the range of the sensitivities and specificities.

Table 2. Indirect comparison of the accuracy of non-invasive tests for *H pylori* infection

Index tests	Studies; participants (*H pylori*present)	DOR (95% CI)	Ratio of diagnostic odds ratios (95% CI), P value		
			Urea breath test-^{13}C	Urea breath test-^{14}C	Serology
Urea breath test-^{13}C	34; 3139 (1526)	153 (73.7 to 316)	-	-	-
Urea breath test-^{14}C	21; 1810 (1018)	105 (74.0 to 150)	1.45 (0.65 to 3.26), P = 0.36	-	-
Serology	34; 4242 (2477)	47.4 (25.5 to 88.1)	3.22 (1.24 to 8.37), P = 0.017	2.22 (1.09 to 4.51), P = 0.028	-
Stool antigen test	29; 2988 (1311)	45.1 (24.2 to 84.1)	3.39 (1.30 to 8.83), P = 0.013	2.33 (1.14 to 4.76), P = 0.020	1.05 (0.44 to 2.53), P = 0.91

The indirect comparison included all studies that evaluated at least one of the four tests, i.e. all available data. The ratio of diagnostic odds ratios is the diagnostic odds ratio (DOR) of the test in the column divided by the DOR of the test in the row. If the ratio is greater than one, then the test in the column is more accurate than the test in the row; if the ratio is less than one, the test in the row is more accurate than the test in the column.

Table 3. Accuracy of non-invasive tests for *H pylori* infection at different levels of prevalence

Prevalence (%)	Specificity	False positives[1]	Test	Sensitivity (95% CI)	Missed cases (95% CI)
42.0	0.79	122	Urea breath test-^{13}C	0.98 (0.95 to 0.99)	10 (5 to 20)
			Urea breath test-^{14}C	0.97 (0.95 to 0.98)	15 (10 to 20)
			Serology	0.93 (0.87 to 0.96)	31 (17 to 54)
			Stool antigen test	0.92 (0.87 to 0.96)	32 (18 to 57)
53.7	0.79	97	Urea breath test-^{13}C	0.98 (0.95 to 0.99)	13 (6 to 26)
			Urea breath test-^{14}C	0.97 (0.95 to 0.98)	19 (13 to 26)
			Serology	0.93 (0.87 to 0.96)	39 (22 to 69)
			Stool antigen test	0.92 (0.87 to 0.96)	41 (23 to 72)

Table 3. Accuracy of non-invasive tests for *H pylori* infection at different levels of prevalence (*Continued*)

66.5	0.79	70	Urea breath test-^{13}C	0.98 (0.95 to 0.99)	16 (8 to 32)
			Urea breath test-^{14}C	0.97 (0.95 to 0.98)	23 (16 to 32)
			Serology	0.93 (0.87 to 0.96)	49 (27 to 85)
			Stool antigen test	0.92 (0.87 to 0.96)	51 (28 to 89)
42.0	0.90	58	Urea breath test-^{13}C	0.94 (0.89 to 0.97)	23 (12 to 46)
			Urea breath test-^{14}C	0.92 (0.89 to 0.94)	33 (24 to 46)
			Serology	0.84 (0.74 to 0.91)	67 (39 to 110)
			Stool antigen test	0.83 (0.73 to 0.90)	70 (41 to 114)
53.7	0.90	46	Urea breath test-^{13}C	0.94 (0.89 to 0.97)	30 (15 to 58)
			Urea breath test-^{14}C	0.92 (0.89 to 0.94)	42 (30 to 58)
			Serology	0.84 (0.74 to 0.91)	86 (50 to 140)
			Stool antigen test	0.83 (0.73 to 0.90)	89 (52 to 146)
66.5	0.90	34	Urea breath test-^{13}C	0.94 (0.89 to 0.97)	37 (18 to 72)
			Urea breath test-^{14}C	0.92 (0.89 to 0.94)	53 (38 to 72)
			Serology	0.84 (0.74 to 0.91)	106 (62 to 173)
			Stool antigen test	0.83 (0.73 to 0.90)	111 (64 to 180)
42.0	0.96	23	Urea breath test-^{13}C	0.86 (0.75 to 0.93)	57 (30 to 103)
			Urea breath test-^{14}C	0.81 (0.76 to 0.86)	78 (58 to 103)
			Serology	0.66 (0.52 to 0.79)	141 (90 to 204)
			Stool antigen test	0.65 (0.50 to 0.78)	146 (93 to 209)
53.7	0.96	19	Urea breath test-^{13}C	0.86 (0.75 to 0.93)	73 (38 to 132)
			Urea breath test-^{14}C	0.81 (0.76 to 0.86)	100 (74 to 132)
			Serology	0.66 (0.52 to 0.79)	181 (115 to 260)
			Stool antigen test	0.65 (0.50 to 0.78)	187 (119 to 267)

Table 3. Accuracy of non-invasive tests for *H pylori* infection at different levels of prevalence (*Continued*)

66.5	0.96	13	Urea breath test-^{13}C	0.86 (0.75 to 0.93)	90 (47 to 163)
			Urea breath test-^{14}C	0.81 (0.76 to 0.86)	124 (92 to 163)
			Serology	0.66 (0.52 to 0.79)	224 (142 to 322)
			Stool antigen test	0.65 (0.50 to 0.78)	231 (148 to 331)

[1]Average number of participants who are diagnosed with *H pylor*i infection but do not have the infection per 1000 tested.
The sensitivities were estimated from the SROC curves at fixed values (lower quartile, median and upper quartile) of specificity from the included studies across all tests. Based on these sensitivities and specificities, and quartiles of prevalence from the included studies (across all tests), the numbers of missed *H pylori* cases and false positives (i.e. overdiagnosed people) were calculated using a hypothetical cohort of 1000 people suspected of having *H pylori* infection.

Table 4. Direct comparison of the accuracy of non-invasive tests for *H pylori* infection

Test	Urea breath test-^{13}C	Urea breath test-^{14}C	Serology
Urea breath test-^{13}C	-	-	-
Urea breath test-^{14}C	N = 0	-	-
Serology	N = 7 DOR (95% CI) of urea breath test-^{13}C = 74.8 (95% CI 17.8 to 314) DOR (95% CI) of serology = 111 (95% CI 41.2 to 297) RDORs (95% CI) of urea breath test-^{13}C versus serology, P value = 0.68 (95% CI 0.12 to 3.70), P = 0.56	N = 1	-
Stool antigen test	N = 7 DOR (95% CI) of urea breath test-^{13}C = 46.6 (95% CI 3.30 to 658) DOR (95% CI) of stool antigen test = 53.0 (95% CI 5.34 to 527) RDORs (95% CI) of urea breath test-^{13}C versus stool antigen test, P value = 0.88 (95% CI 0.14 to 5. 56), P = 0.84	N = 2	N = 4

DOR = diagnostic odds ratio; N = number of studies; RDORs = ratio of diagnostic odds ratios.
Due to paucity of data and substantial heterogeneity observed in ROC space which precluded the use of simpler meta-analytic models, meta-analyses were not possible for two test comparisons that had more than one study. For the single study of urea breath test-^{14}C versus serology (Mansour-Ghanaei 2011), both tests had similar sensitivity, but specificity was higher for urea breath test-^{14}C than for serology. The ratio of diagnostic odds ratios is the DOR of the test in the column divided by the DOR of the test in the row. If the

ratio is greater than one, then the test in the column is more accurate than the test in the row; if the ratio is less than one, the test in the row is more accurate than the test in the column.

CONTRIBUTIONS OF AUTHORS

LB, SS, AS, AG, BL, and KG identified studies and extracted data for the review. LB entered the characteristics of included and excluded studies. KG and YT analysed the data and wrote the review. MY provided critical comments for the review.

DECLARATIONS OF INTEREST

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LB: none known.

SS: none known.

AS: none known.

AG: none known.

BL: none known.

MY: is an Editor with the Cochrane Upper GI and Pancreatic Diseases (UGPD) Review Group. However, other UGPD Editors were responsible for the editorial processing of this review.

KS: none known.

YT: none known.

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DIFFERENCES BETWEEN PROTOCOL AND REVIEW

- We considered urea breath test-^{14}C and urea breath test-^{13}C as different index tests.

- Because of the paucity of data, we did not stratify the analysis by reference standard; however, we investigated reference standard as a potential source of heterogeneity.

- Because studies reported different thresholds and following recommendation from peer reviewers, we used the HSROC model for the primary analyses. For estimation of summary sensitivities and specificities at specific thresholds, we used univariate fixed- and random-effects logistic regression models due to paucity of data.

- We performed direct comparisons whenever possible, rather than deciding this on the basis of the number of studies.