AMINO ACID PROFILES IN PATIENTS WITH INTESTINAL FAILURE: PRELIMINARY DATA ON BIOCHEMICAL INSIGHTS

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Introduction Amino acid profiles have become increasingly important in intestinal failure (IF), ever since citrulline has been used as an IF marker. The purpose of the present study is to investigate levels in patients with IF needing parenteral nutrition (PN) and to examine their use as markers of IF severity to guide clinical decisions.

Method Serum amino acids levels were measured prospectively within the cohort of patients managed by the IF Unit at our hospital using Ion Exchange Chromatography. Statistical analysis was performed by R and SPSS 21.0 using Pearson's Correlation coefficient, t-tests and ANOVA. The traditional classification of IF1 was taken as a proxy of IF severity where Type 1 IF was coded as 1 and type 3 IF was coded as 3.

Results Our study included 35 patients (11 Males, mean age 45, range 16–87), non IF controls (n = 10), Type 1 IF (n = 3), Type 2 IF (n = 3), Type 3 IF (n = 19); all IF patients were on PN. Causes of IF were short bowel syndrome, enterocutaneous fistula, high stoma output, pseudo-obstruction and radiation enteropathy. Citrulline was significantly lower in patients with Type 3 IF ($p = 0.033$) and receiving PN ($p = 0.031$) compared to other groups. Valine was significantly lower in patients with Type 3 and 2 IF compared to other controls and type 1 ($p = 0.053$); a trend was observed for lower homocysteine in patients receiving PN ($p = 0.082$). The other amino acids didn't display differences with respects to groups. Figure 1 shows the correlation matrix between amino acids levels and severity of IF. Lower levels of citrulline, valine, alanine, total homocysteine, methionine, histidine, ornithine, and isoleucine were associated with more severe IF (range of correlation coefficients –0.432 to –0.174) whilst glutamate levels had a positive association (0.215) with less severe IF. Strong positive associations were found between amino acids valine, histidine, threonine, methionine, ornithine, alanine, leucine and isoleucine (correlation coefficient range 0.41–0.73), suggesting involvement in common biochemical pathways.

Conclusion The present study confirmed the usefulness of citrulline as a marker of enterocytes mass in IF It provided new evidence that lower levels of valine, total homocysteine, methionine, histidine, ornithine, and isoleucine were associated with more severe IF. Larger studies are needed to validate those data.

Disclosure of interest None Declared.

REFERENCE

1 ESPEN endorsed recommendations. Definition and classification of intestinal failure in adults. Clin Nutr. 2014. doi: 10.1016/j.clnu.2014.08.017

Table 1. Amino Acid profiles by categories

	Type of Intestinal Failure									*Total Parenteral Nutrition*				
	non IF (n=10)		Type 1 (n=3)		Type 2 (n=3)		Type 3 (n=19)		p-value	No (n=10)		Yes (n=25)		p-value
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Taurine	74.3	21.4	58.3	17.6	68.7	15.6	80.1	63.7	0.903	74.3	21.4	76.1	56.1	0.923
Serine	120.1	34	145.3	43.1	90.7	10.7	114.6	41.6	0.379	120.1	34	115.4	40.6	0.751
Glutamate	57.5	31.5	60	17.3	57.3	28.7	91.6	93.6	0.618	57.5	31.5	83.7	82.9	0.342
Citrulline	34.3	15.4	27.3	20.1	36.3	6.4	19.6	12	**0.033**	34.3	15.4	22.5	13.4	0.031
Alanine	422.7	168.3	388.7	73.9	307	117.9	354.1	130.6	0.515	422.7	168.3	352.6	121.8	0.178
Valine	223.1	80	295.3	109.3	158.3	21.4	191.2	55.1	**0.053**	223.1	80	199.8	68.7	0.392
Isoleucine	71.2	23.6	71	18.1	47.7	12.2	60.8	18.2	0.254	71.2	23.6	60.4	18	0.154
Tyrosine	52.8	21.1	47.7	15	55.3	23	53.2	17.8	0.964	52.8	21.1	52.8	17.5	0.995
Histidine	82.2	32.1	100.3	21	73.3	15.3	67.8	21.8	0.16	82.2	32.1	72.4	23	0.317
Lysine	188	40.3	170	25.2	153.3	26.7	170.8	45.4	0.582	188	40.3	168.6	41.2	0.214
Total Homocysteine	19.8	15.6	19.7	5.5	12.7	7.6	11.9	7.1	0.223	19.8	15.6	12.9	7.2	0.082
Threonine	147.7	54.2	174.3	95.5	97.3	14.6	143.2	50.2	0.374	147.7	54.2	141.4	55.2	0.763
Glutamine	603.7	121.9	669	70.2	467	117	591.6	170.3	0.413	603.7	121.9	585.9	161.1	0.756
Proline	265.8	112.8	301.3	200	176	50	273	126.9	0.613	265.8	112.8	264.8	129.7	0.982
Glycine	394.4	219.5	314.3	73.6	322.3	81.3	410.1	212.2	0.814	394.4	219.5	388.1	190.7	0.933
Methionine	27.1	10.3	31	19.3	21.3	4.7	22.8	9.9	0.493	27.1	10.3	23.6	10.7	0.385
Leucine	112.2	32.5	117.7	18.9	88.3	16.6	105.9	33.3	0.642	112.2	32.5	105.2	30.6	0.554
Phenylalanine	63.9	31.2	69.3	21.4	57	13.1	57.8	24.6	0.854	63.9	31.2	59.1	22.9	0.616
Ornithine	103	43.3	89.3	15.7	63.7	39.6	86.6	38.1	0.461	103	43.3	84.2	36.1	0.196
Arginine	57	32	53.3	11	44.3	15.5	50.8	38.1	0.941	57	32	50.4	33.5	0.596

Figure 1. Correlation Matrix of amino acids and intestinal Failure. The diameter of each circle corresponds to the value of the correlation coefficient and the colour indicates whether the correlation coefficient is positive (black) or negative (white).