Editorial

Reducing myocardial infarct size: myth or reality

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This year is the 30 year anniversary since ‘ischemic preconditioning’, which after reperfusion is the most powerful endogenous intervention for reducing myocardial infarct (MI) size, was first discovered[1]. The last 3 to 4 decades have witnessed a huge published literature in the research field of ‘cardioprotection’ – a term used here to describe mechanical and pharmacological interventions for reducing MI size. Much of the research has focused on targeting ‘myocardial reperfusion injury’, a term used to denote the myocardial injury and cardiomyocyte death which paradoxically occurs on reperfusing acutely ischemic myocardium, and which has been demonstrated to contribute up to 50% of the final MI size[2, 3]. As such, despite timely reperfusion by primary percutaneous coronary intervention (PPCI), mortality and morbidity following an acute ST-segment elevation myocardial infarction (STEMI) remain significant, with 7% death and 22% heart failure at one year[4]. As such, novel cardioprotective therapies are required to target myocardial reperfusion injury and reduce MI size in order to preserve left ventricular (LV) systolic function and prevent the onset of heart failure following STEMI. However, the results of a large number of clinical studies in reperfused STEMI patients have failed to demonstrate reduce MI size and improve clinical outcomes. The reasons for this are multiple and complex and have been discussed extensively in the literature and can be attributed to problems with the design of both pre-clinical experimental and clinical studies used to test novel cardioprotective therapies[5-8].

In this issue of H&M, leading reseachers in the field review some of the recent developments in the topical area of cardioprotection. The H&M issue opens with an introduction by Gerd Heusch highlighting the importance of acute myocardial reperfusion injury as a target for cardioprotection, and alluding to myocardial reperfusion as a ‘double-edged sword’[9]. The metabolic consequences of acute

ischemia and reperfusion on the myocardium are elegantly reviewed by Gary Lopaschuk in the Refresher Corner in this H&M issue. These effects highlight the opportunities for cardioprotection using metabolic modulation agents such as Trimetaizidine, a topic highlighted by Petr Widimsky in this H&M issue.

Mechanical interventions for targeting myocardial reperfusion injury and reducing MI size such as ischemic postconditioning (IPost) and remote ischemic conditioning (RIC) are reviewed by Hans Erik Botker in this H&M issue. Of these RIC, holds the most promise for reducing MI size and improving clinical outcomes in reperfused STEMI patients (highlighted in the Hot Topics section of this H&M issue by Luciano Candilio) – and currently being tested in the ongoing European CONDI2/ERIC-PPCI trial[10]. Targeting the signaling pathways underlying ischemic preconditioning and postconditioning have led to the discovery of numerous cardioprotective targets, many of which have been tested using pharmacological agents – a topic which is reviewed by Michel Ovize in this H&M issue. The ability to assess the efficacy of cardioprotective therapies for reducing MI size requires the quantification of the area-at-risk and MI size. In this regard, cardiac MRI has emerged as the non-invasive imaging modality of choice for assessing the cardioprotective efficacy of therapies for reducing MI size, a subject which is summarized by Colin Berry in this H&M issue. More advanced imaging methods such as hybrid cardiac PET/MR have been investigated in reperfused STEMI patients to interrogate the *in vivo* metabolic effects of acute ischemia/reperfusion injury on the myocardium, a imaging modality which is illustrated in two Case Reports in this H&M issue by Heerajnarain Bulluck.

In summary the articles in this H&M issue highlight some of the recent developments in the field of cardioprotection, and they illustrate the challenges and

opportunities when investigating therapies for reducing MI size and improving clinical outcomes in STEMI patients treated by PPCI.

Reference List

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