Remote ischaemic conditioning for cardioprotection: Bench to bedside in action!

D.J. Hausenloy, Signature Research Program in Cardiovascular & Metabolic Diseases, Duke-NUS Medical School, 8 College Road, Singapore 169857 .

Around 3.8 million men and 3.4 million women worldwide die each year from coronary heart disease (CHD). New treatment strategies are therefore required to limit myocardial injury, preserve cardiac function and improve clinical outcomes inpatients with CHD. One such cardioprotective strategy is to make the myocardium more resistant to the detrimental effects of acute ischaemia-reperfusion injury - this can be achieved by 'conditioning' the heart using brief non-lethal episodes of alternating myocardial ischaemia and reperfusion to activate endogenous cardioprotective mechanisms, a protocol which can be applied either prior to ('ischaemic preconditioning'), during ('ischaemic perconditioning') or at the end of the lethal ischaemic insult and at the onset of myocardial reperfusion ('ischaemic postconditioning').

Intriguingly, it has been discovered that similar levels of cardioprotection can be achieved by applying the brief ischaemia and reperfusion protocol to an organ or tissue remote from the heart (termed 'remote ischaemic conditioning' or RIC), thereby obviating the need to directly 'condition' the myocardium, and facilitating its clinical application. The mechanisms underlying RIC cardioprotection remain unclear and have been attributed to a transferrable cardioprotective factor or factors released into the circulation following RIC. Several proof-of-concept clinical studies have demonstrated the translation of RIC into the clinical setting with intermittent ischaemia and reperfusion of the arm or leg shown to reduce myocardial injury sustained during cardiac bypass surgery, abdominal aortic aneurysm surgery and elective percutaneous coronary intervention, and to reduce myocardial infarct size following acute myocardial infarction. Large multi-centre clinical studies are underway to determine whether 'conditioning' the heart can impact on clinical outcomes and benefit patients with CHD.