

# A Novel Design of a Single Vessel Dual Balloon Catheter

For a controlled, reperfusion-arrhythmia-free recovery of ischaemic myocardium

## Technology

Following myocardial ischaemia caused by full occlusion or partial obstruction of a coronary artery, current treatment typically aims at reperfusing the entire ischaemic tissue as quickly as possible. While this conventional approach addresses the metabolic challenge of ischaemia-reperfusion, it fails to address the potentially fatal electrical heterogeneities that can arise from sudden reperfusion: reperfusion arrhythmias. Often regarded as a necessary evil that is treatable by defibrillation, defibrillation itself can cause additional tissue damage.

We propose a novel catheter system for controlled, two-zone reperfusion of a blocked vessel to prevent reperfusion arrhythmias that occur due to perivascular excitation tunnelling.<sup>1</sup> By reperfusing the distal part of the ischaemic tissue, and so restoring its excitability, while perfusing the proximal part with an oxygenated cardioplegic solution to restore metabolism without regaining electrical excitability, re-entrant arrhythmias through the previously ischaemic zone can be prevented. The underlying principle is that the inexcitable proximal tissue acts as a temporary conduction block zone, shielding the heart from rhythm disturbances. Upon recovery of the distal tissue, the system then allows one to switch perfusates to restore full excitability to the entire tissue.

### Innovation

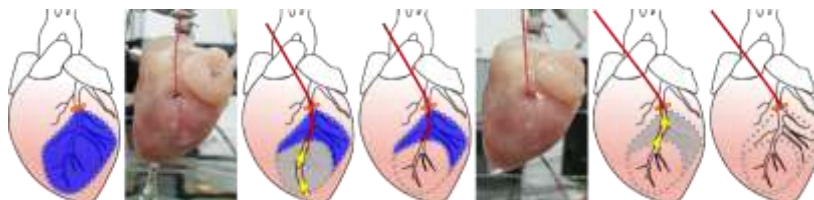
- 2-zone reperfusion of a blocked vessel to prevent reperfusion arrhythmias
- Single-vessel adjustable dual-balloon catheter arrangement allowing one to define two independently controllable reperfusion zones
- Individual control of perfusion to proximal and distal reperfusion zones
- Recording electrodes to assess recovery throughout reperfusion in both reperfusion zones

### Predominant Application

- Post myocardial infarction

### Development Status

Mechanistic proof of principle in isolated hearts (publication in preparation)



1 E Chleilat, et al., Proc Physiol Soc 2021/48:OC01.

### Responsible Scientist

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### Branch

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### Patent Status

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