Impact of reactive oxygen species production on calcium release during ischemia-reperfusion injury

P.P. Jones, Department of Physiology and HeartOtago, University of Otago, Dunedin, Otago, 9016, New Zealand.

Protein oxidation, a consequence of reactive oxygen species (ROS), is a fundamental form of intracellular signalling. ROS production is differentially regulated in discrete regions of the cell, but despite the importance of these 'ROS microdomains' there are currently no tools with the necessary spatial resolution to examine them. In the heart, oxidation is a key regulator of contraction and excess ROS leads to disease, particularly following ischemia-reperfusion injury. ROS augments contraction by increasing calcium release. The calcium release unit in cells of the heart is located within a unique structure, the cardiac dyad, with highly restricted diffusion and localized ROS production. This creates a discrete ROS microdomain. Our recent work has determined the relationship between different ROS levels and calcium release in recombinant cells *in vitro* (Waddell *et al.*, 2016). We are now developing the tools to translate these measurements to the intact heart.

Waddell HMM, Zhang JZ, Hoeksema KJ, McLachlan JJ, McLay JC, Jones PP. (2016) Oxidation of RyR2 has a biphasic effect on the threshold for store overload-induced calcium release. *Biochem. J.* **110(11):** 2386-2396.