## Expression of calcium release channels in rat arteries

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Changes in intracellular calcium concentration, as a consequence of the regulated opening and closing of $Ca^{2+}$ channels, controls many cellular responses. In arteries, $Ca^{2+}$ released from intracellular stores in smooth muscle cells can cause vasoconstriction or vasodilation, depending on the signaling pathways and calcium sources that are involved (see Hill *et al*., 2001). Similarly, in the endothelium $Ca^{2+}$ released from IP3-sensitive stores is associated with vasodilation but the contribution of other $Ca^{2+}$ sources is unknown. Responses to $Ca^{2+}$ fluxes are coordinated through the endothelium and smooth muscle via gap junctions composed of connexins (Cxs). Differential distribution of $Ca^{2+}$ release channels and Cx subtypes may underlie the variability in responses observed between functionally distinct vessels. We used real-time PCR to examine the subtype-specific expression of mRNA for the inositol 1,4,5-trisphosphate receptor (IP3R), ryanodine receptor (RyR), transient receptor potential channels (TrpC), and vascular Cx isoforms in thoracic aorta (ThA), mesenteric (MA) and basilar (BA) arteries removed from juvenile (14-17 day) and adult (9-13 week) Wistar rats that had been anaesthetised with ether and decapitated (Animal Experimentation Ethics Committee, ANU).

IP3R1 was the most abundantly expressed IP3R subtype in all arteries. Compared with the juvenile, the expression of IP3R1 was increased in the adult ThA but not in other arteries, and the expression of IP3R2 and IP3R3 was reduced in the adult MA and BA.

RyR2 was the predominantly expressed RyR subtype in all arteries. RyR3 was detected at a low level in each artery except in the MA where it constituted 25% of RyR expression. Compared with the juvenile, RyR2 was more abundant in the adult ThA but there were no other significant changes with development. RyR1 was not detected in any artery.

TrpC1 was the predominant TrpC channel in all arteries and, compared with the juvenile, was more abundant in the adult ThA. TrpC3 was mainly expressed in the BA and MA, while TrpC4 was mainly expressed in the MA. TrpC6 expression was at a relatively low level in each artery and was much reduced in the adult. TrpC2, TrpC5 and TrpC7 were not detected in any artery. No other substantial changes were found during development.

The expression of vascular Cxs showed that Cx43 >> Cx37 > Cx40 > Cx45 in the ThA while Cx37 >> Cx40 ≈ Cx45 > Cx43 in the MA and BA. Relative levels of Cx expression did not change substantially between the juvenile and adult, although Cx40 expression was significantly reduced in the adult BA and Cx43 was significantly increased in the adult ThA.

The pattern of expression for IP3Rs was similar amongst the 3 arteries however there were differences between elastic (ThA) and resistance (BA, MA) arteries in the expression of TrpC3 and Cxs. Furthermore, MA was distinguished by the expression of TrpC4 and RyR3. Using subtype-specific antibodies we have recently shown that IP3R1 was found in vascular smooth muscle and endothelium while IP3R2 and IP3R3 were almost exclusively restricted to the vascular endothelium (Grayson *et al*., 2003). Future work will determine whether protein expression and distribution of the other $Ca^{2+}$ channel subtypes varies in a similar manner.

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