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Effects of isoflurane post-conditioning on subacute and chronic phase ofischemia-reperfusion heart injury in rats

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Percutaneous coronary intervention and coronary artery bypass grafting (CABG) are therapeutic procedures that can be applied in order to re-establish blood flow in coronary arteries and reduce the size of cardiac infarction. Unfortunately, reperfusion also (paradoxically) exacerbates the initial damage caused by the ischemia itself. So far, investigations using isoflurane in a post-conditioning manner showed a positive effect regarding the infarct size, but were focused mainly on a period of only a few hours after reperfusion. We wanted to see if there are positive effects of isoflurane postconditioning on infarct healing 4 (n=8) and 14 (n=8) days after ischemia-reperfusion injury in rats (sub-acute and chronic phase of healing). Proliferation of newly formed blood vessels is an essential stage of infarct healing. Several studies indicate that the increased genesis of blood vessels in the peri-infarct zone reduces infarct size and improves cardiac function. In our investigation this process was evaluated by detecting various angiogenic factors, including vascular endothelial growth factor (VEGF), platelet/endothelial cell adhesion molecule-1 (PECAM-1/CD31) as a marker of angiogenesis, and Nestin as a marker of immature progenitor cells, and de novo formed blood vessels (vasculogenesis). We wanted to see if isoflurane post-conditioning is a powerful enough stimulus to 'force' resident populations of cardiac Nestin positive cells, possessing an intrinsic ability to differentiate to various subpopulations of cells, towards a vascular path. Hence, we performed double immunolabelling for Nestin and PECAM-1/CD31 to detect endothelial progenitor cells. We can emphasize three morphologically detectable benefits of isoflurane post-conditioning: a marked reduction in the infarct size even on day 14 after ishemia-reperfusion injury; higher number of multipotent progenitor and endothelial progenitor cells along with qualitatively better vascularization of necrotic tissue in the sub-acute phase of infarct healing; more mature looking infarct area in the chronic phase of infarct healing. In addition, in isofluranepostconditioned animals on day 14 after the ischemic injury, we found obvious signs of myocardium regeneration. The smaller quantity of immature granulation tissue along with the higher numbers of newly formed nestin positive cardiomyocytes (derived from progenitor cells) in chronic phase of healing led us to conclude that the infarct area of isoflurane-treated animals heals faster.

Biography

Ivan Agnić is a graduate of University School of Medicine in Split, Croatia. He is working as anAnaesthesiologist in the UniversityHospital in Split. He has completed his PhD at the School of Medicine, Split entitled: 'Impact of isofluranepostconditioning on ishemia-reperfusion injury healing in rats'. So far from this theme he has published one paper in reputed journal *(Histology & Histopathology)*.

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