

Rapid Recovery Hyperbarics

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Effect of oxygenation on stem-cell therapy for myocardial infarction.

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Abstract

Stem-cell transplantation to treat acute myocardial infarction (MI) is gaining importance as a minimally invasive and potent therapy to replace akinetic scar tissue by viable myocardium. Our recent studies have shown that stem-cell transplantation marginally improves myocardial oxygenation in the infarct tissue leading to improvement in cardiac function. The aim of the present study was to determine the effect of hyperbaric oxygen (HBO) treatment on myocardial oxygenation and recovery of function in MI hearts. Fisher-344 rats were subjected to MI by permanently ligating the left-anterior-descending (LAD) coronary artery. The rats were then exposed to 100% O₂ at a pressure of 2 atmospheres for 90 minutes, and the exposure was repeated for 5 days a week for 2 weeks. Adult bone-marrow-derived rat mesenchymal stem cells (MSC, 5x10⁵ cells) were mixed with OxySpin (LiNc- BuO, oxygen sensor) and implanted in the infarct and peri-infarct regions of the heart. M-mode ultrasound echocardiography was performed at baseline and at 2 weeks post-transplantation. The myocardial pO₂ in the MSC+HBO group (16.2±2.2 mmHg) was significantly higher when compared to untreated MI (3.8±1.9 mmHg) or MSC (9.8±2.3 mmHg) groups. In addition, there was a significant improvement in cardiac function, increased vessel density, and VEGF expression in MSC+HBO group compared to MSC group (p < 0.05). **In conclusion, the results suggested a beneficial effect of HBO administration on stem-cell therapy for MI.**

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