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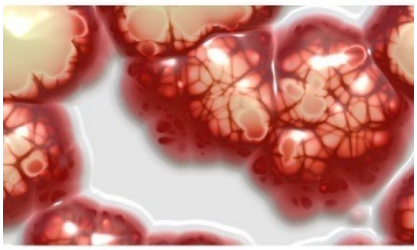
Stem Cell Delivery Can Improve Cardiac Function After Infarction



A study published by Hansen and colleagues in the journal *BioResearch Open Access*, demonstrated that delivering human mesenchymal stem cell (hMSC)-seeded biological sutures to the infarcted myocardium is a promising method with a significant treatment potential for myocardial infarction (MI).

Previous research suggests that stem cell-based therapy can improve cardiac function after MI. However, currently used techniques for the delivery of stem cells to the myocardium suffer from low engraftment rates and therefore negatively affect patient outcomes. Researchers at Worcester Polytechnic Institute, Massachusetts, delivered hMSCs seeded in biological sutures to the damaged heart muscles of rats following induced acute myocardial infarction. One week later, they assessed the effects of hMSC implantation on mechanical cardiac function in the infarct region. Assessed parameters included regional stroke work (RSW), systolic area of contraction (SAC), and global parameters derived from the pressure waveform.

The results showed that MI significantly decreased RSW and SAC when compared with sham operation. The delivery of unseeded biological sutures to the infarcted hearts did not change regional mechanical function compared with the infarcted hearts. The delivery of hMSC-seeded sutures exerted a trend toward increase of regional mechanical function compared with the infarcted heart. Although global function showed no significant differences between any group, there was a trend toward improved function with the addition of either unseeded or seeded biological suture. In addition, hMSCs remained present in the infarcted myocardium after one week. The greatest infarct size was observed in the infarct group, where unseeded and hMSC-seeded suture groups maintained similar infarct sizes. Furthermore, the remaining suture area was significantly decreased in the unseeded group compared with that in the hMSC-seeded group.

The current study suggests that the delivery of hMSC-seeded biological sutures to a specific target, such as the myocardium, can result in functional repair directly in the region where the hMSCs are transplanted. It also demonstrates that varying the concentration of hMSCs as well as the timing of seeding influence the amount of cells seeded onto the sutures. This work has potential applications not only for MSCs and heart muscles but for other cell types and tissues as well.

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