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Induction of Autologous Mesenchymal Stem Cells by Low Level Laser Therapy Has Beneficial Effects on the Infarcted Heart

Uri Oron, Hana Tuby, Lidya Maltz
Zoology, Tel Aviv University, Israel

Multiple clinical trials were performed recently on the use of various stem cells to the ischemic heart. The general outcome of these trials was that the procedures are safe but improvement in the functional performance of the heart was marginal. The aim of the present study was to demonstrate that low level laser therapy (LLLT) application to stem cells at the bone marrow (BM) may have beneficial effects on the infarcted rat heart post myocardial infarction. LLLT applied to the infarcted area in the heart caused a significant reduction of 39% in the infarct size compared to control infracted, non-laser treated rats. LLLT applied directly to stem cells in the BM caused significant ($p<0.001$) reduction of 79% in the infarct size compared to control. Ventricular dilatation measurements also showed a marked reduction (74%, $p<0.001$) in the laser treated rats compared to control. In the group of rats in which LLLT was applied to the BM a significant ($p=0.05$) elevation of 27-fold in the density of c-kit immunopositive cells (a marker of MSCs) in the infracted area as compared to control was noticed. In conclusion, the present study demonstrates a **novel approach** of applying LLLT to autologous BM of infarcted rats in order to induce stem cells that are consequently recruited to the ischemic heart, leading to a marked beneficial effect to the heart post-myocardial infarction. The possibility that this approach can also be applied to other ischemic/injured organs or organs undergoing degenerative processes, with consequent beneficial effects there too, cannot be ruled out.