

Induction of Mesenchymal Stem Cells by Low Laser Therapy has Beneficial Effects on Infarcted Heart

Tuby, Hana; Maltz, Lidia; Oron, Uri

Tel Aviv University, Tel Aviv, Israel

In the last decade cellular therapy for cardiac repair has undergone a rapid transition from basic science to clinical studies. Multiple clinical trials were performed in the last decade on the use of various stem cells applied via coronary arteries or directly to the ischemic heart. Yet, improvement in the functional performance of the heart was not achieved or was very marginal. The aim of the present study was to demonstrate that low level laser therapy (LLLT) application to stem cells can induce and cause recruitment of mesenchymal stem cells (MSCs) to the infarcted rat heart and affect scarring following myocardial infarction (MI). LLLT applied to the infarct area in the heart caused a significant ($p=0.008$) reduction of 39% in the infarct size compared to control (infarcted, non-laser treated rats). LLLT applied directly to stem cells caused even a higher ($p<0.001$) reduction of 79% in the infarct size compared to control. When LLLT was applied directly to the infarcted heart a significant ($p=0.01$) elevation of 8-fold in the density of c-kit immunopositive cells (a marker of MSC) as compared to the control group was noticed. In the group of rats in which LLLT was applied to the stem cells a significant ($p=0.05$) and even higher elevation of 27-fold in the density of c-kit immunopositive cells as compared to control was noticed. In conclusion, the present study demonstrates a novel approach of applying LLLT to autologous stem cells of infarcted rats in order to induce stem cells that are consequently recruited to the ischemic heart, leading to a marked beneficial effect post-myocardial infarction.