

# Low-Energy Laser Irradiation Reduces Formation of Scar Tissue After Myocardial Infarction in Rats and Dogs

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**Background**—Low-energy laser irradiation (LELI) has been found to attenuate various biological processes in tissue culture and experimental animal models. The aim of the present study was to investigate the effect of LELI on the formation of scar tissue in experimentally induced chronic infarct in rats and dogs.

**Methods and Results**—Myocardial infarction (MI) was induced in 50 dogs and 26 rats by ligation of the left anterior descending coronary artery. After induction of MI, the laser-irradiated (LI) group received laser irradiation (infrared laser, 803-nm wavelength) epicardially. Control MI-induced non-laser irradiated (NLI) dogs were sham-operated, and laser was not applied. All dogs were euthanized at 5 to 6 weeks after MI. Infarct size was determined by TTC staining and histology. The laser treatment ( $P,0.05$ ) lowered mortality significantly, from 30% to 6.5%, after induction of MI. The infarct size in the LI dogs was reduced significantly ( $P,0.0001$ ) (52%) compared with NLI dogs. Histological observation of the infarct revealed a typical scar tissue in NLI dogs and cellularity in most of the LI dogs. Only 1463% of the mitochondria in the cardiomyocytes in the ischemic zone (4 hours after MI) of LI MI-induced rats were severely damaged, compared with 3661% in NLI rats. Accordingly, ATP content in that zone was 7.6-fold (significantly) higher in LI than in NLI rats.

**Conclusions**—Our observations indicate that epicardial LELI of rat and dog hearts after chronic MI caused a marked reduction in infarct size, probably due to a cardioprotective effect of the LELI.

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