

Article

Effect of low-power He-Ne laser irradiation on rabbit articular chondrocytes in vitro

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Abstract

Background and Objectives -- In the orthopaedic field, the repair of articular cartilage is still a difficult problem, because of the physiological characters of cartilaginous tissues and chondrocytes. To find an effective method of stimulating their regeneration, this in vitro study focuses on the biostimulation of rabbit articular chondrocytes by low-power He-Ne laser.

Study Design/Materials and Methods -- The articular chondrocytes isolated from the cartilage of the medial condyle of the femur of the rabbit were incubated in DMEM/HamF12 medium. The second passage culture were spread on 24 petri dishes and were irradiated with laser at power output of 2-12 mW for 6.5 minutes, corresponding to the energy density of 1-6 J/cm². Laser treatment was performed three times at a 24-hour interval. After lasering, incubation was continued for 24 hours. Non-irradiated cells were kept under the same conditions as the irradiated ones. The cell proliferation activity was evaluated with a XTT colorimetric method and the cell secretion activity was analyzed by metachromasia and immunocytochemistry.

Results -- Irradiation of 4–6 J/cm² increased the cell numbers and revealed a considerably higher cell proliferation activity comparing to control cultures. There into, the energy density of 4 and 5 J/cm² remarkably increased cell growth, with positive effect on synthesis and secretion of extracellular matrix.

Conclusions -- The present study showed that a particular laser irradiation stimulates articular chondrocytes proliferation and secretion. These findings might be clinically relevant, indicating that low-power laser irradiation treatment is likely to achieve the repair of articular cartilage in clinic. *Lasers Surg. Med.* 34:323–328, 2004. © 2004 Wiley-Liss, Inc.

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