

# The effects of He-Ne laser irradiation on regenerative process of wounded skin of white mice

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The following results have been obtained in the present investigation which deals with the effects of He-Ne laser irradiation on regenerative process of wounded skin of white mice.

(1) A total of 76 white mice, divided into nine groups were exposed to various doses of He-Ne laser irradiation. Differences in time of wound fully healing between irradiation groups and control groups were observed. Paired-t test method was used to test the significance of differences in time of wound fully healed. The experimental results show that the  $0.38\text{J}/\text{mm}^2$  dosage of He-Ne laser irradiation has a promotive action on the regenerative process of wounded skin of white mice.

(2) Samples of irradiation groups which were exposed to dosage of  $0.38\text{ J}/\text{mm}^2$  show superior effects in various histomorphological indices of healing regeneration of wounded skin, such as healing speed of wound, regenerative ability of epidermis, mitotic amount of epithelial cell, density of capillary distribution and growth of granulation tissue etc., than those of the controlled groups. These results show that the low power density He-Ne laser irradiation can stimulate the regeneration of tissues and cells of the wounded skin of white mice.

(3) From the electron microscopic observations, samples of irradiation groups with the dosage of  $0.38\text{ J}/\text{mm}^2$  show an increase in the amount of endoplasmic reticulum in epithelial cells and fibroblasts and the amount of various lysosomes in macrophages. In addition, some fibroblasts which form the collagen in a particular mode has also appeared in these samples of irradiation groups. A part of cell membrane disappeared in these fibroblasts, the cytoplasmic "granules" spread from this part to extra-cellular stroma and then arrange themselves gradually to form the cross striated collagen fibrils. These results indicate that the irradiation with low power density He-Ne laser can stimulate the phagocytosis of macrophage and the new-born of granulation tissue, and thus promote the wounded skin to heal up.

# He-Ne 激光辐照对小白鼠创伤皮肤再生过程的影响

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本研究涉及 He-Ne 激光辐照对小白鼠创伤皮肤再生过程的影响, 获得结果如下:

(1) 在不同 He-Ne 激光辐射剂量下, 照射了九批共76只小白鼠。观察了辐照组与对照组的伤口全愈合时间差异。用成对  $t$  测验方法测验差异显著性。结果表明, 当 He-Ne 激光辐射剂量为  $0.38 \text{ J/mm}^2$  时, 对小白鼠创伤皮肤再生过程有促进的作用。

(2) 在用  $0.38 \text{ J/mm}^2$  剂量的辐照组样品上, 创伤皮肤再生的各项组织形态学指标, 例如伤口愈合速度、表皮组织的再生能力、上皮细胞的有丝分裂数量、微血管分布密度和肉芽组织的生长等, 都比对照组的指标优越。这些结果表明, 低功率密制 He-Ne 激光辐照能刺激组织细胞的再生。

(3) 从电子显微镜的观察, 在  $0.38 \text{ J/mm}^2$  剂量的辐照组样品中, 上皮细胞和成纤维细胞的内质网数量和巨噬细胞的各级溶酶体的数量都有增加, 此外, 还出现了另一种以特殊方式形成胶原纤维的成纤维细胞, 在这些成纤维细胞中, 部分胞膜消失, 胞质内的“颗粒”从胞膜消失处向细胞外基质伸展, 然后逐步排列形成具有横纹的胶原纤维。这些结果表明: 低功率密度 He-Ne 激光辐照能刺激巨噬细胞的吞噬作用和肉芽组织的新生从而促进创伤皮肤愈合。