EFFECTS OF LOW-INTENSITY, LINEARLY POLARIZED NEODYMIUM LASER BEAM ON SKIN WOUNDS HEALING

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According to the Maxwell's equations, the optical energy deposition efficiency in a microroughness interface depends on the electrical field polarization component. Considering a linearly polarized laser beam, this efficiency depends on the roughness parameters for p polarized light and it does not depend of such parameters for s polarized light. Previous research in our laboratory has shown that the polarization component of the electrical field plays an important role on the healing process of inflammatory lesions created in the end of the spinal column of Lewis rats, using a He-Ne laser at 632,8 nm wavelength.

It is well known that polarization is lost in a turbid medium, such as living tissue. However, the Nd:YAG wavelength (1064 nm) allows more polarization preservation than 632,8 nm. The Nd:YAG laser beam has been used in clinical trials as a biostimulating agent. In this work, we have investigated the influence of a low-intensity, linearly polarized Nd:YAG laser beam on skin wounds healing, considering two orthogonal directions of polarization.

Three round lesions measuring about 6 mm in diameter were created at the end of the spinal column of twenty rats by burning the rat back skin with liquid nitrogen. Lesions #1 and #2 were illuminated using Nd:YAG pulsed laser radiation. The laser polarization was aligned with the rat spinal direction in lesion #1 and with the perpendicular relative orientation in lesion #2. The lesion #3 was not irradiated (control). The animals were irradiated with a total dose of 1 J/cm2 on days 3, 7, 10 and 14, post-wounding. We have taken photographs from the wound areas on the 3rd, 7th, 10th, 14th and 17th postoperative day.

This macroscopic analysis has shown that the lesions #1 healed faster than other lesions, which presented a smaller degree of healing after 17 days post-wounding.

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