

Healing Process after Pulsed CO₂ Laser Irradiation on Rat Palatal Mucosa

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Despite the extensive use of the pulsed CO₂ laser, the cellular response and healing process after irradiation with it is not fully understood. We conducted this study to evaluate the healing process of the laser wound by means of histopathology and immunohistochemistry.

The CO₂ laser irradiation was made on rat palatal mucosa with the parameters of 600 μ s pulse duration, 5W peak power, 151.52pps repetition rate, and 14.16J/mm² average energy density. The palatal mucosa dissected at 6 hrs and 1, 3, 5, and 7 days after irradiation was fixed and embedded in paraffin. The sections were stained with H-E or Azan-Mallory for histopathological examination or processed immunohistochemically to examine the expression of Hsp47, α -SMA, and Factor-VIII.

On day 1 post-irradiation, the laser wound consisted of coagulation necrosis showing the matrix configuration identical to that of the surrounding normal tissue, along the surface of which the emigration of regenerating epithelium was observed. In the tissue surrounding the laser wound, the up-regulation of Hsp47 in fibroblasts and vascular endothelial cells was noted. On day 3, re-epithelization of the wound surface was completed and Hsp47-expressed fibroblasts and vascular endothelial cells progressively infiltrated into the wound. Some fibroblasts exhibited the expression of α -SMA. On day 7, the wound was almost entirely replaced by newly formed fibroblasts and capillaries, most of which appeared to express strong Hsp47. Many of Hsp47-positive fibroblasts in the laser wound also showed α -SMA-expression. The extracellular matrix of the laser wound showed Factor-VIII-positive reaction throughout the experimental period except 6 hours post-irradiation, suggesting the persistence of inflammatory reaction.

Since there was no significant difference in the healing process between laser wound and scalpel-made wound, we speculate that laser irradiation and the resultant tissue coagulation may not necessarily disturb the healing process.

Key words : CO₂ laser, Hsp47, α -SMA, Factor-VIII

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