

**PATHOPHYSIOLOGICAL PATTERNS OF REPARATIVE PROCESSES
UNDER DIFFERENT MODES OF LASER TISSUE TREATMENT**

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Keywords. laser tissue treatment, wound healing; reparative processes, infrared and ultraviolet laser therapy.

The aim of the study was to investigate the patterns of wound healing and reparative processes under different modes of laser tissue treatment in an experimental setting.

Materials and methods. The study was performed on 36 white outbred rats and 6 rabbits with modeling of infected wounds. Animals were divided into control and experimental groups depending on the type of laser exposure. In the control group, conventional full-thickness laser incision was performed. In the experimental group, a modified technique was applied, including selective infrared laser exposure (1.46 μm) to the deep dermal layers with preservation of the epithelial and basal layers, followed by additional ultraviolet (UV) laser treatment of the wound surface. The course of wound healing was assessed based on clinical and morphological parameters, including inflammatory response, necrosis, wound edge integrity, epithelialization rate, and type of healing.

Results. It was established that the nature of the wound process is determined by the depth and selectivity of laser exposure. In the control group, conventional laser incision led to the formation of a coagulation necrosis zone, which under conditions of

microbial contamination was associated with the development of inflammatory reaction, wound edge separation, and delayed healing predominantly by secondary intention. In contrast, the modified technique provided a fundamentally different pattern of reparative processes. Preservation of superficial skin structures combined with selective coagulation of deep dermal layers ensured reliable hemostasis, minimal necrotic changes, and favorable conditions for tissue regeneration. Wound healing in the experimental group occurred predominantly by primary intention, without signs of infection or suture failure. Dynamic observation demonstrated that by day 7 complete wound healing was achieved in rabbits, whereas in rats active epithelialization was observed by day 14 with almost complete tissue restoration by day 21. In the control group, complete healing occurred only by day 21 and was accompanied by coarse scar formation and prolonged inflammatory phase.

Conclusion. The mode of laser exposure plays a key pathogenetic role in determining the course of wound healing. Selective infrared laser treatment of deep dermal layers with preservation of superficial structures, combined with ultraviolet irradiation, creates optimal conditions for reparative processes, reduces inflammatory complications, and significantly accelerates tissue regeneration. The obtained data substantiate the feasibility of using modified laser technologies to optimize surgical outcomes in conditions of infected wounds.

References

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