The Effects of Low-Intensity Laser on Skin Wound Healing in Rabbits

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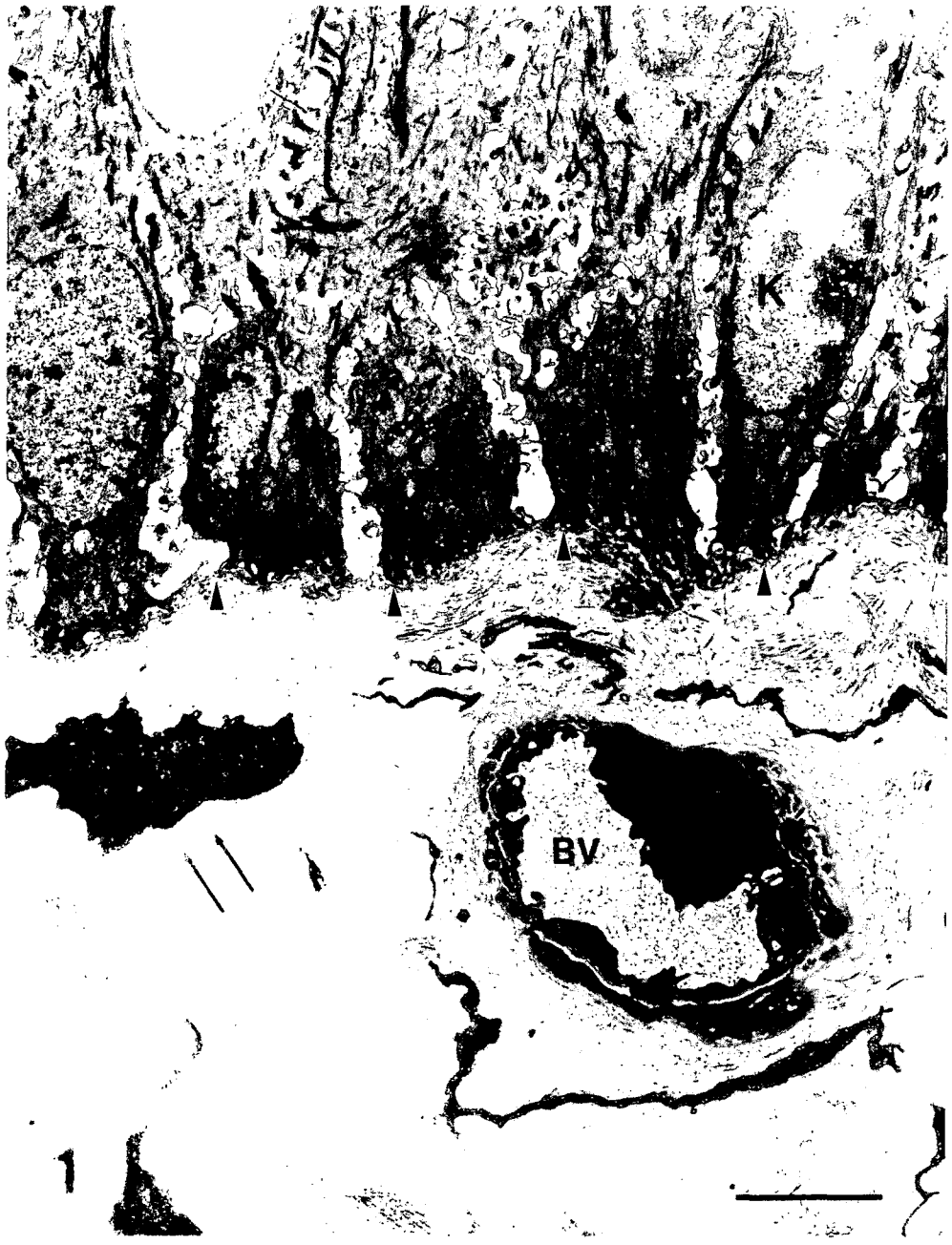
Skin is an organ that has many important roles, including protection against infection, regulation of temperature and fluid loss, and sensory function. Injury to the skin, wound repair normally involves: (1) balanced activity of inflammation, (2) the re-epithelial phase and (3) the matrix formation of remodeling phase. Thus, skin wound healing is a finely controlled biological process involving a series of complex cellular interactions. Laser therapy is being implemented with increasing frequency in medicine. Low intensity laser is one that is capable of producing an energy density so low that any biologic alterations are the result of direct irradiation effect, not thermal events. This study was designed to evaluate the efficacy of low intensity laser therapy on skin wound healing in rabbits. A total of 10 male rabbits, age 4 months were used. Skin wound were sugically created dorso-lateral on the flank of 10 rabbits (2×2cm/damage areas). The experimental animals were treated with 5Hz (830 nm wave length) low-intensity laser (MILTA-01 Model) daily at 10min (16 mJ) for 12 days. Control animals were sham treated with the laser head. Laser irradiation animals showed a complete remodeling of the epithelial layer, a positive repair of connective tissues, and enhanced the wound closure rate over time as compared to the control animals. Especially, laser irradiation groups improved fibroblast activity, cellular content, granulation tissue formation, and collagen deposition which is resulted in improving the tensile strength of the wound. These findings suggest that laser photostimulation could accelerate healing of open wound in rabbits, and may be benefit in the treatment of open wound, including decubitis ulcers.

Figure 1. Transmission electron micrograph of the rabbit skin wound after laser irradiation. This micrograph shows that the wound base is filled with newly formed connective tissue and the blood vessel (BV). The boundary of the basal layer (arrow heads) and dermis can be seen clear line. Parallel alignment of fibroblast (arrows) and collagen fibers with dense arrangement in adjacent dermis can be seen. K; keratinocyte. Scale bar = 5 ㎛

Figure 2. Transmission electron micrograph of the rat skin wound after laser irradiation. In this laser irradiation groups, dense collagen fibers (arrows) are more developed and numerous than control groups. This micrograph depict that fibroblasts (F) have a prominent rough endoplasmic reticulum (arrow heads) and active collagen synthesis. The dilated cisternae are filled with a amorphous material produced by the ribosomes. Scale bar = 2 ㎛


K
BV
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