

Spinal Cord Injury

Light promotes regeneration and functional recovery and alters the immune response after spinal cord injury

Lasers in Surgery and Medicine

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Abstract

Background and Objectives

Photobiomodulation (PBM) has been proposed as a potential therapy for spinal cord injury (SCI). We aimed to demonstrate that 810 nm light can penetrate deep into the body and promote neuronal regeneration and functional recovery.

Study Design/Materials and Methods

Adult rats underwent a T9 dorsal hemisection, followed by treatment with an 810 nm, 150 mW diode laser (dosage = 1,589 J/cm²). Axonal regeneration and functional recovery were assessed using single and double label tract tracing and various locomotor tasks. The immune response within the spinal cord was also assessed.

Results

PBM, with 6% power penetration to the spinal cord depth, significantly increased axonal number and distance of regrowth ($P < 0.001$). PBM also returned aspects of function to baseline levels and significantly suppressed immune cell activation and cytokine/chemokine expression.

Conclusion

Our results demonstrate that light, delivered transcutaneously, improves recovery after injury and suggests that light will be a useful treatment for human spinal cord injury.

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