



980nm laser irradiation improved functional recovery after peroneal nerve injury in rabbits

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Background:

Light therapy (LT) has been shown to promote peripheral nerve regeneration using wavelengths primarily within 600-900nm. Longer wavelengths are not commonly used for repair of the peripheral nervous system and their effects in promoting peripheral nerve regeneration have not been adequately researched. Our objective in this study was to investigate for the first time the capacity of 980nm wavelength laser irradiation to improve post-traumatic peripheral nerve regeneration.

Materials and Methods:

Twelve White New Zealand rabbits were randomized into 2 groups: 1) control, no light; and 2) LT, light treatment using parameters: 980nm wavelength, 1.5W output power, 40 seconds duration, and 8cm² area at the skin surface. The left peroneal nerve was completely transected and repaired using epineural suture with 8-0 ethilon. Light was applied transcutaneously immediately after closure of the skin and daily thereafter for a total of 10 days. Control group was treated exactly the same but with laser off. To measure functional recovery, toe-spreading reflex test was performed at baseline and weekly starting from the fourth week post-injury. Animals were euthanized at week 9 post-injury.

Results:

At week 4, toe spread was 63.7±2.6% and 65.3±2.9% of baseline for control and LT groups respectively, indicating functional loss in both groups. At week 6, LT group showed statistically significant functional recovery compared to week 4 ($p<0.05$), while control group didn't show functional recovery ($p=0.68$). LT group consistently performed significantly better in the toe spread reflex test compared to the control group starting from week 6, with a return of function to 86.9±4.2% in LT group and 72.2± 3.6% in control group ($p<0.05$) by week 9.

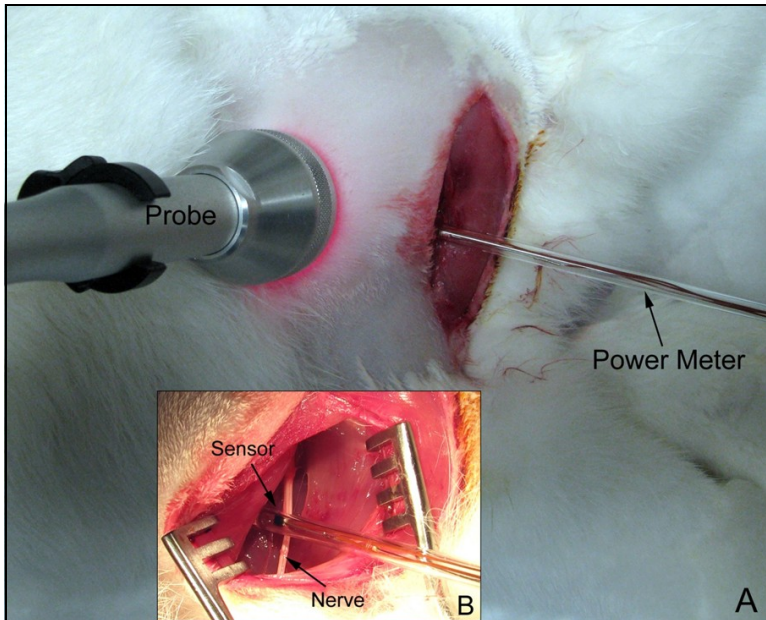
Discussion:

Our results demonstrate that 980nm laser irradiation successfully promoted earlier and faster functional recovery after peroneal nerve transection and surgical repair. This study warrants further investigations into use of 980nm lasers as treatment for nervous system injuries.

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Key words: light therapy, peripheral nerve injury, regeneration, toe spread reflex



Animal Studies

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Background:
 Petri Dish study yielded optimal parameters for nerve repair was $\sim 100 \text{ mJ/cm}^2$.

Extrapolating from this using the transmission data shows an appropriate dosage on the surface in treating this nerve will be 4 J/cm^2 .

