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ABSTRACT OF DISSERTATION

Title	Low-Intensity Pulsed Ultrasound Ameliorates Neuropathic Pain Induced by Partial Sciatic Nerve Ligation Via Regulating Macrophage Polarization （低出力超音波パルスは坐骨神経部分結紮によって引き起こされる神経障害性疼痛をマクロファージ極性制御を介して改善する）
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Objective: Inflammatory (M1-polarized) macrophages cause neuropathic pain (NP) after nerve injury through non-resolving neuroinflammation. However, increasing evidence suggests that converting M1 to anti-inflammatory M2 macrophages may rescue NP. In the present study, the therapeutic potential of low-intensity pulsed ultrasound (LIPUS) was investigated in a partial sciatic nerve ligation (PSL)-induced NP model.

Materials and Methods: Abnormal pain sensations, such as tactile allodynia and hyperalgesia, were caused by PSL. Immediately after PSL induction, the mice were subjected to LIPUS treatment for 20 min/day for 7 days. LIPUS was used at an average intensity of 60 mW/cm^2 and a frequency of 1.5 MHz.

Results: In the behavioral test, the LIPUS group showed a significant improvement in the PSL-induced hypersensitivity compared to the PSL group not exposed to LIPUS. We found an increasing number of M2 macrophages in the injured sciatic nerves after LIPUS exposure. Furthermore, the activation of spinal microglia was suppressed after LIPUS treatment.

Conclusions: Our data suggest that LIPUS has an anti-nociceptive effect by inducing anti-inflammatory M2 macrophages and may be a suitable therapeutic candidate for NP.