Docket #: S23-109

Improved Pain Suppression with Targeted Ultrasound

Stanford researchers have developed a method for targeted focused ultrasound application to peripheral nerves to suppress acute pain. This invention can non-invasively concentrate ultrasound waves onto peripheral nerves without impacting surrounding tissue. It uses focused ultrasound waves to block pain fibers for 1-2 weeks with minimal motor fiber blockage, avoiding problems with common pharmaceutical painkillers and traditional 'nerve block' techniques.

Pain after surgery or injury is often moderate-to-severe for 1-2 weeks and the majority of patients have poorly controlled acute pain during this time. Moderate-to-severe acute pain is associated with increased risk of a wide array of worsened health outcomes including developing myocardial ischemia, impaired pulmonary function, ileus, thromboembolism, impaired immune function, infection, and anxiety. Opioids are commonly prescribed to treat pain and they do well at controlling dull, burning, or rest pain, but don't do as well at controlling sharp or movement pain. Traditional 'nerve blocks' use inject local anesthetics near nerves; these local anesthetic drugs block all nerve fibers, not just pain fibers, including motor and non-pain sensory fibers, which can increase the risk of a patient falling and prevents early participation in physical therapy. There is therefore a significant need for a non-invasive, non-drug based pain therapy which can block acute pain for 1-2 weeks after surgery or injury without the risk of major side effects. This invention can non-invasively and reversibly inhibit peripheral nerves with no risk of serious side effects and has the potential to greatly improve the standard of care for patients managing acute pain.

Stage of Development
Pre-clinical, proof of concept in animals

Related Technologies:
Stanford docket 17-430: Acute and Chronic Pain Suppression through Targeted

Peripheral Nerve Application of Focused Ultrasound

Applications

- Acute pain management
- Chronic pain management
- Pain management after surgery and trauma

Advantages

- The only current focused ultrasound device for peripheral nervous system neuromodulation to suppress acute pain
- Alternative to opioid treatment and traditional nerve blocks
- Non-invasive
- Easy to administer
- Optimized nerve fiber selectivity
- No risk of serious side effects
- Can block pain fibers for different durations

Publications

- Anderson TA, Pacharinsak C, Vilches-Moure J, Kantarci H, Zuchero JB, Butts-Pauly K, Yeomans D.Focused ultrasound-induced inhibition of peripheral nerve fibers in an animal model of acute pain. Reg Anesth Pain Med. 2023 Sep;48(9):462-470. Epub 2023 Feb 23. PMID: 36822815.
- Anderson TA, Delgado J, Sun S, Behzadian N, Vilches-Moure J, Szlavik RB, Butts-Pauly K, Yeomans D. Dose-dependent effects of high intensity focused ultrasound on compound action potentials in an ex vivo rodent peripheral nerve model: comparison to local anesthetics. Reg Anesth Pain Med. 2022 Apr;47(4):242-248. Epub 2022 Feb 3. PMID: 35115412.

Patents

- Published Application: WO2024263992

- Published Application: 20260102636

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