An Innovative Approach to Providing Noninvasive and Precise Acute Pain Management Using Focused Ultrasound

Acute pain management involves assessing, treating, and monitoring pain that may be of sudden onset but may take weeks to resolve. Injury, surgery, medical procedures, or disease processes may cause this type of pain, which can be severe and debilitating. In the U.S., there are 150 million surgeries and emergency department visits annually; 70% of these patients report moderate to severe pain.

Poorly controlled pain – which is common in large part due to limitations in current treatment options – is associated with significant patient morbidity, including prolonged recovery, increased healthcare costs, and an increased risk of developing chronic pain.

Pain medications and/or nerve blocks for managing pain are often ineffective. Non-opioid pain medications have dose-limiting side effects, restricting their effectiveness. Opioids are inadequate for controlling acute pain as they only partially block pain fibers and have many serious short- and long-term adverse effects, including addiction and death.

In addition to creating a non-invasive and easy-to-administer method to control acute pain, our goal is to expand pain management options for patients who currently might not qualify to undergo regional anesthesia.
-Thomas ("Tony") Anderson, M.D., Ph.D.

Current nerve block techniques, via needle insertion and injection of local anesthetics around peripheral nerves, improve acute pain for some patients but have significant shortcomings restricting their use. These limitations include their short duration of action relative to how long pain often lasts, inhibition of not just pain fibers but also motor fibers resulting in temporary paralysis, their invasiveness, and the need for advanced healthcare training to conduct nerve blocks.

There is a critical need for an acute pain management tool that inhibits pain fibers without causing temporary paralysis, is noninvasive, does not require systemic medications, and reduces pain for 1-2 weeks. Acute pain will remain poorly treated without such a tool, resulting in adverse outcomes and long-term harm from using dangerous pain medications, especially opioids.

Focused ultrasound (FUS) is a ground-breaking technology providing an alternative to pain medications and current invasive nerve block techniques for managing acute pain. This technology focuses beams of ultrasonic energy precisely and accurately on nerves without damaging surrounding normal tissue. The Anderson Lab's research team found that applying FUS to nerves

resulted in 1-2 weeks of significantly decreased pain in animals. A single, noninvasive application of FUS takes less than 5 minutes and can block pain for up to 2 weeks, potentially eliminating the need for pain medications. His research team's long-term goal is to develop FUS into a device used for nerve blockade to improve acute pain management in people without the need for pain medications, especially opioids. No such device currently exists. The National Institutes of Health typically does not fund device development, so philanthropy is vital to making this device available to healthcare providers and patients to more effectively manage acute pain.

ABOUT DR. ANDERSON

Thomas Anthony Anderson, M.D., Ph.D. is a pediatric and adult anesthesiologist at the Stanford University School of Medicine. His research interests include using non-opioid pharmacologic agents and regional anesthesia to improve pediatric and adult patient analgesia and safety. Dr. Anderson and his research team focus on using novel technologies and pharmacologic agents to reduce acute pain and the risk of chronic pain after surgery. He earned his medical degree from the University of Michigan School of Medicine and a Ph.D. from the Massachusetts Institute of Technology. Dr. Anderson completed his residency at UCSF, a fellowship at Boston Children's Hospital, and a faculty fellowship at Stanford's Byers Center for Biodesign. Dr. Anderson's research has received support from the Stanford-Coulter Translational Research Grants Program and Fogarty Innovation. For more information about his lab, visit: https://andersonlab.stanford.edu/

OPPORTUNITY FOR IMPACT

Inadequate treatment of pain represents a public health crisis in the United States. In a dedicated effort to lessen the burden of pain on patients and their caregivers, Stanford faculty are determined to prevent and alleviate pain by developing new and effective treatments and therapies. With philanthropic support for his research efforts, Dr. Anderson can advance his research discoveries more quickly and share best practices for clinical care.

Anderson Translational Research and Innovation Fund | $1.5 million to $5.5 million
Gifts to this fund enable Dr. Anderson to advance promising new projects and help translate discoveries into treatments delivered to patients. A $1.5 million commitment will enable Dr. Anderson and his research team to build a first-generation focused ultrasound device to conduct initial trials in humans. A $5.5 million commitment will fund the initial trial and provide $4 million in seed funding to further develop the device from a prototype to a marketable product.

For more information on how you can help advance Dr. Anderson's research efforts by making a philanthropic contribution, please contact:

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