Clinical trial underway: Miniature ultrasound device could revolutionize pain relief

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It looks more like an iPod than a medical tool. But the latest miniature ultrasound device created by Cornell biomedical engineering graduate student George K. Lewis could one day introduce a whole new level of home therapy for arthritis, injury and other painful ailments.

The sleek blue-and-white device slips into a pocket and sends ultrasound waves deep into muscles via a coin-sized polystyrene pad. This is the transducer, which converts electrical energy into ultrasound.

Lewis hopes that this model - possibly the world's smallest ultrasound device - can hit the marketplace and find itself in the pockets of millions of people.

Since first publishing research about his pocket-sized devices in 2007, Lewis has continued to improve them, making them smaller and more efficient. He recently teamed with MBA student Bryant Guffey to form ZetrOZ Inc. to try and take the devices to the market.

And to give the systems medical legitimacy, Lewis - a National Science Foundation fellow and a Cornell Presidential Life Sciences fellow - has partnered with Cary Reid, a geriatrician at Weill Cornell Medical College's Irving Sherwood Wright Center on Aging, and Charles Henderson, senior research associate in the Department of Human Development, to prepare their first clinical trial. The study will focus on

osteoarthritis patients to determine whether the devices can significantly reduce joint pain. The devices are likely useful for all types of arthritis, Lewis said.

Ultrasound is often used to relieve muscle and joint pain but requires patients to receive treatments in doctors' and physical therapists' offices. Lewis' mini-machine would allow people to receive such treatment at home and work.

Reid said that medications are the primary way to treat pain in older patients, but with age comes increased risk of complications. There is a "great need" to support research into non-drug therapies for pain, Reid said.

Lewis' latest prototype sends low-intensity energy in the form of ultrasound waves from the transducer into the body, which is gentle enough to be kept close to the skin for up to 10 hours.

The clinical study at Weill Cornell will be restricted to patients with osteoarthritis of the knee. Reid emphasized that for the study to be successful, participants must not only experience reduced pain, but also increased mobility.

"The most rigorous outcome or benchmark to judge this treatment is whether people change their overall level of activity as a consequence of it," Reid said.

Lewis and Guffey also hope to eventually demonstrate that the ultrasound device could be used for such groundbreaking therapies as muscle healing and even drug delivery. For example, Lewis hopes his device can affect treatment for the brain cancer glioblastoma, which is the subject of Lewis' Ph.D. thesis. After tumor removal surgery, a surgeon would place a dissolving drug wafer into the hole, and the

ultrasound would help spread the drug to kill the remaining cancer.

However, to make new claims and get FDA approval will require additional clinical studies down the road, Lewis said.

Provided by Cornell University

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