

Ultrasound, Microbubbles, Acoustic Pattern Recognition And Wireless Technology

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Using a portable device to diagnose strokes “in the field” is one of the primary goals of BURL Concepts. But the company’s innovative technology, which combines ultrasound, microbubbles, acoustic pattern recognition and wireless technology, has a number of applications that go well beyond stroke detection.

The use of ultrasound to reopen clotted vessels, known as sonothrombolysis, has generated considerable excitement in the medical community. The team at BURL Concepts is becoming internationally recognized for its expertise in this field, thanks to the work of Thilo Hoelscher, M.D., a board-certified neurologist from Germany.

Hoelscher came to UC San Diego in 2002 to collaborate on research with Robert Mattrey, Ph.D., the vice-chairman of radiology. “I was doing some cutting edge work on the brain using ultrasound and microbubbles,” recalled Hoelscher. “Nobody in the U.S. at that time was doing that kind of work.”

Hoelscher started his own lab in 2008, and by 2012, he was focused almost exclusively on microbubbles and ultrasound. He partnered with Arne Voie, Ph.D, Director of Brain Ultrasound Research Laboratory, UCSD Department of Radiology, to develop a battery-powered, hand-held ultrasound device that allows paramedics and EMTs to detect whether a stroke occurred or not in the pre-hospital environment.

The BURL device – BURL stands for Brain Ultrasound Research Laboratory – transfers this data, in real time, to a hospital or other dedicated location using wireless technology. “Stroke diagnosis and potentially treatment should be initiated at the earliest point possible, preferably at the site or during patient transport,” said Hoelscher.

“Portable ultrasound has been used for pre-hospital diagnosis for applications other than stroke, and its acceptance as a valuable diagnostic tool ‘in the field’ is growing,” he added. “In the future, I envision small devices that are the size of an iPhone which use disposable ultrasound transducers. You patch them to the temporal bone, and then you start a diagnosis right there.”

Globally, 15 million strokes occur every year, and less than 5 percent of those victims get any treatment. The impact on stroke victims and their families can be catastrophic. “Every one of us knows someone who has had a stroke,” said company co-founder Jim Brailean, who holds a Ph.D. in Electrical Engineering. “My own mother had two strokes, which were misdiagnosed, and they definitely impacted the quality of her life.”

While BURL Concepts is perfecting its handheld stroke detection model, the company is also exploring other scenarios where ultrasound, in combination with microbubbles, can improve upon current diagnostic tools and treatments. One such application is drug delivery, where the BURL device can temporarily “open the gates” of the blood-brain barrier

(BBB) to deploy targeted drug delivery where needed without overloading the entire body with pharmaceutical agents like chemotherapy.

“ *The BURL device can also act as a BBB gatekeeper for targeted gene therapy. This core competency has already been established using rodent models.*

BURL's long-range plans are to market affordable devices to an international customer base, and its ultimate goal is to save lives in the remotest parts of the globe. “In some rural areas, it can take hours to get to a hospital,” said Brailean. “Transport times in developing nations can stretch into days. So we see the world as our market. We want to make [BURL devices] as cheaply as possible, so they're as common as cardiac defibrillators.”

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