Breakthrough Technology for Lowering Blood Pressure

Heart disease, kidney failure and strokes are among the top causes of death in the United States and around the world and can be caused by hypertension. This is the most common medical problem, probably in the world, and the number of people with hypertension is increasing as the incidence increases with age, diabetes, and obesity.



Nearly half of Americans have high blood pressure, but only one in three people are even aware that they have it, and less than half are effectively treated, according to the Center for Disease Control. The Office of the Surgeon General says it's not only a nationwide health emergency, it's quite possibly the *biggest health crisis of our time.*

The U.S. spends $130 billion a year dealing with the morbid side effects of hypertension and high blood pressure. The creators of California startup PressureStim have developed a solution that can save lives -- and it's not a pill.

There are dozens of medications available to treat high blood pressure, but none genuinely help prevent hypertension or make it completely go away, and most have side effects that significantly limit compliance for a condition that is largely without symptoms until a stroke or heart or kidney disease are evident.

The makers of PressureStim are in the midst of developing a bioelectric pulse treatment, one that's poised to drastically improve the quality of care for millions, no matter where they live or what they earn. New clinical trials are launching this year after a delay due to the coronavirus.

PressureStim is a wearable technology that resembles a carpal tunnel brace. It is outfitted with patented technology that delivers non-invasive acupressure to certain locations on the wrist. The treatment uses the body's nervous system to lower a patient's blood pressure.

It is the first therapy to use a bioelectric-controlled release of a protein in the body called tropoelastin, the pre-cursor of elastin, to increase the elasticity of the aorta and other peripheral vasculature and serve as dampening mechanism for high blood pressure.

"The use of it to treat high blood pressure is a breakthrough technology," says Dr. Les Miller, Chief Medical Officer at Leonhardt Ventures LLC and practicing cardiologist.

Other areas of treatment by the company in which bioelectric stimulation are used to lower blood pressure include the ankle, back, and auricle ear lobe, which are being tested to as novel non-invasive approaches to treating hypertension.

During PressureStim's first trial of 300 patients, which took place in early 2020, the procedure was administered once a week and yielded promoting results.

Will patients swap their daily medication for a weekly outpatient treatment?

"Absolutely," Dr. Miller says. "PressureStim fills a huge need for millions of people. Compliance with taking multiple doses of medications for a condition that is largely asymptomatic is the biggest problem with the increasing prevalence of the condition and its significant side effects. Everyone wants an alternative to a drug. They'll be lining up for it."

Bobby Shah, President of PressureStim, says that the patented technology is beneficial for insurance payers and healthcare providers alike because it is an attractive low-cost treatment.

"With hundreds of billions of dollars spent on hypertension treatment and care each year, globally everyone from the government to investors are looking for innovative and cost-effective ways to treat the disease," he says.

Only PressureStim is using pulsed electrical stimulation to identify proteins that are important to improving the elasticity of arteries to allow them to relax and decrease the constriction that increases blood pressure.

It is also the only known therapy to control the release of another novel protein in the body called Klotho. Klotho levels decrease with age and are associated with progressive kidney disease, and increasing Klotho levels has been found in studies to reduce high blood pressure. The body produces less klotho as it ages, "so this treatment is crucial to treating older patients," Shah says.

In addition to outpatient clinics, Shah says it will ultimately be administered in long-term care facilities to monitor blood pressure in real time.

"It will be an internal part of lifestyle management," he says.

Once the product is clinically available, the next step is identifying and getting it to the people who need it.

The PressureStim team is focusing on blood pressure testing in high traffic places, like shopping malls, to facilitate early detection of the disease, then delivering the treatment as simply as possible.

"This is a condition that will not be going away -- it's lifelong," Shah says.

Healthcare investors are targeting new ways to gather and secure patient data. Existing technology relies on patient data from insurers, and the quality of data is really where it needs to be, Shah says.

"PressureStim was created to deliver acupressure, but also to log real time patient data," he adds. PressureStim works best with patients who pair it with a healthy diet and exercise regime to help control weight and blood glucose, as opposed to those who pair it only with daily medications, according to researchers' investigative work.

Historically, compliance has been one of the biggest problems in treating high blood pressure, because there are very few symptoms or warning signs until the condition is advanced and causing consequences like stroke.

"Lifestyle modification is very important in blood pressure management. A good lifestyle," Dr. Miller says, "usually means better results."

The data that Dr. Miller and Shah's team have gathered has been very encouraging and they expect innovative technology to solidify it even more.

"We're expanding our clinical trial base and examining the optimal locations and delivery," Dr. Miller says. "We know this mechanism works, but we need to expand our clinical trial base to refine optimal delivery. We're enthused by what we've found thus far, but we need more data and more trials to discover more."

High blood pressure often starts asymptomatically, meaning a patient has no idea they have it. The most common cause is genetics; the risk of developing hypertension is inherited, and most likely to develop with high salt intake, obesity, and lack of exercise.

Whether it's a preexisting medical condition, obesity, or just bad habits that contribute to it, high blood pressure is a silent killer, often targeting the poorest communities.

While wealthy regions are more likely to have easy access to prescription medications, poor communities may not. Inequality and gaps in medical care are impossible to resolve with one product, but it's an important step in the right direction.

"A different approach," Dr. Miller says, "is badly needed." — By Victoria Kertz, California Business Journal

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