J.C. CHIAO

Jenkins Garrett professor of electrical engineering, University of Texas at Arlington

By Bill Michalosch Staff Writer

Think of it as a pacemaker for the stomach.

That’s one of the medical devices Dr. J.C. Chiao is trying to bring to market. The device, called a gastric stimulator, could eventually help some of the more than 170 million people worldwide who suffer from gastroesophageal or partial paralysis of the stomach.

The disease often develops in patients with a long history of diabetes or those undergoing chemotherapy.

People suffering from gastroparesis have disrupted digestion, feel nauseated, frequently vomit and aren’t able to get proper nutrition.

“With gastroparesis, the patient’s stomach doesn’t marry, Chiao said. Basically, what we do is we develop a pacemaker to jump-start the stomach.

The small stimulator Chiao and his team came up with forces the stomach to contract, which helps it digest properly. It can be implanted during a 30-minute outpatient procedure through the mouth, using an endoscope, and without surgery, he said.

The device needs to undergo FDA testing, so it will be four or five years before it’s ready for clinical application, he said.

The closest competition for treatment of gastroparesis and other stomach motility disorders is a much larger neurostimulator device that requires a three-hour surgery under general anesthesia and hospitalization afterward, he said. Chiao’s device is smaller than half a postage stamp.

A small controller that mounts on a necklace or belt wirelessly activates the implant to set off weak electrical impulses that stimulate the stomach muscles, making the stomach move to properly digest food.

The device also has applications for obesity control, Chiao said. After a patient eats, the stimulator can make the stomach move in an out-of-sync way to make the patient feel full, he said.

About 171 million people had gastroptosis in 2000 and 386 million are expected to have the condition by 2050, according to the World Health Organization.

Chiao is working with a team of clinicians from the University of Mississippi Medical Center and Texas Health Resources to further the development of the patent-pending device.

In addition, Chiao is an adjunct associate professor of internal medicine at the University of Texas at Arlington, where he said his research achievements are multidisciplinary, incorporating electrical and mechanical engineering, optics, nanotechnology, wireless technologies, biotechnology and medicine.

Dr. Rajeev Jain, a partner at Texas Digestive Disease Consultants and chief of gastroenterology at Texas Health Dallas, is working with Chiao on the gastric stimulator.

"It is interesting some amazing things with trying to take different technologies and miniaturize them and then apply them there’s need in digestive disorders, Rajeev said.

In addition to the gastric stimulator, Chiao has developed implantable sensors that help treat severe acid reflux, sensors to test treatments for illnesses that can lead to cancer, and, in collaboration with other researchers, neurostimulators designed to detect and block pain signals.

Chiao said he has long been fascinated by the promise that engineering holds for medicine. "I believe that engineering can offer a lot to reduce health care costs by implementing some comfortable and convenient ways to monitor the patient or to treat the patient or to let the patient control their own management of illness."

"The medical market is an area of growth," he said. "We are getting older. I believe if a student has a dual talent across engineering and medicine, they are better off for the future."
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