Gastroesophageal Reflux; Doctors, Engineers Develop New Wireless System to Detect Esophageal Reflux
June 12, 2007
Science Letter by NewsRX

UT Southwestern Medical Center doctors and UT Arlington engineers have developed a wireless monitoring system that uses electrical impulses to track esophageal reflux.

The wireless technology, called radio frequency identification (RFID), has been used in thousands of stores for tracking inventory and in identification chips implanted in some pets. Researchers combined that technology with another emerging applied science called impedance monitoring, which tracks reflux through electrical impulses.

“We always want to come up with something that improves what we do on a daily basis,” said Dr. Shou Jiang Tang, assistant professor of internal medicine at UT Southwestern who specializes in therapeutic endoscopic and endoscopic innovations.

According to the American College of Gastroenterology, approximately 19 million people have gastroesophageal reflux disease (GERD), which is caused by stomach content moving upward from the stomach into the esophagus.

The new system involves pinning a small, flexible RFID chip to the esophagus, where it remains until removed by a physician. The chip, about two square centimeters, or a little bigger than a dime, tests for electrical impulses that signal acidic or nonacidic liquids moving through the esophagus. It then transmits data to a wireless sensor worn around the neck.

The device, presented May 23 at the Digestive Disease Week conference in Washington D.C., is still in the test phase. But researchers believe it will be a welcome replacement for current standard procedures, which require placing a flexible catheter tube through the nose and down into the esophagus.

“The procedure is very uncomfortable and because of the catheter, you can’t eat or drink the way you normally would. The test results can be biased because you change the way you eat,” explained Dr. Tang.

No catheter is required with the RFID system, so doctors are hopeful that the system makes it easier to follow normal eating, drinking and activity patterns that may play a part in the acid reflux. Researchers say patients shouldn’t feel anything in their throat when the device is inserted thanks to a special plastic material used.

The RFID system is the next step in a growing effort to develop less invasive wireless technologies for gastrointestinal diseases. Those include the PillCam, a small pill-sized wireless camera that takes photos as it goes through the digestive tract, and Bravo capsule, another wireless system that detects esophageal acids. Both technologies are currently used by UT Southwestern gastroenterologists.

Researchers have already successfully tested the new RFID device to see that it properly identifies simulated stomach acids in a test tube and that the transmitter can send the results through human tissue. The sensor is designed to detect stomach acid, gas and water so doctors

can determine whether the presence of those substances coincides with feelings of **heartburn**, the start of eating or other activities. The next step will involve testing in animal models before the system eventually is tested in humans.

UT Southwestern's Dr. Tang and Dr. Fred Tibbals, director of the Bioinstrumentation Resources Center, have been working with Dr. Jung-chih Chiao, associate professor of electrical engineering at UTA, for two years to develop the wireless system. Engineers had to develop the specialized radio frequency implant, which detects and sends the data, as well as the receiver. The receiver will include a button the patient can push when they begin eating. Eventually, engineers hope to design a devise similar to a personal digital assistant to store the results. That PDA-like device could then be taken into a doctor's office and downloaded into a computer to analyze the results.

Work on the RFID system is funded internally and a pending patent has been filed.