Northwest company rolls out toothbrush invented at the University of Washington

http://www.firstlight.cn 2007-04-23

Apr. 19, 2007， A new product developed from technology invented at the UW aims to change the way you brush your teeth. It will make ultrasound -- now available only at the dentist -- part of the daily routine. The high-tech brush creates vibrations in bubbles of foam that work to clean pearly whites. Details of the product were made public at an industry launch in late February.

Until this spring, the gadget was in what investors call "stealth mode." A newspaper article last March titled "The Son of Sonicare?" merely reported rumors of a new Seattle-based toothbrush company. Nobody was divulging any details about the device. Not even its name.

This April, Ultreo, as the brush is known, makes its public debut. The past four years have involved quiet development and unusual teamwork. It's hardly surprising the School of Dentistry played a central role. But the device was first created in the Applied Physics Laboratory and the Department of Neurological Surgery.

It all began in 2003, when the UW's Pierre Mourad met local entrepreneur Jack Gallagher for a steak lunch. Mourad, a research scientist in APL's Center for Industrial and Medical Ultrasound and research associate professor in the UW's Department of Neurological Surgery, was using high-frequency pulses to deliver drugs to brain tissue and to diagnose pain. Mourad sought an investor for a medical company. Gallagher, who helped launch the Sonicare toothbrush, had another idea: He wanted to build a better toothbrush.

Mourad began tinkering in the lab. He knew that ultrasound, already used in high-pressure professional dental cleanings, could clean teeth. The technique works because ultrasound is the right frequency to vibrate bubbles. As the bubbles vibrate more than 20,000 times per second, they move the surrounding fluid, creating thin layers of water that sweep off the plaque.

Previous attempts to create a consumer-grade ultrasonic toothbrush had failed. Ultrasound travels much better in water than in air, and directing the pulses was a challenge. Mourad believed he could do better.

"It helped that I had a lab filled with gizmos," he said. "We can build anything at APL." The lab's engineers inserted a transducer, a machine that turns electric pulses into mechanical pulses, into the head of the toothbrush. Then they built a rubber waveguide to direct those pulses to the edge of the bristles. The prototype was a toothbrush connected to a rack holding about 100 pounds of equipment, including a 150-Watt amplifier.

Everyone left the room before Mourad tried brushing for the first time. He survived, and a toothbrush was born.

After the physicists had settled on a basic design, the project moved to the School of Dentistry.

"There have been toothbrushes that tried to use ultrasound," said Frank Roberts, an associate professor of periodontics. "But they haven't been very effective. It took people that knew a lot about ultrasound to do it well."

Dental researchers studied what frequency and intensity of ultrasound would be best to remove plaque and preserve gum health. In the lab, they coated artificial teeth with brightly colored plaque to compare results using different settings. Ultreo directs ultrasonic energy toward the bristle tips, which also vibrate but at slower, sonic frequencies. Lab tests showed that adding ultrasound cleared plaque from grooved surfaces better than using a traditional power brush.

"The addition of the ultrasonic to the power toothbrush was able to remove more plaque from places the bristles didn't reach," Roberts said. "I've been impressed with it."

Early research was made possible by three grants from the Washington Technology Center. Clinical trials were funded by the National Institutes of Health through a Small Business Innovation Research grant. Gallagher also raised more than $11 million in start-up money from local investors.

Ultreo is manufactured by a Redmond-based company of the same name. The company's scientific director is no stranger to the UW: Chris McInnes received both his doctorate in bioengineering and his bachelor's in mechanical engineering at the UW. "I'm familiar with the dental school, in particular, and it's great working with the people there," he said.

McInnes' team worked to shrink the electronics into a toothbrush handle. They further tweaked the product and held clinical trials in the United States and Canada. Research showed that adding ultrasound to the power toothbrush removed more plaque than bristle action alone. Ultreo employees also worked to arrange marketing and line up investors, and to design the product.

Linking the company and the scientists was the UW's Office of TechTransfer, which coordinates the commercialization of university re

search.

"Ultreo is an excellent example of the collaborations that are often needed to effectively develop a product from academic research," said James Severson, vice provost of intellectual property and technology transfer. "UW TechTransfer is proud to have played a part in deploying this exciting technology."

Inventor Mourad, one of five founders of the company, feels that excitement. "This is going to be huge," he predicted.

Ultreo is now shipping to dentists' offices. Customers can buy the brush online or at participating dental offices for $149. Stores will begin carrying the product in late 2007.

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