Taking a cue from breath fresheners, researcher develops new method for taste testing

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Using the same concept behind commercial breath-freshening strips, a Temple University researcher has developed a new, easier method for clinical taste testing.

Greg Smutzer, director of the Laboratory of Gustatory Psychophysics in the Biology Department of Temple's College of Science and Technology, has created taste strips similar to breath-freshening strips, but these edible strips contain one of the five basic tastes that are detected by humans — sweet, sour, salty, bitter and monosodium glutamate, which is also known as umami taste.

This research, "A Test for Measuring Gustatory Function," has been published in the June 2 online "Ahead of Print" edition of The Laryngoscope, the journal of the American Laryngological, Rhinological and Otological Society.

The idea was born when a lab equipment repairman who was a friend of Smutzer's stopped by the laboratory more than four years ago and offered him one of the new breath-freshening strips.

He said, "You have to try one of these," Smutzer recalled. "I had never seen the strips before. But as soon as he showed them to me, one of my first thoughts was, this technology would be ideal for a taste test because it is so simple to use."

Smutzer starts by using a combination of two polymers, pullulan and Methocel. His strips are created by dissolving the polymers — in the form of powders — in warm water and then allowing the solution to cool to room temperature. Added into the solution is a small amount of a taste stimulus that will give each strip the desired taste: sodium chloride for salty, sucrose for sweet, ascorbic acid for sour, quinine for bitter, and monosodium glutamate for umami taste.

Once the solution is cool, it is then poured onto Teflon-coated pans and allowed to dry five to six hours in order to produce a clear, thin film. When dry, the films are carefully removed, and cut into one-inch-square strips.

He said that pullulan, a major ingredient of the Listerine breath strips, is tasteless and dissolves within seconds in the mouth. Methocel is added in small amounts to increase the tensile strength of the pullulan films.

The development of the taste strips solves a problem for researchers. According to Smutzer, no standardized method for rapidly measuring taste function in humans is currently available, and taste norms for the human population as a function of age and sex have yet to be determined.

"What is typically done in the lab is a 'sip and spit' test, where a liquid solution is prepared that contains dissolved tastant," Smutzer explained. "You then place a small amount of the solution, maybe half an ounce, into a small cup for the test subject to place into their mouth, swish around and then spit it out."

But this type of test is difficult to administer outside the lab because the solutions have a very short shelf life and are not very portable, he said. Another big problem with the liquid test is that it cannot be effectively used to examine selected regions of the tongue, such as just one side, the

front or the back of the tongue.

"It is very difficult to do regional testing with the liquid test because it is tough to concentrate liquid in just one area of the mouth," said Smutzer, who is hoping to commercialize the taste strips. "We can alter the size or thickness of these strips, place them on a desired area of the tongue and allow saliva to dissolve them without causing the tastant to spread over the surface of the tongue."

Since different parts of the tongue may respond to different tastes, or may respond more or less strongly to the same taste stimulus. Smutzer said his taste strips could be used to develop detailed taste maps of the tongue surface, a project he plans to examine in the future.

Another major advantage of this technology, according to Smutzer, is that the strips can measure thresholds for tastants at levels that are from 10 to 100 times lower when compared to a standard "sip and spit" test. These lower threshold values for sweet, sour, salty, bitter or umami taste could be useful for examining taste disturbances in clinical populations where such disturbances have not been previously identified.

Smutzer added that his strips, which are stored at room temperature and have been used up to six months after being produced, could also be beneficial to the pharmaceutical industry, since certain medications can create temporary taste disturbances. He said that subjects could be tested with taste strips during clinical trials to determine whether new drugs or therapies interfere with taste function.

Source: Temple University