Medical Xpress

New findings help explain our most mysterious sense

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Credit: ArnoldReinhold

From your first sip of morning coffee to the minty zing of toothpaste before bed, your tongue is bombarded daily with a flood of flavors. How we disentangle and identify all those tastes is still pretty mysterious. That's starting to change, though, as researchers unlock the secrets of flavor.

Several taste experts spoke at a symposium on "The Science of Eating: Perception and Preference in Human Taste" on February 19 at the annual meeting of the American Association for the Advancement of

Science (AAAS), held this year in Washington, D.C.

A couple of decades ago, the established number of basic tastes went from four to five, with the addition of umami -- the savory taste of Parmesan cheese and sundried tomatoes -- to the traditional grouping of salty, sweet, sour, and bitter. But there's much more to flavor than those five tastes.

Most of what we think of as flavor is really aroma. To the taste buds on your tongue, a lemon and a lime are both just sour. It's your nose that tells you which citrus you're swallowing.

Food scientists envision flavor as a medley of factors, including taste, odor, texture, and even irritation -- a familiar component of spicy chilies. "Tastes, aromas, and mouthfeel factors are rich sources of stimulation throughout our lives," said Jane Leland, a food scientist at Kraft Foods in Glenview, Ill., in an interview before the symposium.

Leland took part in the AAAS session along with William Yosses, the White House pastry chef, and Gary Beauchamp, director of the Monell Chemical Senses Center in Philadelphia.

"There are large individual differences in the way we perceive the world," said Beauchamp, also in an interview. "Those differences are due to two interacting sources – genetic variation and individual experience."

Genetically speaking, for instance, certain individuals are inherently more sensitive to bitter flavor compounds. They often abhor broccoli and other bitter vegetables.

Many other factors play a role in shaping our fondness for flavors. Both before and after birth, babies get a hint of the foods their mothers

consume via taste and odor compounds that get into amniotic fluid and breast milk. Studies show that children have a preference for flavors they were first exposed to this way, Beauchamp said.

Cultural factors, too, influence which foods you love or hate. If you grew up eating spicy curries or seaweed salad, those preferences can stick with you longer than other cultural carryovers.

"Studies show that in people who emigrate, the last things they give up are those flavor principles," said Richard Mattes, a professor of food and nutrition at Purdue University in West Lafayette, Ind., who did not participate in the AAAS symposium.

We may feel strongly about certain foods, but precisely how we taste them is still an open question. Our taste buds contain a variety of specialized chemical structures, known as receptors, that latch onto molecules characteristic of particular tastes, signaling their presence to our brains. But scientists have not yet identified all the receptors that do this job.

Some researchers have even begun to suspect that there are more than just five basic tastes. According to Mattes, we may also have receptors for compounds such as fat, calcium, and carbon dioxide.

"It's far from proven that these things do in fact have unique taste properties," he said, "but there's a growing body of science that's consistent with that notion."

A recent surprise for taste scientists has been the discovery of receptors for the basic tastes not only on the tongue, but also in the airways and the intestines.

"Scientists believe the receptors throughout the digestive tract may help

coordinate the body's hormone response to food nutrients," Leland said.

One such response might be how full we feel after eating certain foods. If that's so, it might be possible one day to combat overeating by finding ways to trick the gut receptors into thinking we've had enough.

It's no surprise that Kraft, like many other food manufacturers, is exploring ways to promote healthy foods while giving consumers the tastes they crave.

"Almost all consumers tell us they want to eat healthier. Yet no one wants to give up their favorite foods or eat foods they don't like," Leland said.

As flavor scientists learn more about taste receptors, they will find better ways to replace ingredients such as salt, sugar and fat, Beauchamp predicted. Chemicals that boost the perception of saltiness, for example, could result in potato chips that taste satisfyingly salty but are actually low in sodium.

Insights from flavor scientists won't necessarily all be applied to making foods healthier, however.

These days, food is often entertainment. "We use food as a form of sensory stimulation and pleasure, and as a basis of social interaction," Mattes said. Gourmet chefs increasingly serve palate-challenging dishes such as ice cream that looks like vanilla but tastes like bacon and eggs.

"It does seem as though the trend has been for novelty, perhaps over palatability," Mattes said. Challenging your tongue can be fun, he added. "But whether you'd want to eat that on any regular basis is another question."