

New device could help improve taste of foods low in fat, sugar and salt

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Scientists may be closing in on a way to let consumers savor the sweet taste of cake, cookies and other culinary delights without the sugar rush. In preliminary tests using a new device developed in-house that allows them to screen for odor compounds in real foods, they have isolated several natural aromatic molecules that could be used to trick our brains into believing that desserts and other foods contain more fat, sugar or salt than they actually do.

The researchers will present their work today at the 252nd National Meeting & Exposition of the American Chemical Society (ACS).

"Most [consumers](#) know that they should be eating more [healthful foods](#) made with reduced amounts of fat, sugar and [salt](#). But this is problematic because these are the very ingredients that make many of the foods we like taste so delicious," says Thierry Thomas-Danguin, Ph.D. "Based on our lab work, we've come to believe that aromas can help compensate for the reduction of fat, sugar and salt in healthful foods and make them more appealing to consumers."

Aroma plays a vital role in how we perceive food (just try pinching your nose closed while you eat—odds are you won't taste anything). Based on this fact, food scientists have long used chemical aromatics, essential oils and botanical extracts to enhance the flavor of food and beverages to boost sales.

Recently, scientists have turned their attention to using aromas to

improve the taste of foods made with reduced amounts of fat, sugar and salt, which many consumers avoid because of their notoriously bland flavor.

"If you buy a product made with 30 percent less salt, and you don't like it because it isn't very tasty, what do you do?" Thomas-Danguin asks.

"You'll probably reach for the table salt and put some into the product. So the target is missed. Our goal is to optimize the reformulation process, so the food industry can produce more healthful products that consumers will like as they are and will choose to eat them regularly."

In earlier work, Thomas-Danguin set out to prove that if the right aroma is added in the right amount in the right places in the right food, the [brain](#) can be fooled into thinking there is more fat, sugar or salt in it. Study participants were asked to taste flan, a type of custard, made in layers containing varying amounts of ham aroma and salt. The researchers found that the ham aroma, even though it contained no salt, increased the perception of saltiness of the flan. In fact, some participants thought one variation of the custard made with ham aroma and salt distributed unevenly in layers throughout it tasted the same as a flan made in the traditional way with 40 percent more salt.

In their latest study, Thomas-Danguin and his colleagues at the Centre des Sciences du Goût de l'Alimentation in France, sought to find a new way to isolate aroma molecules associated with sweet tastes. So they created a first-of-its-kind device called a Gas Chromatograph-Olfactometry Associated Taste (GC-OAT) and used it in conjunction with an olfactoscan, which delivers a continuous stream of aromas through a tube to a subject's nose.

Participants were asked to smell real fruit juice aroma through the olfactoscan. Meanwhile, the researchers used the GC-OAT to isolate molecules from the juice. Then, they added the molecules one at a time

into the olfactoscan tube. As the participants smelled each of these mixtures, they were asked if the molecule contributed to their perceived sweetness of the fruit juice. Thomas-Danguin says the preliminary results suggest that this new technique could eventually help food manufacturers better formulate more healthful foods without sacrificing taste, aroma or texture of the original products.

More information: Aroma compounds to rescue the taste of healthy foods and beverages, 252nd National Meeting & Exposition of the American Chemical Society (ACS), 2016.

Abstract

Health issues have led health organizations to endorse the decrease of fat, salt and sugar content in food. However, performing such reduction without changing consumer liking remains a major challenge because it usually alters products' sensory characteristics. In order to maintain taste of low-fat/salt/sugar foods, we propose to use odorants to compensate for the loss in perception through the multi-sensory-integration mechanism underpinning flavor perception. In a series of studies relying on water solutions, model and real food products, we demonstrated that well-selected odorants can enhance taste perception through the odor-induced taste enhancement effect (OITE). Our results highlighted several features of OITE. First, for OITE to be observed, odorants need to be congruent with the target taste: only odorants with a salty dimension can enhance saltiness (Lawrence et al., 2009, 2011). Moreover, the OITE width is related to the actual taste intensity. Indeed, when salty taste intensity is too high, OITE is no more efficient while it can compensate for 25% salt reduction in water solutions at medium taste intensity (Nasri et al., 2011). We also ascertained the advantage of combining OITE with other strategies developed to maintain taste in low-salt foods (Nasri et al., 2013; Emorine et al., 2013). In model-cheeses varying in both salt and fat content, we reported that a mixture of odorants could increase salty taste in almost all tested products while fat

perception was improved unevenly across products, which suggested a critical impact of food matrix composition and/or structure on OITE (Syarifuddin et al., 2016). Recently, we developed a method to screen for odorants associated to taste in real food (GC-OAT for Gas Chromatography-Olfactometry Associated Taste); and using an online odor recombination system we pointed out odorants which modulate sweetness perception of a real fruits juice odor. Overall, these findings demonstrate that cross-modal interaction can be an efficient strategy to compensate for salt/fat/sugar reduction, which should help to develop sustainable and healthy foods and beverages while maintaining a good acceptability for consumers. We acknowledge collaborators and students involved in this research and financial supports from Regional Council of Burgundy, European Regional Development Fund (FEDER), Unilever R&D, Marie S.A., Carnot Institute Qualiment, AgreenSkills, EU Marie Skłodowska-Curie actions, EU TeRiFiQ project.

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