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HEALTH

# Can We Be Trained to Like Healthy Foods?

*Favorite flavors might be programmed in infancy, leading to new research investigating how to rewire our bad dietary habits*

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By Brian Mossop on July 13, 2011



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Our diets are unhealthy, that much is clear. Now, an increasing number of scientists and physicians wonder if our propensity for unhealthy, obesity-inducing eating might be tied to the food choices made during our first weeks and months of life. Indeed, the latest research indicates that what we learn to like as infants paves the way for what we eat as adults. If true, we might be able to tackle the obesity epidemic in a new and more promising way, one that starts with the very first spoonful.

Today, unfortunately, most of those early lovin' spoonfuls contain more sugar and salt than is nutritionally wise. A recent study in the *Journal of Public Health* found that 53 percent of processed baby and toddler foods lining supermarket shelves (at least in Canada) have an excessive number of calories from simple sugars, and 12 percent of them have too much sodium. The authors, noting how overindulgence on both of these nutrients is tied to cardiovascular disease and diabetes, suggest that early exposure to overly sweet or salty meals could promote a taste for these unhealthy ingredients in the future.

There are, of course, some very real, deeply rooted evolutionary affinities for salt and sugar. Basic tastes are largely hardwired, predetermined by genetics and our primordial drive to stay alive. In the wild most herbivores and omnivores have developed ways to quickly sort the good foods from the potentially harmful ones. Sugars in fruits, for example, are natural sources of energy. And because of that, animals have strong inclinations for—and receive

great pleasure from—eating sweet foods.

Rather than focus on limiting the unhealthful aspects of diet, Gary Beauchamp, a biopsychologist and a leading expert on chemosensory science, prefers to study the promotion of good-for-you foods. Based on data he has collected in the past 40 years, Beauchamp thinks "that complex multisensory flavor profiles—even more so than individual tastes such as sweet or bitter—are influenced by our experiences during the first few months of life." And if parents introduce healthful tastes and flavors, such as carrots or broccoli, early on, an infant will not only rapidly adapt, but will also develop a preference for these flavors that could persist for a lifetime.

To be clear, there is a marked difference between tastes and flavors. Tastes are one-dimensional, whereas flavors are multimodal. The five basic tastes (sweet, salty, sour, bitter and umami) activate specific receptors—the taste buds—of the sensory system, which map directly to cranial nerves. Flavors, on the other hand, arise when information from both the mouth and the nose is combined, and it can be difficult to tease out the contribution of the smells from the assortment of tastes that describe the essence of a flavor. Think about the experience of enjoying a glass of fine wine. Describing the vintage as sweet would be a disservice to the complexity of the liquid before you. While the taste of supple fruit may dominate the varietal, sweet does not exactly describe the flavors from the subtle vanilla undertones or the smoky oak finish. Nor does it explain the lush aroma that hits your nose as you sip.

Situated between the campuses of the University of Pennsylvania

and Drexel University in West Philadelphia, the Monell Center is the world's only independent, non-profit institute studying the science of taste and smell. "Our hypothesis is that flavors associated with various vegetables, could be influenced by early exposure," says Beauchamp, who is the organization's director. So now he and his team are trying to figure out how exposure to certain tastes and flavors early in life influences the foods we choose to eat as we get older."

### **More of a bad thing**

At first blush, it seems logical that increasing the amount of sugar in an infant's diet would cause the evolutionary drive to kick into high gear, intensifying his or her fervor for sweets. But even though science supports our evolutionary inclination for certain tastes, the evidence is mixed on whether altering exposure to individual tastes can trump the biological components.

Children do have an increased affinity for sweet foods compared to adults, presumably due to their nutritional needs required for active growth. But there has been little evidence to support the idea that increased sugar intake will affect preferences as an adult. "The liking for sweets," Beauchamp says, "is a particularly strong case where you [have] a very big biological component."

As we have developed an innate liking for sweet to get the energy we need, our reactions to other tastes have developed to protect us. Bitter tastes often signal a food might be toxic or poisonous, whereas a sour zing may hint that something has fermented or spoiled, both of which seem to be evolutionary aversions that kept foragers safe when dining in the wild.

Nevertheless, many plants that are good for us are quite bitter. Could our aversion to these tastes also be leading to health problems? In a [2010 review article](#), researchers at the Monell Center questioned whether over-consumption of bad foods is fully to blame for many diet-related health problems. Although most are quick to point the finger at high-sugar and salt diets as the causative agent for many diseases, the team wondered whether our decreased intake of bitter vegetables—those that are known to regulate the metabolic system—could be exacerbating the problems.

### **Bitter is better (than it tastes)**

Since the 1930s, researchers have known that [some people are more sensitive to bitter tastes than others](#). Moreover, the sensitivity seemed to run in families, leading to a hypothesis that there was a genetic component to taste preferences. In 2003, the TAS2R38 bitter receptor [was described](#), and certain alleles of the gene that codes this receptor were linked to a person's perception of a compound that was bitter to some, and tasteless to others.

Shortly after the discovery of the TAS2R38 link to bitter taste sensitivity, researchers at the Monell Center discovered that although genetics predispose certain people to be vulnerable to bitter foods, [the effect seemed to wane with age](#). During one particular study, the researchers found that 64 percent of children with one copy of the gene allele that heightened their bitter perception were able to detect the lowest concentration of a bitter-tasting chemical. However, when it came to the adults with the exact same genetic profile, only 46 percent of them were able to notice the subtle bitter flavor. Acquired tastes for noticeably bitter foods, like

coffee and beer, support the notion that some tastes can change with exposure and age.

But even more striking evidence for acclimation to bad-tasting foods that are good for you comes from the Monell Center's work on flavors, which appear to be more readily morphed by exposure, especially early in life. In 2009 Beauchamp, along with [Julie Mennella](#) and a few other colleagues from the Monell Center published [a study](#) in which they recruited four- to nine- month-olds who, as infants, were fed a hydrolyzed casein formula, which contains proteins broken down into their simpler peptide and amino acid constituents. This type of formula is often given to babies who have problems digesting proteins. But according to Beauchamp, the curious thing about it is its flavor: "To you and me, [it] tastes absolutely awful."

Hydrolyzed casein is somewhat bitter, a little sour and oddly savory. But it is the aftertaste that does people in. (Beauchamp says that many adults throw up the first time they try it.) The team discovered that if babies had consumed hydrolyzed casein early in life, their perceptions of flavor changed. Early exposure to the predigested formula caused babies to eat more savory, bitter, sour or plain cereal than infants who were brought up on breast milk or regular milk-based formula. Not only did the babies familiarized with hydrolyzed casein formula consume more off-tasting foods, but they also seemed to thoroughly enjoy their meal, making fewer disapproving facial expressions than the standard formula or the milk drinkers.

"If you feed a baby this formula before he or she is four months of

age," Beauchamp says, "most accept it readily. They seem to like it. [But] if you begin the feeding at five to six months of age, by that time, something has happened." By that age, the window of influence has closed, and eating the hydrolyzed casein formula is not enjoyable at all. "They hate it just like you or I [would]," he notes.

As occurs with other senses, it seems that Beauchamp has uncovered a sensitive period in early development for flavor preferences. Feed an infant a food in the first few months, and they might just become a fan for life; miss that window, and the liking for foods with pungent flavors—no matter how good for you—might be much more of a fight.

### **A case for conditioning**

Adam Drewnowski, an epidemiologist and nutritional expert at the University of Washington, wonders whether Beauchamp's finding that babies exposed to hydrolyzed casein formula early in life develop a taste for sharp flavors is a form of classical conditioning. "You have a nasty taste, but you are pairing it with calories," he says. So it is possible that with exposure, the infants learn to accept the bad taste because the positive stimulus—the underlying need for a caloric energy source for survival—is much stronger. He suggests that this powerful form of learning could be put to use to introduce more icky-tasting but healthful foods early on in a child's life. In essence, what Beauchamp uncovered may be the infant equivalent of the phenomenon of adults developing a taste for bitter coffee or beer in part because they're drawn to the underlying caffeine or alcohol buzz.

Beauchamp's work squares with the advice that many pediatricians,

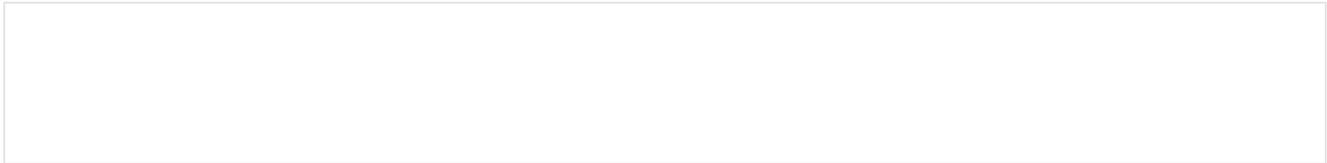
including [Wendy Sue Swanson](#), who is a staff member at Seattle Children's Hospital and practices at The Evertt Clinic, give to parents.\* "You are setting your child up for a lifetime," she tells families that visit her clinic. She recommends "offering them whole foods and fresh foods" and training them so that "they are learning to crave water when they're thirsty—not sports drink, not fruit juice." And so, Swanson endorses Beauchamp's work of promoting natural-tasting, healthy foods as soon as babies are ready for solids.

Swanson's only concern is how and when to introduce these flavors, given that most pediatricians suggest nothing but breast milk or formula early in life. "Babies who were fed formula and rice cereal before four months of age had an...increased likelihood of being obese based on body-mass index at the age of three," she says, citing previous studies. "So if you're introducing a lot of food before four months of age that isn't breast milk or standard 20 calorie-per-ounce formula, you may be setting them up for either overeating or not regulating their hunger properly."

Obesity is a multifaceted problem; aside from the strong behavioral aspects, there are equally prominent socioeconomic elements. And as Drewnowski points out, getting people to eat more vegetables and less processed foods will only battle obesity in middle-class America, where people can better afford to pay the premium that is pinned to more healthful foods. "[Beauchamp's work is] a step in the right direction," Drewnowski says. But, he notes, in practice, "many people don't eat the foods they like, they eat the foods they can afford."

Despite the unresolved issues they point out, both Swanson and Drewnowski agree that new, innovative approaches to battling obesity are needed. "Clearly, whatever we are doing now isn't working," Swanson adds. And what makes Beauchamp's theory so appealing is that it lays out a different plan of attack for metabolic and cardiovascular disorders: Instead of telling people what they shouldn't consume, it may work just as well if researchers and physicians can instead find ways to train the senses to prefer healthful foods in the first place.

*\*Correction (7/13/2011): This sentence was changed after posting to correct Wendy Sue Swanson's title.*



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