

Scientists have studied why people prefer certain foods. Read the article that explains the scientists' findings and answer the questions that follow.

The Science Behind Why We Love Ice Cream

by Shirley S. Wang

- 1 Why people prefer certain foods over others depends largely on a combination of taste and texture. While taste sensations are fairly well understood, scientists are just beginning to unravel the mystery of food texture.
- 2 Now, researchers at the Monell Chemical Senses Center in Philadelphia have found that an enzyme in saliva called amylase, which breaks down starch into liquid, could play a key role in determining the appeal of various textures of food. A new genetic study shows that people produce strikingly different amounts of amylase, and that the more of the enzyme people have in their mouth the faster they can liquefy starchy foods.
- 3 Scientists think this finding could help explain why people experience foods as creamy or slimy, sticky or watery, and that this perception could affect our preference for foods. For the numerous foods that contain starch, including pudding, sauces and even maple syrup, what can feel just right to some people is experienced as too runny or not melting enough for others because they produce different amounts of the enzyme.
- 4 The ability to quickly break down starch, which is a type of carbohydrate, is only one part of the puzzle that determines what people like to eat. Taste preferences are driven by a complicated interaction between taste buds and other receptors in the mouth and nose, and the messages they send to the brain. Culture plays a role, as people tend to like foods that are familiar, says Rick Mattes, a foods and nutrition professor at Purdue University in West Lafayette, Ind. And repetition sometimes can win out: Many people initially don't like oysters because of their slimy texture, for instance, but can come to enjoy them after several tries.
- 5 "We all have had the experience of liking a food that someone else complains is too tacky, or slippery, or gritty, or pulpy," says Paul Breslin, a researcher at the Monell center and a professor at Rutgers University in New Brunswick, N.J. "This is why a given line of product often comes in different textural forms," such as orange juice with and without pulp, he says.
- 6 Starch comprises or is added to about 60% of the foods people typically eat, so determining how it is digested is key to understanding food-texture preferences, Monell center scientists say. Other research has shown that people have a preference for creamy sensations as well as for foods that start off solid and melt in the mouth such as ice cream and chocolate, says Dr. Breslin, who began the current research because of his interest in creaminess. Amylase also could help explain individual preferences for different brands of ice cream or yogurt, for instance, because they contain different amounts of added starch.

- 7 In their recent work, Monell researchers had 73 adults swirl around in their mouths solutions made up of different concentrations of starch—blobs of translucent gelatinous substances with no particular taste—and rate their runniness over the course of 60 seconds. Depending on the amount of amylase individuals produced, the starch could be reduced to liquid within seconds.
- 8 The researchers also took DNA samples of the participants from a blood sample or cheek swab and studied the link between the numbers of copies of a gene that turns on the production of amylase and how quickly the participant reported the sample turned runny. The findings showed that the number of copies of the gene, called *AMY1*, varied widely between individuals. People with higher numbers of gene copies reported that the starch turned to liquid more quickly. The study was published last month in *PLoS ONE*, a journal of the Public Library of Science.
- 9 The Monell researchers are now investigating whether people with more *AMY1* copies see larger spikes in blood glucose after eating. They also plan to study the link between greater amylase production and food preferences, hypothesizing that people who make more of the enzyme will prefer starchy products because they get a faster blast of glucose into their bloodstream.
- 10 The role of amylase and the rate of starch breakdown also has implications for diabetes. People who digest starch quickly could be more likely to have larger spikes in blood-sugar levels and thus a need for the body to generate more insulin. This continued demand on the body might lead these people to become insulin resistant or even diabetic if the body's ability to produce insulin breaks down, says Abigail Mandel, Dr. Breslin's colleague at Monell and first author on the study.
- 11 Amylase and other enzymes in saliva could also help explain food-texture preferences that are known to vary with age, Dr. Breslin says. For instance, many young children dislike certain fruits because of a perceived sliminess—think of the inside of a tomato. But people's saliva-flow rate tends to slow with age, which might affect their ability to break down starch in the mouth and reduce sensations of sliminess.
- 12 Another factor in food preferences: People vary—probably based on genetics—in their ability to detect other textures, such as fat, and bitter and sweet tastes. Valerie Duffy, a registered dietitian and professor in the department of allied health science at the University of Connecticut, Storrs, Conn., has shown in her research that adults with a gene that makes bitter tastes more intense consume fewer vegetables containing bitter compounds, such as kale or spinach.
- 13 But that genetic preference can be changed by repeatedly exposing the individual to the taste or by masking the bitterness, even at an early age, she has found. In a preliminary study with preschoolers, Dr. Duffy's group added a sweet taste to balance out the bitterness of certain vegetables—less than half a teaspoon of sugar to a cup of broccoli or asparagus, for example, during cooking—and found that the children were more accepting of the greens. Even when the sweetness was removed, the children still liked the vegetables more than before because they had developed a positive association with them, she says. "It suggests that people should focus on what they like to eat and make it work for them," Dr. Duffy says.