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# Enzyme in saliva shapes how we sense food texture

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Creamy. Gritty. Crunchy. Slimy. Oral texture perception is a major factor contributing to each person's food preferences. Now, a new study from the Monell Center reports that individuals' perception of starch texture is shaped by variability in the activity of an oral enzyme known as salivary amylase.

"Differences in starch perception likely affect people's nutritional status by influencing their liking for and intake of starchy and starch-thickened foods," said study lead author Abigail Mandel, a nutritional scientist at Monell.

Starch, such as from wheat, potatoes, corn, and rice, is a major component of the modern diet, comprising 40 to 60 percent of our calories. Amylase enzymes secreted in saliva help break down starches into simpler sugar molecules that ultimately are absorbed into the bloodstream and thus influence blood glucose levels.

In the study, reported in the journal *PLoS ONE,* analyses revealed that changes of starch consistency in the mouth were directly related to salivary amylase activity.

Enzyme levels and activity were measured in several ways, using saliva collected from 73 subjects. First, each person's saliva was mixed with a standardized starch sample and a sensor measured the enzymatic break-down of the starch's consistency. Next, enzyme and protein assays directly measured the amount and activity of salivary amylase in the

saliva samples.

Finally, subjects completed continuous evaluations over a 60-second interval to rate the perceived breakdown of a starch sample while in the mouth.

"Taken together, this means that foods with different starch levels will be perceived very differently by people as a function of how much salivary amylase they produce. What may seem like a thick and resistant pudding or starchy food to some may seem noticeably thin in the mouths of others," said senior author Paul A. S. Breslin, a Monell sensory geneticist.

The findings may also extend to starch digestion and metabolism, ultimately lending insight into why some people develop metabolic diseases while others don't. Individuals who have more salivary amylase may break starchy foods down more quickly, leading to a more rapid increase of post-meal blood glucose levels.

"In today's state of food excess and refined starch ingestion, it is possible that high levels of salivary amylase contribute to the risk of insulin resistance and non-insulin dependent diabetes," said Mandel.

The study went on to demonstrate a genetic influence on salivary amylase activity. Previous research had revealed that an individual can have anywhere from 2 to 15 copies of AMY1, the gene that codes for salivary amylase. Mandel and collaborators analyzed DNA samples from 62 subjects and found that the number of AMY1 copies a person has is directly related to the amount and activity of their salivary amylase.

Combining the findings, the study demonstrated a series of relationships extending from variation in genes to individual differences in nutrient perception in the mouth. "A link from genetic variation to enzymatic

proteins to altered physiology to oral perception of textures is quite novel and provides a complete story," said Breslin.

Additional studies will explore relationships between the AMY1 gene copy number and liking for and consumption of starchy foods, as well as whether salivary amylase levels affect carbohydrate digestion and absorption.

Provided by Monell Chemical Senses Center