Your gut has taste receptors

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Researchers in the Department of Neuroscience at Mount Sinai School of Medicine have identified taste receptors in the human intestines. The taste receptor T1R3 and the taste G protein gustducin are critical to sweet taste in the tongue. Research now shows these two sweet-sensing proteins are also expressed in specialized taste cells of the gut where they sense glucose within the intestine.

“We now know that the receptors that sense sugar and artificial sweeteners are not limited to the tongue. Our work is an important advance for the new field of gastrointestinal chemosensation - how the cells of the gut detect and respond to sugars and other nutrients,” said lead author, Robert F. Margolskee, MD, PhD Professor of Neuroscience at Mount Sinai School of Medicine. “Cells of the gut taste glucose through the same mechanisms used by taste cells of the tongue. The gut taste cells regulate secretion of insulin and hormones that regulate appetite. Our work sheds new light on how we regulate sugar uptake from our diets and regulate blood sugar levels.”

These new findings, just published online in the August 20th, 2007 “Early Edition” of the Proceedings of the National Academy of Sciences, may lead to new treatments for obesity and diabetes. The two new studies are titled- “T1R3 and gustducin in gut sense sugars to regulate expression of Na+-glucose cotransporter 1” and “Gut-expressed gustducin and taste receptors regulate secretion of glucagon-like peptide-1.”

“This work may explain why current artificial sweeteners may not help

with weight loss, and may lead to the production of new non-caloric sweeteners to better control weight," said Dr. Margolskee. "Sensing glucose in the gastrointestinal tract is the first step in regulating blood sugar levels. Having discovered the identity of the gut's sweet receptors may open the way for new treatment options for obesity and diabetes."

How Taste Receptors Work

Prior to this research, the intestinal sugar sensors were unknown. Dr. Margolskee and his colleagues Dr. Josephine M. Egan, Dr. Soraya P. Shirazi-Beechey and Dr. Zaza Kokrashvili reasoned that the sugar sensors of the tongue's taste buds might also be there in the gut. Sweet taste in the tongue depends on the taste receptor T1R3 and the taste G protein gustducin.

The small intestine is the major site where dietary sugars are absorbed into the body to provide energy, and maintain normal metabolism and homeostasis. If glucose is absorbed in excess obesity may occur. T1R3 and gustducin, critical to sweet taste in the tongue, are also expressed in specialized taste cells of the gut where they sense glucose within the intestine.

Carbohydrate ingested from meals & beverages breaks down into glucose, which stimulates the sweet-sensing proteins in these gut taste cells. Activating the sweet–sensing proteins of the gut taste cells promotes secretion of glucagon-like peptide-1 (GLP-1), an intestinal hormone that plays a key role in promoting insulin secretion and regulating appetite.

Source: Mount Sinai School of Medicine