



Good Food, Good Life

From Sweet to Heat! One molecule - Two Perceptions.

Lausanne, SWITZERLAND 2 July 2007 - In the June online edition of the American Journal of Physiology, a research team from the Nestlé Research Center (NRC), Lausanne, Switzerland, explains the molecular basis for the off-taste of artificial sweeteners. The researchers discovered that a specific receptor in humans, TRPV1, typically involved in the perception of, heat, pain and noxious stimuli, also detects artificial sweetener off-tastes. The full contribution is available on the [Journal of American Physiology](#) internet site.

The perception of certain food stimuli, such as salt or artificial sweeteners, shifts from pleasant towards unpleasant as concentration increases. Artificial sweeteners are known to taste sweet at low concentrations, but at higher concentrations their taste has been described as unpleasantly bitter, metallic and irritating. Some of these off-tastes have been previously attributed to the activation of bitter taste receptors.

TRPV1 receptors and their variants can be found in taste receptor cells and in nerve endings throughout the oral cavity and are activated by a wide range of structurally different molecules, such as pungent spices, minty compounds and heat sensations. TRPV1 is best known for its sensitivity towards capsaicin, the principle spicy compound in hot chili peppers. In the present study, researchers found that saccharin, one of the most widely used artificial sweeteners, exhibits a strong ability to activate the TRPV1 receptor. *"It seems that at high concentrations artificial sweeteners activate all bells and whistles in the chemosensory detection pathways of the oral cavity,"* commented the lead researcher, Dr. le Coutre.

Activation of TRPV1 by artificial sweeteners was an unexpected discovery for the Nestlé research team; however, the real surprise occurred when the researchers tested the ability of divalent metal cations, which impart metallic off-tastes, to activate TRPV1. Study results revealed that the divalent metal cations, copper, zinc and iron do stimulate TRPV1, thus linking the previously described metallic off-taste for artificial sweeteners. The combined findings indicate that chemosensory coding, i.e. the distinct transmission of specific stimuli into the brain is more complex than originally thought. *"If one receptor can be activated by both spicy and metallic stimuli, the next challenge will be to understand how these perceptions are separated in the brain,"* said Dr. le Coutre.

The work for this study was conducted in collaboration with EPFL (Ecole Polytechnique Fédérale de Lausanne) Switzerland, representing the first jointly published results of the long-term partnership between NRC and EPFL to investigate the relationship between food, nutrition and the human brain. The objective of this study is to understand the interaction between taste perception and the somatosensory system.

Article Reference:

Celine E Riera, Horst Vogel, Sidney A Simon, and Johannes le Coutre; Artificial Sweeteners and Salts Producing a Metallic Taste Sensation Activate TRPV1 Receptors; Am J Physiol Regul Integr Comp Physiol (June 13, 2007). doi:10.1152/ajpregu.00286.2007.

About the Nestlé Research Center

Established in 1987, the Nestlé Research Center (NRC), Lausanne, Switzerland, is one of the world's leading research institutions in food, nutrition and life sciences. With a diverse staff of leading researchers from a broad range of scientific competencies, NRC possesses a unique blend of talent and expertise. Knowledge on nutrition and health, food science, food/consumer interaction and food quality and safety are combined at the Nestlé Research Center to help develop Good Food as a source of Good Health throughout life.

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