For Men Only

World Congress on Advanced Integrative Rejuvenology
OCT 20th , 2006 Gulf Shores, Alabama USA

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Taste Buds Get Us Going

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1. "The way to a Man's Heart is through his stomach?"
2. Arbiter of Taste: Energy molecule transmits flavor to brain

As you sample all the treats that the holiday season has to offer, be thankful for adenosine 5'-triphosphate (ATP). New research suggests that this molecule, typically associated with processing energy in cells, plays a pivotal role in conveying information about foods' tastes to the brain.

When food hits the tongue's taste buds, cells there send chemical messages that stimulate nearby nerve fibers. These fibers, in turn, notify the brain of the distinguishing tastes: whether each food is sweet, salty, sour, bitter, or umami—the flavor of monosodium glutamate.

Researchers have been missing a key piece of the taste puzzle: the identity of the messenger, known as a neurotransmitter, that sends information from taste buds to the nerve fibers. Scientists have proposed several molecules, including norepinephrine and serotonin, but experiments have ruled out most of the candidates.

Sue Kinnamon of Colorado State University in Fort Collins and her team noted that ATP assumes the role of neurotransmitter in a few other places in the body. For example, ATP transmits information about blood-oxygen concentrations from sensors called carotid bodies to nerves. Because both carotid bodies and taste buds detect chemicals, the team wondered whether ATP might be the mystery neurotransmitter, says Kinnamon's colleague Leslie Stone-Roy, also of Colorado State.

To test their hypothesis, the researchers first worked with taste buds removed from normal mice. When stimulated with flavored solutions, the buds' cells released ATP.

Next, Kinnamon's team experimented with mice genetically altered to lack certain receptors that carry ATP into cells. After hooking electrodes to the rodents' gustatory nerves, the researchers tested the nerves' reactions to touch and various flavor chemicals. Although the nerves of the genetically altered animals reacted normally to touch, they showed no response to the chemicals. In contrast, the nerves of normal mice were triggered by both touch and tastes.

Finally, the researchers observed mice in cages equipped with two water bottles. While one of the bottles held only drinking water, the water in the other bottle was supplemented with various flavor chemicals. On the basis of how much or how little they drank from a bottle, normal mice seemed to prefer some flavors to pure water but not others. However, the genetically altered mice drank equally from both the flavored and unflavored bottles. The researchers published the results in the Dec. 2 *Science*.

Scott Herness, a taste researcher at Ohio State University in Columbus, calls the findings "amazing."

"From the 1960s to the present, scattered papers have suggested a number of different candidates for a taste neurotransmitter, but nobody was talking about ATP. It wasn't even on the radar screen," he says.

However, Herness notes that many other neurotransmitters have been identified in the taste buds. "The continuing question will be to determine what are these neurotransmitters' roles," he says, noting that they may convey information among the cells that make up each bud.