Duke University Office of Licensing & Ventures
Technology Opportunity Report # 2567

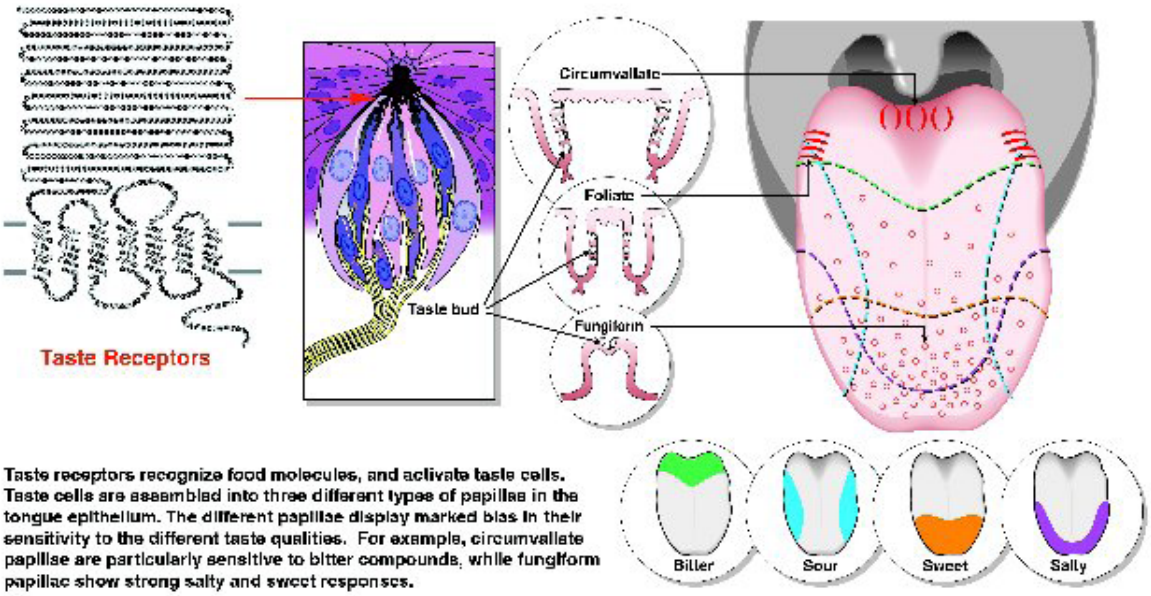
IDENTIFICATION OF NOVEL SOUR TASTE RECEPTORS and SCREENING ASSAYS

Duke University is seeking a corporate partner to further develop and commercialize technology related to a novel sour taste receptor. Whereas much is known about the other components of taste: bitter, sweet, and umami, until now, very little has been known about sour taste. This invention arises out of the laboratory of Hiro Matsunami, Ph.D. and includes identification of a novel sour taste receptor and accompanying biochemical screens for identification of specific ligands.

The Opportunity

The sense of taste is of central importance in the development of new foods, beverages, and medicines. An entire industry exists around modulation of taste perception to improve flavor. In some cases this can also improve nutrition by minimizing the use of unhealthy ingredients such as fats and sugars.

The recently discovered sour taste receptor complex appears to be the only molecular target for sour and acidic flavors, providing a unique opportunity: an inexpensive and rapid method for discovering novel agents to promote or block the sensation of sour taste or acidity.



Taste receptors recognize food molecules, and activate taste cells. Taste cells are assembled into three different types of papillae in the tongue epithelium. The different papillae display marked bias in their sensitivity to the different taste qualities. For example, circumvallate papillae are particularly sensitive to bitter compounds, while fungiform papillae show strong salty and sweet responses.

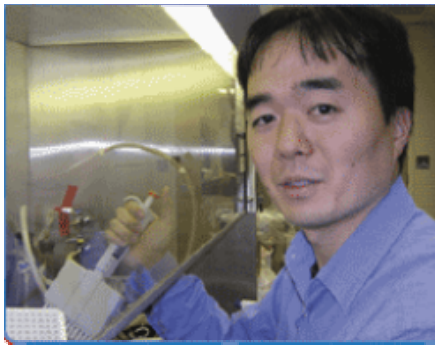
Advantages

Conventional testing of flavoring agents is expensive, time consuming, and often subjective. This molecular technology can dramatically lower the time and cost required to identify novel taste-modifying agents for use in food, beverage, and medicine flavoring. Until now, it has only been possible to use such methods for the tastes of sweet, bitter, salty, and umami. The present invention is the only available molecular technique for identification of sour taste agents.

Technology

Research performed at Duke University Medical Center has identified two proteins of the transient receptor potential (TRP) family, PKD1L3 and PKD2L1 that together, form a sour taste receptor. When these two proteins are introduced, cells acquire the ability to detect sour taste agents, but not agents responsible for the remainder of tastes: sweet, salty, bitter, and umami. Since the PKD1L3/PKD2L1 sour taste receptor complex is a nonselective cation channel activated by binding sour taste agents, this technology is optimally designed for common high throughput assays used in the pharmaceutical and biotechnology industries, including the FLIPR Calcium Assay from Molecular Devices. Many other rapid and efficient assay platforms are also compatible with this technology, which has been validated in published research.

Lead Inventor



Hiroaki Matsunami, Ph.D. is an Assistant Professor in the Department Molecular Genetics and Microbiology at Duke University Medical Center. Dr. Matsunami has authored numerous high-profile publications elucidating the mechanisms underlying the senses of taste and smell, beginning with seminal contributions to these fields while working with Nobel laureate Linda Buck. His most recent publication, in the Proceedings of the National Academy of Science (Vol 103, August 2006), reports on the first study to define how humans perceive sour taste and identifies the proteins, PKD1L3 and PKD2L1.

Intellectual Property

Patent pending.

Contact Information

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