

## Pea and beef protein peptides as bitter taste blockers

### Technology Details

University of Manitoba researchers isolated bioactive peptides derived from beef and pea proteins hydrolysates to reduce the bitterness. They have identified 11 peptides between 0.445 and 3.78 kDa from these sources. Using an electronic tongue, these peptides (T2R blockers) significantly lowered the bitterness caused by the T2R agonists quinine, one of the most intensely bitter-tasting compounds, and diphenhydramine.

Beef protein hydrolysates were a proof-of-concept that demonstrated the potential of naturally derived peptides (Figure 1) to block bitter tastes. Since then, they have derived similar T2R blockers from pea protein. Furthermore, a 12-person double-blind taste panel indicated a significant reduction in bitterness of quinine following the addition of various concentrations of the pea protein hydrolysates.

### Background

The food, beverage, pharmaceutical, and supplements industry has relied almost exclusively on flavouring agents that include sugars and salt to mask the unpleasantness of bitter tastes. Health concerns regarding excessive intake of salts and sugar have shifted towards identifying novel compounds to block bitter tastes with limited adverse effects on human health.

Bitter taste is mediated by 25 bitter taste receptors (T2R) in humans compared to only 3 receptors for sweet and umami taste. Blockers of T2Rs (T2R antagonists and inverse-agonists) have wide-ranging applications as additives to the food, beverage, pharmaceutical, and supplements industries to help enhance sensory and improve consumer acceptance and adherence. Peptides derived from hydrolyzed natural protein sources can offer cardioactive properties for use in functional foods and nutraceuticals in addition to bitter taste blocking.

### Technology Benefits

These naturally-derived peptides have the potential to replace sugars in formulated foods, beverages, supplements, nutraceuticals, and pharmaceuticals to lower sugar consumption. Therefore, leading to a beneficial impact to those living with diabetes and other chronic diseases associated with hyperglycemia and consumption of sugar.

### Development Stage

This technology is available for licensing, seeking a development or commercial partner.

#### Publications:

- (1) Pea protein-derived peptides as multifunctional human bitter taste receptor T2R4, T2R7 and T2R14 blocker. (2025 in progress)
- (2) Zhang C, Alashi AM, Singh N, Liu K, Chelikani P, Aluko RE. Beef Protein-Derived Peptides as Bitter Taste Receptor T2R4 Blockers. J Agric Food Chem. 2018 May 16;66(19):4902-4912. doi: 10.1021/acs.jafc.8b00830. Epub 2018 May 7. PMID: 29706068.
- (3) Pydi SP, Sobotkiewicz T, Billakanti R, Bhullar RP, Loewen MC, Chelikani P. Amino acid derivatives as bitter taste receptor (T2R) blockers. J Biol Chem. 2014 Sep 5;289(36):25054-66. doi: 10.1074/jbc.M114.576975. Epub 2014 Jul 24. PMID: 25059668; PMCID: PMC4155672.

#### Patent Status:

US Provisional Patent – pea protein hydrolysates for bitter taste blocking (in preparation)

United States Patent US20210045419A1 and Canadian Patent CA3091084 (Examining; filed Feb. 15, 2019)

#### PRINCIPAL INVENTOR

Drs. Prashen Chelikani and Rotimi Aluko  
Departments of Biochemistry and Medical Genetics  
Department of Food and Human Nutritional Sciences  
University of Manitoba

#### TECHNOLOGY TRANSFER MANAGER

Dr. Andrew Tse  
E-mail: [andrew.tse@umanitoba.ca](mailto:andrew.tse@umanitoba.ca)  
Phone: (204) 590-9188