The role of bitter polyphenols in the regulation of blood sugar

August 22 2024

Researchers from SIT reveal the mechanism by which bitter taste of plant-based polyphenols interact with T2R in the gut and secrete GI hormones, thereby regulating blood sugar levels and appetite, reducing the risk of diabetes and obesity. Credit: Frankie Fouganthin, Wikimedia Commons, CC BY-SA 4.0, wikimedia.org/wikipedia/commons/b/bf/Polyphenol.jpg

Bioactive compounds like polyphenols and their health benefits have long captured public attention and interest. Commonly present in plant-based food like fruits, vegetables, seeds, coffee, and tea, polyphenols have a strong bitter taste, and in the normal course of a day, are excreted by our body due to poor absorption.

The polyphenols interact with human bitter taste receptors also known as type 2 taste receptors (T2R) expressed within and outside the oral cavity. Notably, the activation of T2R expressed along the gastrointestinal (GI) tract is responsible for the bioactivity of ingested polyphenols.

The scientific mechanisms beyond T2R activation leading up to the reported health benefits of polyphenols are unclear. With over 8,000 types of polyphenols and 25 types of human T2R, this is a crucial gap in knowledge.

With a focus on filling in this gap, a team of researchers led by Professor Naomi Osakabe from Shibaura Institute of Technology, Japan, along with Dr. Makoto Ohmoto from the Takasaki University of Health and Welfare, Japan; Dr. Yasuyuki Fujii and Dr. Takafumi Shimizu from Shibaura Institute of Technology, Japan; Dr. Keiko Abe from University of Tokyo, Japan; and Dr. Vittorio Calabrese from University of Catania, Italy, conducted a review to understand the interaction between the polyphenols and T2R and the resulting health benefits. Their findings are published in the journal *Food Bioscience*.

Professor Osakabe asserts, "Despite their poor absorption, there are reports that polyphenols improve glucose tolerance. We are investigating the relationship between polyphenol intake and the risk of type II diabetes, as the mechanism of this beneficial effect is still unknown."

The review highlights the mechanism of communication between the polyphenols, T2Rs, and the brain centers regulating glucose homeostasis

and appetite. Polyphenol-mediated binding and activation of T2R in the GI tract promotes secretion of GI hormones such as cholecystokinin (CCK) and incretins.

The incretins include the glucose-dependent insulinotropic polypeptide and glucagon-like peptide-1 (GLP-1) that trigger insulin secretion and regulate blood glucose homeostasis. CCK and GLP-1 regulate appetite and food intake by influencing GI motility. Together, the GI hormones triggered by polyphenols reduce the risk of obesity and diabetes.

Prof Osakabe explains, "The GI hormones are known to regulate feeding behavior and maintain glucose tolerance via the endocrine and nervous systems; thus it is possible that the bitterness of polyphenols helps to reduce the risk of diabetes and its complications, through T2R activation."

Overall, the findings suggest that ingested polyphenols, despite remaining unabsorbed, promote the secretion of gastrointestinal hormones by activating bitter taste receptors expressed on the digestive secretory cells, thereby regulating blood sugar levels and appetite.

Prof. Osakabe concludes, "Our study highlights the importance of consumption of polyphenols to reduce obesity and diabetes risk through regulation of blood sugar levels and appetite."

More information: Naomi Osakabe et al, Gastrointestinal hormone-mediated beneficial bioactivities of bitter polyphenols, *Food Bioscience* (2024). DOI: 10.1016/j.fbio.2024.104550

Provided by Shibaura Institute of Technology

Citation: The role of bitter polyphenols in the regulation of blood sugar (2024, August 22) retrieved 23 August 2024 from https://medicalxpress.com/news/2024-08-role-bitter-polyphenols-blood-sugar.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.