Title of Project : Elucidation of Sensory Systems for Food Factors in View of Molecular Epidemiology and Chemical Biology

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Research Area : Food science

Keyword : Food factor, Molecular epidemiology, Sensing molecule, Chemical biology

【Purpose and Background of the Research】

Organisms are exposed to a variety of exogenous signals including pathogens and foods in their environments. Sensory molecules such as Toll-like receptors play critical roles in pathogen-sensing and innate immune responses to maintain homeostasis. In this context, the understanding of sensory systems for food factors is quite important both physiologically and biologically. However, no systematic information is available regarding the molecular rationale for functionality of food factors.

We previously identified the cell-surface tea polyphenol (–)-epigallocatechin-3-gallate (EGCG) receptor that confers EGCG responsiveness to tumor cells including hepatoma, melanoma, multiple myeloma, and acute myeloid leukaemia. The EGCG receptor has been shown to mediate the physiological activities of EGCG in basophils, adipocytes and aortic endothelial cells. We further identified several signaling molecules that govern the EGCG action. We, therefore, focus the intracellular factors underlying sensitivity of our body to food factors with functionality.

In this research project, our goal is to identify novel molecules, novel pathways, and novel networks of sensory systems for food factors.
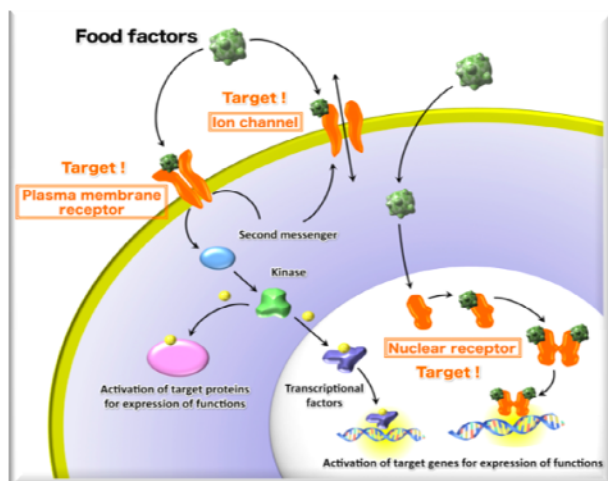
【Research Methods】

To achieve our research objectives, we plan to carry out the following works.
1) Identification of sensing molecules for functional food factors by using genetic suppressor element methodology.
2) Imaging analysis of physiological actions of functional food factors.
3) Collaborative analysis of the sensory systems and the spatiotemporal behaviors of food factors by using *in situ* metabolomic imaging.
4) Validation of sensory systems for food factors in view of molecular epidemiology.

【Expected Research Achievements and Scientific Significance】

The understanding of sensory systems for food factors may be useful for development of personalized foods for health promotion, and give a molecular basis for food factor-food factor interactions which are important in food design. Research achievements of this project will provide the fundamental principles of functionality of foods in daily life.

【Publications Relevant to the Project】

・ Tachibana, H., et al. A receptor for green tea polyphenol EGCG. **Nat. Struct. Mol. Biol.**, 11, 380-381 (2004).
・ Umeda, D., Tachibana, H. et al. Green tea polyphenol epigallocatechin-3-gallate signaling pathway through 67-kDa laminin receptor. **J. Biol. Chem**., 283, 3050-3058 (2008).
・ Byun, E.H., Tachibana, H. et al. TLR 4 signaling inhibitory pathway induced by green tea polyphenol epigallocatechin-3-gallate through 67-kDa laminin receptor. **J. Immunol**., in press.

【Term of Project】　　FY2010-2014

【Budget Allocation】　143,300 Thousand Yen

【 Homepage Address and Other Contact Information】
http://www.agr.kyushu-u.ac.jp/biosci-biotech/syokuryo/