

# Takamatsu Area

Creation of a health-related bioindustry based on the functionality of characteristic sugars

## Framework for Project Promotion

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- Science and Technology Coordinator: Jun Hosokawa, Yoshimitsu Obata, Tadao Inazu
- Management Coordinator: Shunji Murao

## Core Research Organizations

- Kagawa University, Tokushima Bunri University, Meijo University,
- AIST Shikoku (National Institute of Advanced Industrial Science and Technology, or AIST),
- Kagawa Prefectural Industrial Technology Center

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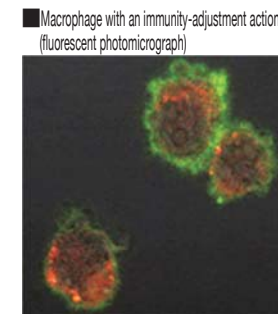
## Major Participating Research Organizations

- Industry: Okadabuichi Shoten Corporation, Kadoya Sesame Mills Inc., Linking Setouchi Innate Network (NPO), Rare Sugar Foods LLC, SeaBion Co., Ltd., Takara Shokuhin Co., Toyo Olive Co., Ltd., Fuji-Sangyo Co., Ltd., Fushimi Pharmaceutical Co., Ltd., Masuda Chemical Industries Co., Ltd., Marukin Chuyu Co., Ltd., Matsutani Chemical Industry Co., Ltd.
- Academia: Kagawa University, Tokushima Bunri University, Meijo University, Okayama University, Osaka University, Tokyo University of Marine Science and Technology
- Government: AIST Shikoku (National Institute of Advanced Industrial Science and Technology, or AIST), Kagawa Prefectural Industrial Technology Center



Theme 2 : Development of foods and other products utilizing the immuno-regulatory functions of glyco-related materials obtained from regional agricultural and marine resources

- (A) Development of health-care products utilizing a biomaterial (fermented-flour extract)  
We will develop foodstuffs and skin-care products that contain glycolipids as active substances from Pantoea agglomerans-fermented flour, to combat lifestyle-related diseases and allergies.
- (B) Whitening and immunopotentiating mechanisms, and the use in cosmetics of polysaccharides from marine bacteria  
We will develop a beauty lotion with excellent anti-aging effects by utilizing glycosaminoglycan produced by marine bacteria.
- (C) Development of functional foods using physiologically active glycolipids isolated from olives  
We will establish a method of preparing an immunity-regulating glycolipid from olives, and then develop functional foods using this glycolipid.
- (D) Biological functions of oligosaccharides from brown algae  
We will establish a mass-production system for  $\beta$ -1,3(6)-glucan and its partial depolymerization products (oligosaccharides) obtained from brown algae. These products will be applied to aquatic food and animal feed.



## Aims of Project

In the Takamatsu area, technological systems have been established for the production of rare sugars (monosaccharides that exist only in small amounts in nature), and research has been undertaken into the biological activities of these sugars. The structures and functions of these rare sugars have been clarified using funds provided by national and local governments.

This City Area Program aims to promote the commercial production of rare sugars by utilizing research results. By carrying out intensive R&D and by commercializing functional foods, skin-care products, diagnostic products, intermediates for the synthesis of medicals, and other products, this project is expected to promote the development of the food industry and related industries in this area, leading to innovation in the health-related bioindustry in readiness for the aging of society.

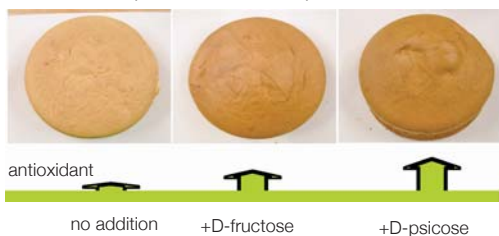
## Contents of Project

Theme 1: Development of food for specific health uses, employing the biological functions of the rare sugar, D-psicose

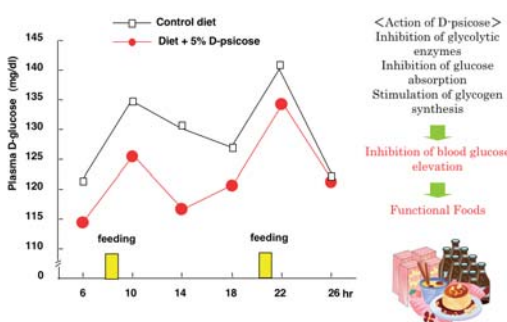
### (A) Development of psicose-added foods with enhanced health benefits

We will produce various food products with added D-psicose, including confectionary, bakery products, and processed marine products. We will then clarify the chemical changes of D-psicose and other characteristics of the foods. Finally, based on a sensory evaluation of the products, we will develop foods with superior functions.

■ Improved coloring and antioxidant properties of sponge cake baked in the presence of added D-psicose



■ Inhibitory effect of D-psicose on the elevation of blood glucose levels following meals (The administration of D-psicose maintains blood glucose at low levels)



### (B) Elucidation of the physiological functions of rare hexoses, including D-psicose for anti-diabetic, anti-atherosclerotic, and anti-obesity purposes

We will study the in-body kinetics, organ distribution, metabolism, and excretion of D-psicose using normal healthy rats. The anti-diabetic and anti-obesity effects of D-psicose will be studied using diabetic model animals. The results will be used in the development of healthy foods.

Theme 3 : Chemoenzymatic synthesis of rare-sugar-based intermediate materials for pharmaceutical drugs and chemical products

Non-naturally occurring sugars have attracted attention as intermediate materials for pharmaceutical drugs and agricultural chemicals. The objective of this research is to chemoenzymatically synthesize and characterize rare-sugar-based intermediate materials such as oligo- and polysaccharides, glycosides, and glycopolymers.

Theme 4 : Development of novel cancer markers by glycan analysis

This project will investigate oligosaccharide markers in serum originally expressed in breast cancer, and thereby develop useful detection probes (antibodies) for cancer diagnosis.

