



Sapporo Biocluster "Bio-S"

Hokkaido Area (with Sapporo as the core)

The development and commercialization of functional foods based on cutting-edge analysis and leading scientific research

Cluster Vision

Hokkaido's major industries are agriculture, livestock, and fisheries. Therefore, medical analysis and evaluation of these foods is crucial. Projects in the knowledge cluster (Bio-S) are supposed to provide scientifically verified functional foods, cosmetics, and medical ingredients from Hokkaido's products and eventually build and promote Hokkaido's brand in foods and ingredients.

Project Overview

The Sapporo Biocluster "Bio-S" is trying for creating a new health sciences-based business in Hokkaido. Bio-S will add the values to the Hokkaido-grown products and ingredients via cutting-edge scientific research. Furthermore, Bio-S will make a platform to the functional foods hoping it become the center of world public attention.

Main research themes

1. Immune/allergy improvement research

- ① Research of intestinal epithelium function and development of functional foods.
Establish the evaluation system for intestinal epithelium function using primly cultured cells and develop the functional foods by using it.
- ② Research of immune balance control and development of functional foods.
Finding out the food ingredients to control Th1/Th2 balance by applying the high efficient evaluation system and develop the functional foods.
- ③ Research of allergic/inflammation reactions and development of functional foods.
Establish the evaluation system of physiological function of sphingolipids and proteoglycan and develop the functional foods/cosmetics by using it.
- ④ Development of functional foods ingredients by applying the immunological techniques.
Research of the anti-tumor activity of spirulina extraction to identify the biologically active substances and development the functional foods.

2. Cognitive function improvement research

- ① Screening of biomarkers to diagnose dementia and the development functional food ingredients.
Search for and identify the diagnostic biomarkers applying advanced proteomics techniques and develop functional food ingredients to suppress the progression of neurodegeneration.
- ② Identify the biomarker of dementia using animal models and the development of functional food ingredients with preventive effects.
Establish a diagnostic system for dementia as Alzheimer's disease applying cell biological and psychological approaches and search for functional food ingredients showing an inhibitory effect.

3. Metabolic function improvement research

- ① Development of functional food ingredients to improve carbohydrate metabolism
 - 1 Development of Epilactose
Investigate the functions of epilactose, a novel oligosaccharide and develop functional foods using the same.
 - 2 Development of Diffructose anhydride
Evaluate the functions of Diffructose anhydride with the potential to decrease the risk of colonic disease and develop functional foods by using the same.
- ② Development of functional food ingredients to improve lipid metabolism
Focus on a plasmalogen (phospholipids) with effects of suppressing cholesterol oxidation, and develop analysis methods and measurement kits. Furthermore, aiming to develop functional foods with plasmalogen and fucoxanthin derived from seaweeds.
- ③ Development of functional foods with antioxidant effects
Establish measurement systems for polyphenols, etc. with anti-oxidative effects and develop functional foods by using the same.

Making Hokkaido a base for the health sciences industry

The Sapporo Bio Cluster "Bio-S" project began with the purpose of initiating a new health sciences industry in Hokkaido that would move in concert with its bountiful primary commodities industry. Knowledge gleaned from Universities centered around the central Hokkaido region is being coordinated with the industrial sector to advance the creation of a Bio Cluster. Every individual wishes to be healthy, and we are attempting to actualize this by initiating food-based projects and utilizing the science of biotechnology. The first task we have attended to is creating the functional evaluation infrastructure. In areas of immunity/allergy, cognitive function, and metabolic function, we have advanced excellent research concerning characteristic functional evaluations, and a number of indices have been established. On the basis of this science and these technologies, we are going to supply candidates for functional food ingredients and test and diagnostic agents with the cooperation of partner companies. In making such efforts, we would create a mechanism for innovation and develop human resources for the business. Our aim is to make Hokkaido not only an international base for the functional evaluation of food and biotechnology, but also a major center for food and biotech-related businesses are concentrated.

CEO of Bio-S(Project Director)
Fumio Suzuki, PhD



Fumio Suzuki, PhD was President of Kyowa America Inc., in NYC from 2005 to 2006, and Senior Executive Managing Officer at Kyowa Hakko Kogyo Co. Ltd. (strategy planning, business development) from 2001 to 2005. He has extensive experiences in R&D and portfolio management.

Cluster Headquarters

- President Harumi Takahashi
(Governor of Hokkaido)
- Vice President Fumio Ueda (Mayor of Sapporo)
- Project Director Fumio Suzuki, Ph.D
- Chief Scientist Yasuyuki Igarashi, Ph.D
(Professor, Hokkaido University)
- Deputy Chief Scientist Fuyuhiko Inagaki, Ph.D
(Professor, Hokkaido University)
- Science and Technology Coordinators Naoyuki Honma, Ph.D, Koji Kimura

Core Organization

Northern Advancement Center for Science & Technology (NOASTEC FOUNDATION)

Participating Research Organizations (Bold: Core Research Organization)

- Industry: Amino Up Chemical Company, Primary Cell Co., Ltd, Hokkaido System Science, MARUKYOU BIO FOODS Co., Ltd., Hokkaido Mitsui Chemicals Corporation, BIO MATECH JAPAN CORP., Maruha Group Inc. Central Research Institute, Nissei Bio Company, Ltd., SHIONOGI & Co., LTD., MITSUBISHI CHEMICAL MEDIENCE, Atto Corporation, Immuno-Biological Laboratories Co., Ltd., Sanyo Chemical Industries, Medical Care Intracorporations, Sapporo Immuno Diagnostic Laboratory, SNOW BRAND MILK PRODUCTS Co., Ltd., NIHON SHOKUJIN KAKO Co., Ltd., ADEKA Corporation, DENKA SEIKEN Co., Ltd., ASAHIKAWA DENKIKIDOU Co., Ltd, SAPORO BREWERIEES, i-Ware Corporation,
- Academia: **Hokkaido University**, Sapporo Medical University, Asahikawa Medical College, Hokkaido Information University, Hirosaki University, Teikyo University, Tottori University, Tokyo University of Science, Health Sciences University of Hokkaido
- Government: National Food Research Institute, National Agriculture and Food Research Organization, Asahikawa Food Industry Support Center, Hokkaido Food Processing Research Center

4. Platform research

- ① Establish a platform for developing functional foods
Aiming to establish a reasonable clinical trial system for developing functional foods based on scientific evidence.
- ② Establish evaluation systems/technologies to develop functional food ingredients.
Building up several evaluation systems to search for the functional food ingredients and provide cross-sectional support for themes participating in this project.

5. Applied/Advanced research

- ① The creation of fluorescent polymer probes applying novel solvatochromic fluorescent dyes.
Produce new fluorescent nano-polymer particle probes with various light emission functions and low toxicity involving the application of several forms of biological research.
- ② Elucidate the physiological activity of malt lactic acid bacterium against intestinal tract tissue and the development of functional foods.
Clarify the function of lactate acid bacterium against intestinal tract tissue using model animals and clinical tests to develop functional foods.

Main Results

- "Development of an ESR system for measurement of anti-oxidative activity" Development of elementary technologies as below (2007):
 - A trial kit (reagent package) for a simple and easy measurement
 - A standard protocol
 - Automation system
 - Supporting software for anti-oxidant measurement
 Utilizing these developed technologies for measuring the anti-oxidative activity for food ingredients, clinical samples (blood) (2008).
- "Development of imaging methods" on the theme of "Research of intestinal epithelium function and development of functional foods."
 - Development of a novel solvatochromic dye, changing its fluorescent wavelength depending on its environmental polarity as the difference of solvents.
- "Research of immune balance control and development of functional foods."
 - Discovery of the existence of immune balance controlling ingredients in the extract from "Kuro Sen Goku," Hokkaido-grown soybeans. Value-added "Kuro Sen Goku" has already been processed for fermented soybeans and sweets. Some products are sold in various parts of Japan.
- Screening of biomarkers for diagnosis of dementia and the development of functional food ingredients.
 - Electrophoresis system for clinical samples (blood), which aimed at separation and concentration of targeted proteins. This system, named "Nativen" was launched in July 2009.

