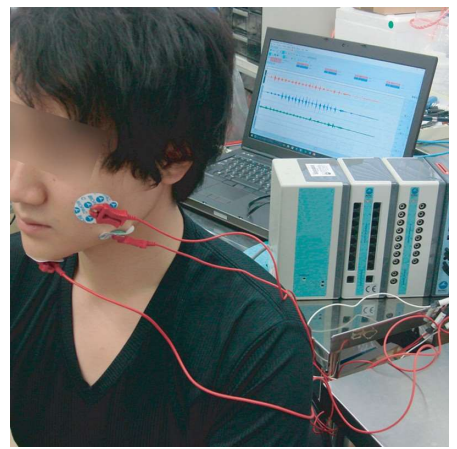
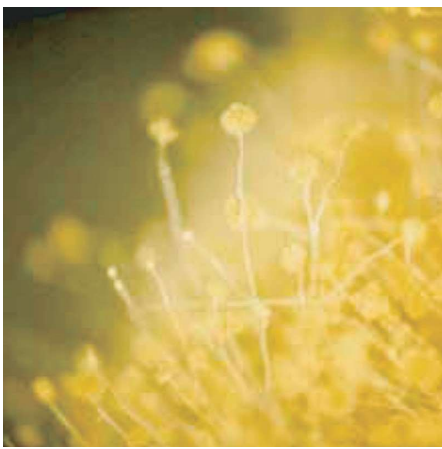




**農研機構**  
National Agriculture and Food Research Organization

# Food Research Institute, NARO (NFRI)



# The Food Research Institute, NARO (NFRI) conducts innovative R&D to ensure a safe and healthy dietary life and resolve food issues in Japan.



**Hiroshi NABETANI**  
Director-General  
Food Research Institute, NARO  
(NFRI)

The Food Research Institute, NARO (NFRI) conducts a broad range of both basic and applied food studies in order to ensure a safe and healthy dietary life, provide appropriate scientific information for foods to the public, and contribute to government policy on food and food industry development.

Specifically, we conduct both basic research and state-of-the-art technological developments, as well as research that addresses continuously evolving social needs, focusing on the following three research areas in close cooperation with five research divisions.

- Investigation of three functionalities of agricultural products and foods (nutritional functionality, palatability and physiological functionality) and the development of technologies for their effective utilization
- Development of technologies to ensure the safety, credibility and quality of agricultural products and foods
- Development of distribution and processing technologies with the aim to maintain or improve the quality and functionality of agricultural products

We, as members of the sole national institute specializing in integrated food research, will continue our efforts to be a more open and active research organization, aiming to be the hub of industry-academia-government cooperation in Japan and act as an international center.

## History

- 1934: Established as the Rice Utilization Research Institute under the Agricultural Bureau of the Ministry of Agriculture, Forestry and Fisheries in Tokyo.
- 1944: Reorganized as the Office of Food Administration Research Institute.
- 1947: Reorganized as the Food Research Institute.
- 1972: Reorganized as the National Food Research Institute.
- 1979: Moved to Tsukuba Science City from Tokyo.
- 2001: Reorganized as the Independent Administrative Agency, National Food Research Institute.
- 2006: Merged with the Independent Administrative Agency, National Agriculture and Food Research Organization (NARO).
- 2016: Reorganized as the Food Research Institute, NARO (NFRI)

# Organization

## Director-General

### Department of Planning and General Administration

Deputy Manager	Planning and Cooperation Section General Administration Section Risk Management Section
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### Division of Food Function Research

Nutritional Biochemistry Unit	Food Physics and Functions Research Unit
Functional Food Factor Unit	Sensory Science Unit
Functionality Evaluation Unit	

### Division of Food Processing and Distribution Research

Food Process Engineering Unit	Food Quality Evaluation and Control Unit
Food Resource Utilization Unit	Postharvest Science and Technology Unit
Advanced Food Technology Unit	

### Division of Food Safety

Food Hygiene Unit	Food Entomology Unit
Chemical Hazard Unit	Food Safety Science Unit

### Division of Analytical Science

Food Chemistry Unit	Food Component Analysis Unit
Nondestructive Evaluation Unit	Food Authenticity Analysis Unit

### Division of Food Biotechnology

Applied Mycology Unit	Biomolecular Engineering Unit
Applied Microbiology Unit	Bioresource Conversion Unit
Enzyme Research Unit	

## Inter-departmental problem solving teams

For current issues in food research, we organize flexible working teams to take prompt measures in cooperation with specialized or multi-disciplinary teams, depending on the scale of the issue.

### Current teams:

- **Food analysis/standardization team**  
We aim to ensure the validity of analytical values in the measurement of genetically modified organisms and radioactive cesium levels as certified reference materials, by obtaining certification (ASNITE 0018T) based on ISO/IEC 17025 from the International Accreditation Japan, National Institute of Technology and Evaluation.
- **Starch gelation analysis team**  
We analyze the mechanisms of gel formation and retrogradation of starch and starch-derived materials for application in the development of novel foods and uses of grains.
- **Working group on effects of radioactive materials**  
We release information on the effects of radioactive cesium in foods following the Great East Japan Earthquake both domestically and internationally.

# Division of Food Function Research

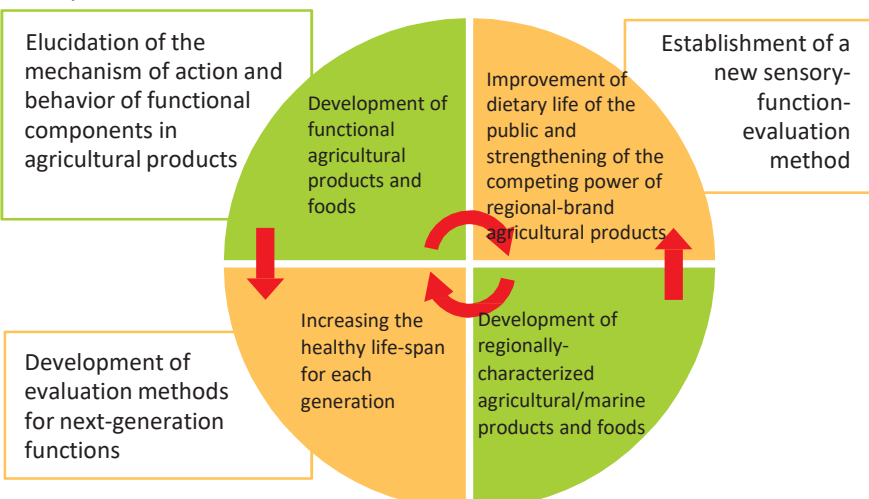
We gather scientific findings on the nutritional and health functionalities, such as the preventive effects of agricultural products and Japanese meals on lifestyle-related diseases, aiming to extend the healthy life expectancy for each generation.

- ◎ Elucidation of the mechanism of action and behavior of functional components in agricultural products and evaluation of next-generation functions
- ◎ Development of functional agricultural products and foods that are labeled with function claims
- ◎ Expansion of the database for functionality evaluation data for agricultural and marine products and foods
- ◎ Establishment of a new sensory-function-evaluation method to improve the dietary life of the public and strengthen the competing power of regional-brand agricultural products, etc.

Benifuuki  
(*Camellia sinensis* L.)  
green tea bag



Notified and received for a foods with function claims (notification number: A67)



## Functional boxed lunch



We are studying the effects of the consumption of a boxed lunch containing agricultural products on humans; the functional information of these foods is described by NARO.

# Division of Food Processing and Distribution Research

We develop technologies for food processing and distribution of domestic agricultural products, employed in maintaining or improving food quality and function, ensuring food safety, increasing applications, adding high value, and for effective food resource utilization.

- ⊙ Food processing technologies using engineering unit operations, e.g., heating, freezing, drying, pulverizing, granulating
- ⊙ Food processing/utilization technologies based on the characteristics of food constituents (carbohydrates, proteins, etc.)
- ⊙ Advanced food technologies, e.g., high electrical field AC, **radio frequency** heating, pulsed electric field, membrane separation, microchannel emulsification
- ⊙ Improvement of food quality by processing with high hydrostatic pressure (HHP) or by slowing the rate of starch digestion as well as method optimization for the sensory evaluation of food
- ⊙ Technologies that reduce postharvest losses and improve the quality of agricultural products and foods through the analysis of various factors during food distribution



Blanching by aqua-gas heating (superheated steam with fine water drops)



Equipment for HHP food processing and HHP-processed fruit compotes



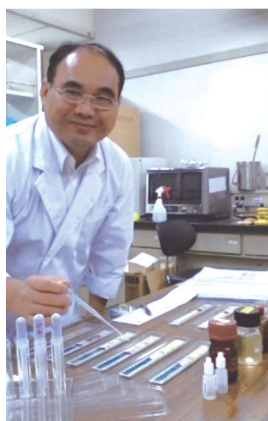
Three-dimensional vibration simulator that enables reproduction of transportation vibration

# Division of Food Safety

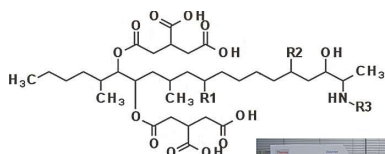
We develop technologies to elucidate, detect, and control chemical and biological hazards in the food chain to ensure food safety.

- ⊙ Development of identification methods and simple/rapid-detection/control technologies for food-borne pathogens
- ⊙ Elucidation of the antimicrobial mechanism of the historic and popular food preservative "vinegar (acetic acid)"
- ⊙ Development of analytical methods for harmful chemical substances (e.g., mycotoxins) and elucidation of their behavior in foods and agricultural products
- ⊙ Elucidation of the ecology of food insect pests and development of technologies for food pest detection and control to prevent food contamination
- ⊙ Elucidation of the behavior of radioactive cesium in processing/cooking processes and technological support for quality assurance in radioactivity measurement

Detection/identification of food-borne pathogens



Development of new analytical methods for modified mycotoxins (e.g., glycosides) and identification of routes of contamination



	R1	R2	R3
FB <sub>1</sub>	OH	OH	H
FB <sub>2</sub>	H	OH	H
FB <sub>3</sub>	OH	H	H
NDfrc-FB <sub>1</sub>	<u>OH</u>	<u>OH</u>	<u>C<sub>6</sub>H<sub>10</sub>O<sub>5</sub></u>
NDfrc-FB <sub>2</sub>	<u>H</u>	<u>OH</u>	<u>C<sub>6</sub>H<sub>10</sub>O<sub>5</sub></u>
NDfrc-FB <sub>3</sub>	<u>OH</u>	<u>H</u>	<u>C<sub>6</sub>H<sub>10</sub>O<sub>5</sub></u>

Fumonisin Bs and their sugar derivatives. Those underlined in red were found at NFRI. The image shows an LC-high-resolution mass spectrometer (LC-MS).



Identification of foods contaminated by insect pests using DNA analyses



Contamination can be detected even with insect fragments.

Measurement of radioactive cesium by gamma-ray spectrometry



Measurement device and detection spectrum

# Division of Analytical Science

We develop analytical technologies and evaluation methods for agricultural products and foods to ensure the credibility and quality of foods.

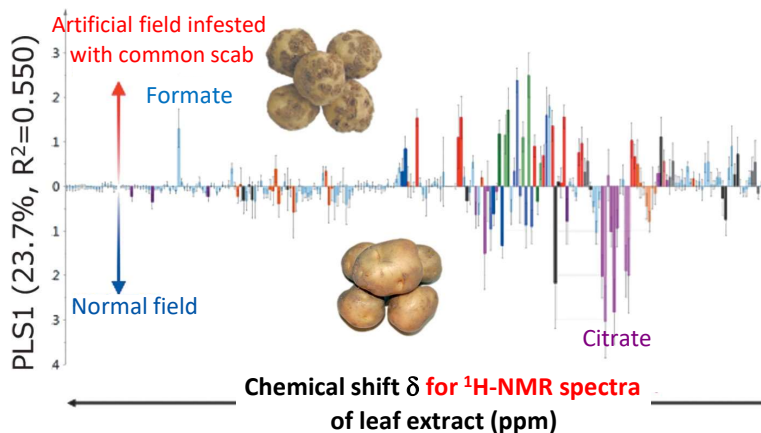
- ◎ Development of fundamental and comprehensive assessment technologies using instrumental analysis (mainly NMR) and chemical methods
- ◎ Development of nondestructive evaluation technologies based on spectroscopic and physical measurements
- ◎ Development of effective utilization technologies for lipophilic functional compounds in foods
- ◎ Development of analytical methods to trace the geographical origin of food ingredients, identify cultivars, and detect genetically modified organisms (GMOs) by chemical and biochemical techniques

## Development of nondestructive evaluation technologies using NIR spectroscopy



Nondestructive and noncontact measurement of tomato using diffuse reflected light

## Development of assessment technologies using NMR-based metabolic profiling



The development of a method to evaluate the infestation status of potato fields with common scab **pathogen** by analyzing leaves before tuber formation.

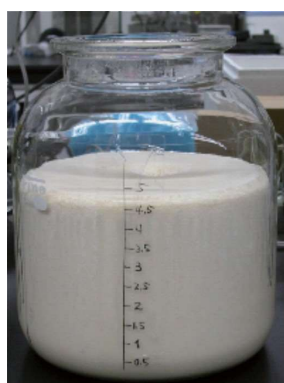
# Division of Food Biotechnology

We broadly conduct research on the biological functions of microorganisms, animals, plants, and their functional molecules, from basic research on the function of living organisms to applied research that exploits these functions for industrial use.

- ◎ Basic research to elucidate the latent potential of microorganisms (e.g., light responsive promoter)/animals/plants and their development into beneficial utilization technologies
- ◎ Development of manufacturing technologies for valuable substances (e.g., human milk oligosaccharides) using microorganisms and enzymes
- ◎ Development of utilization technologies for unused/**under**-used biological resources (e.g., rice straw, Japanese silver grasses) using microorganisms and enzymes



Visualization of the production of blue dye produced by koji (rice malt) mold reacting with light



Production of human milk oligosaccharides on a kilogram scale



Production of materials with industrial value by the extraction and fermentation of sugars from rice straw, Japanese silver grasses, etc.

## Access



### Tsukuba Center → NFRI

Tsukuba shuttle bus service or TAXI, 15 min

### Tokyo stn. → Tsukuba Center (Tsukuba terminal)

Tokyo stn. → Akihabara stn. → Tsukuba terminal  
Tokyo stn. → (JR Line, 5 min) → Akihabara stn. →  
(Tsukuba Exp. Line, 45-55 min) → Tsukuba terminal

Tokyo stn. → Tsukuba Center  
Highway bus service, 65 min

### Airport → Tsukuba Center

Tokyo International Airport (Haneda) →  
Tsukuba Center  
Highway bus service, 120 min

Narita International Airport → Tsukuba Center  
Highway bus service, 80 min

Ibaraki Airport → Tsukuba Center  
Bus service, 60 min

### Tokyo stn. → Ueno stn. → Ushiku stn. → NFRI

Tokyo stn. → (JR Line, 5-10 min) → Ueno stn. →  
(JR Joban Line, 55 min) → Ushiku stn.

Ushiku stn. → Bus service or TAXI, 30 min → NFRI

## Collaboration with NFRI

### Overseas Organizations and Universities

- Royal University of Agriculture (Kingdom of Cambodia)
- Institute of Food Science and Technology, Chinese Academy of Agricultural Sciences (People's Republic of China)
- Bogor Agricultural University (Republic of Indonesia)
- Korea Food Research Institute (Republic of Korea)
- The Clean Agriculture Development Center (Lao People's Democratic Republic)
- Rajamangala University of Technology Thanyaburi (Kingdom of Thailand)
- United States Department of Agriculture (United States of America)
- Dong Nai University of Technology (Socialist Republic of Vietnam)
- United Nations University

arranged in alphabetical order of the country

### Fellowships for Foreign Researchers

- JICA-KIRIN Fellowship Program

### Domestic Organizations and Universities

- National Institute of Health and Nutrition
- National Institute of Advanced Industrial Science and Technology
- Food and Agricultural Materials Inspection Center
- Japan Association for Techno-innovation in Agriculture, Forestry and Fisheries
- Ibaraki University
- Ochanomizu University
- Shizuoka University
- Seitoku University
- University of Tsukuba
- The University of Tokyo
- Tokyo University of Agriculture
- Tokyo University of Agriculture and Technology
- Tokyo University of Science
- Tohoku University
- Tokushima University

arranged in the order of the Japanese syllabary

## Food Research Institute, NARO (NFRI)

National Agriculture and Food Research Organization

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URL : <http://www.naro.affrc.go.jp/english/nfri/>