

# Distinctive Education and Research Programs

## Support for University Education Reform

The Ministry of Education, Culture, Sports, Technology and Science (MEXT) has implemented a number of programs to support university education reform efforts in a competitive environment in national, public and private universities, and for promoting the full-fledged development of distinctive education and research in all universities. The following are the most recently adopted projects at Kobe University.

### The Global COE (Center of Excellence) Program

## Education and Research on Signal Transduction Medicine in the Coming Generation

— Bringing up clinician-scientists in the alliance between basic and clinical medicine —



Professor **Takeshi Azuma**  
Graduate School of Medicine

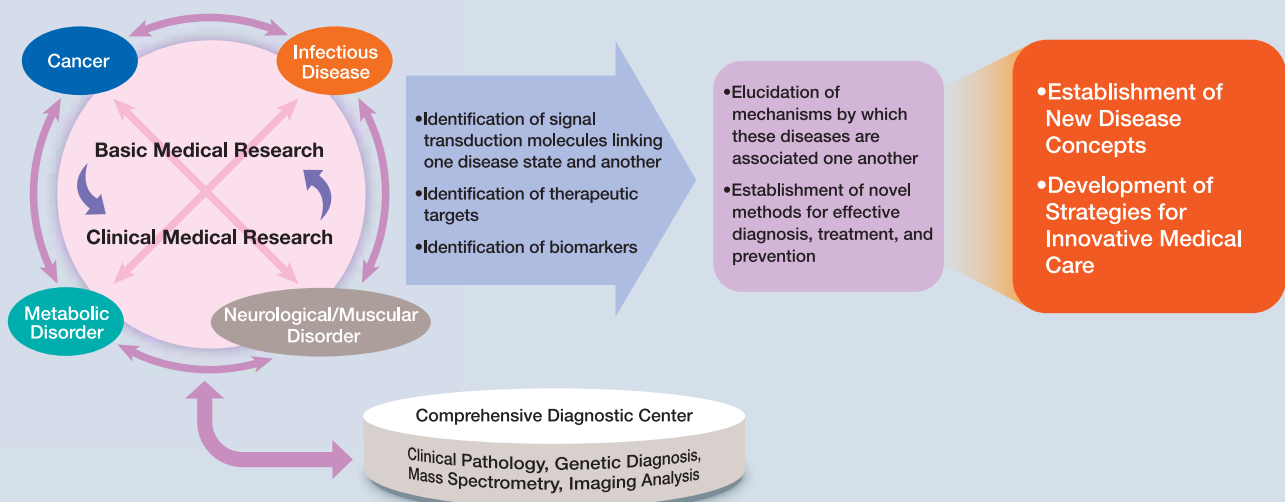
### Outline of plan for establishing COE

“Signal transduction medicine” is a field of medicine that investigates diseases from the view of information systems for maintaining homeostasis in the body, and studies their mechanisms, diagnosis, treatment, and prevention. While dramatically deepening our understanding of individual diseases, progress in signal transduction medicine has highlighted complexities that cannot be clarified by conventional approaches focusing on a single disease and specialty. The purpose for establishing this COE is to elucidate the pathogenesis and pathophysiology of diseases and understand their nature from a completely new viewpoint based on accumulating world top-level research in signal transduction medicine at Kobe University. It is also meant to develop strategies for innovative medical care, and to nurture young scientists to become leaders in the coming generation in the fields of medical sciences and medical care. To achieve these objectives, we will establish a global COE for education and research on signal transduction medicine for diseases such as cancers, metabolic disorders, infectious diseases, and neurological and muscular disorders, for which radical solutions are urgently required. A cross-disciplinary and integrative approach based on the alliance between basic and clinical medicine will be adopted in this COE. This global COE aims to clarify the core mechanisms by which these diseases are associated with one another and establish novel methods for their effective diagnosis, treatment, and prevention, while also training clinician-scientists and medical researchers who are capable of creating new medical fields.

### Objectives, significance and prospective impacts

The research field of the proposed COE is signal transduction medicine. In recent years, the understanding of individual diseases has been increased markedly by progress in signal transduction medicine, but the complexity of the diseases cannot be captured by conventional approaches focusing on a single disease and specialty. For example, the disease state of cancer is being revealed to be closely associated with infection, inflammation, and/or metabolic disorders, so it is essential to investigate the disease by an organized team of specialists from different backgrounds including infection, inflammation, and metabolism together with oncologists. For more effective cancer treatment, it is clearly important to implement a medical care system supported by a team of specialists in various fields including surgery, chemotherapy, radiation therapy, prevention of infection, and mental care. Diabetes, a typical metabolic disorder, is associated with infection and inflammation, and certain types of cancer occur at a higher frequency in diabetic patients. In this COE, by focusing on cancers, metabolic disorders, infectious diseases, and neurological/muscular disorders, all of which are closely related to failures of signal transduction systems, we aim to elucidate the core mechanisms by which these diseases are associated with one another, from a completely new perspective.

We aim to elucidate the core mechanisms by which cancers, metabolic disorders, infectious diseases, and neurological / muscular disorders are associated with one another, and establish novel methods for effective diagnosis, treatment, and prevention of these diseases while nurturing clinician-scientists and medical researchers who are capable of creating new medical fields, by a cross-disciplinary and integrative approach.



## The Global COE (Center of Excellence) Program

## Foundation of International Center for Planetary Science



Professor **Yoshitsugu Nakagawa**  
Graduate School of Science

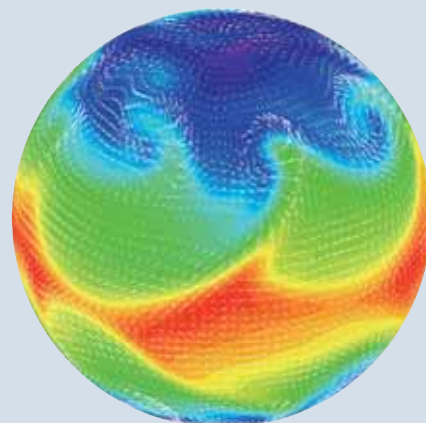
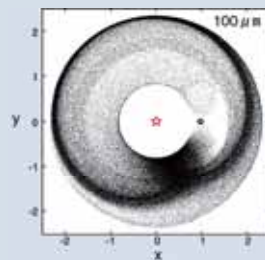
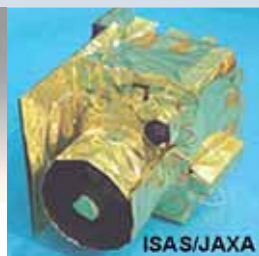
**P**lanetary sciences are continuing to develop and expand across the fields of astronomy and Earth sciences. About 300 extra-solar planets have been found orbiting around stars other than the Sun since the first of such discovery in 1995. Many small objects appear to be in the outermost region of the solar system. Laboratory analyses of primordial planetary materials and analogue experiments of the most primitive minor planets Itokawa, explored by the Japanese spacecraft Hayabusa, are clarifying the history of planetary accretion. Theoretical studies and computer simulations are also resolving the formation of planetary systems, or evolution of atmospheres on various planets. As a result of expansion, however, research activities in planetary sciences have become more diversified.

The main purpose of this Global COE program (2008-2013) is the establishment of an organization in Japan to promote cooperation activities in education and research among planetary scientists around the world. This organization will also provide a stage where people from various fields of planetary sciences can assemble as well as accumulate knowledge and information. Our plan is to expand the "Center for Planetary Science (CPS)", which was launched at Kobe University under the former "21st-Century COE Program" (2003-2007), to function as a coordination center with capabilities to oversee project planning and management, information orientation, international cooperation, etc. The CPS will not only act as a catalyst for personnel trainings and research activities, but also function as a platform for a comprehensive understanding of the

expanse of planetary sciences. To enhance the function of the CPS as the real basis of interuniversity activities, the present program is being planned and will be carried out in close cooperation with Hokkaido University, which has a largest group of active planetary scientists in Japan possessing a common awareness of the issue.

What is unique regarding the educational aspect of the planned CPS is the fostering of a wide range of human resources possessing abilities to plan, organize, manage, construct necessary infrastructure, etc. required for the development of planetary science. In addition to conventional education and research programs, young scientists are urged to actively participate in activities coordinated at the center. This will serve as on-the-job training of human resources who possess broad and interdisciplinary perspectives on planetary science research, are sufficiently skilled to be active internationally, are capable of evaluating the significance of their research in the field, and appreciate the importance of establishing infrastructure for education and research. Moreover, activities supported by the CPS such as technical workshops, etc. may be attended by scientists from private enterprises and municipalities. One of the characteristics of the planned CPS is to provide young students and scientists an opportunity to pursue diverse career paths and become active in a wide range of fields, not only in academic community but also in public at large. The deployment of those educated youth into the society will help build the social backing for the promotion of planetary science.

### Various methods and tools in planetary Sciences



# Distinctive Education and Research Programs

## The Global COE (Center of Excellence) Program

### Global Center for Education and Research in Integrative Membrane Biology



Professor **Tohru Kataoka**  
Graduate School of Medicine [adopted in 2007]

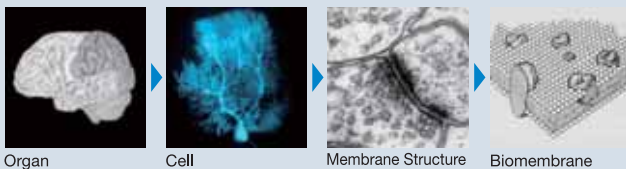
**B**iomembranes play a fundamental and universal role in biological phenomena. The purpose of establishing this COE is to understand the biological phenomena involving biomembranes more precisely and comprehensively, by recognizing biomembranes as a higher-level system of integrated functions consisting of lipids and proteins based on the wealth of accumulated knowledge from preceding studies on their individual molecular constituents. To this end, under the banner of “Global Center for Education and Research in Integrative Membrane Biology”, we will organize interdisciplinary cooperation among world-class researchers with a variety of relevant research interests and approaches, in order to clarify the whole picture, as well as the underlying fundamental principles, of higher-level biomembrane functions. In this COE, we will also establish a unique education and training system for raising young researchers who are equipped with integrative knowledge and methodologies in membrane biology, as well as the ability to create innovative research projects on their own initiative and engage in international research activities. Participation of these young researchers will reinforce the research activities of the COE and make provision for its sustained development.

This COE aims to establish two systems. The first system will promote interdisciplinary creative research by organizing close cooperation among world-class researchers with diverse backgrounds and approaches in membrane biology. The second system will raise world-leading young researchers who are capable of acquiring systematic and interdisciplinary knowledge and methodologies in membrane biology and the ability to explore new frontiers of the life sciences from their own unique viewpoints. To this end, this COE will convert the basic principle

of education and training from the subordinate and apprenticeship style, conventional in Japanese universities, to a new style which puts an emphasis on nurturing creativity and the ability to pursue independent and international research activities. To achieve these targets, various measures for research promotion, reforms in graduate school education, and a plan for supporting independence of young researchers will be implemented under a proper administrative management system.

In particular, a cross-departmental “Training Course for Raising Research Leaders in Membrane Biology” will be introduced into graduate school education for nurturing creativity, as well as the ability to pursue independent and international research activities. In this course, outstanding students in their first and second years of doctoral programs will be selected, based on the evaluation of their research proposals written in English, and provided with grants for independent research and financial supports. They will be encouraged to pursue independent research projects under appropriate mentoring and advices from COE members. As for training of young researchers and support for independence, the following 3-stage systems will be enforced: a conventional post-doctoral fellow system; “Track A” (tenure track that secures complete independence in research and promotion to a tenure position of associate professor based on rigorous evaluation after 3 or 5 years); and “Track B” (intermediate positions between post-doctoral fellows and Track A, similar to research associates in US). The aim is to raise world-leading scientists capable of exploring new frontiers in the life sciences by attracting the most outstanding young researchers and students.

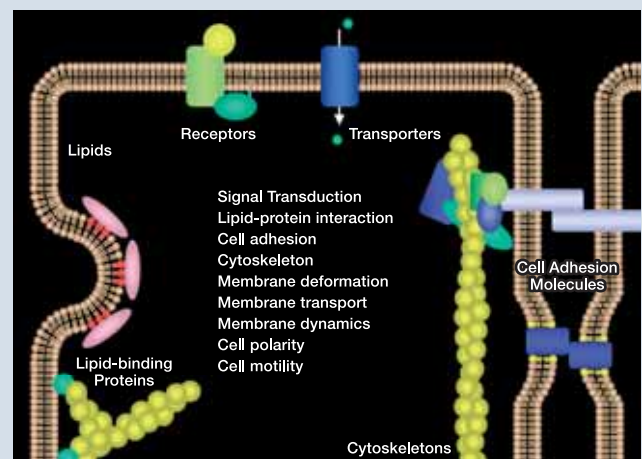
#### Purpose of Establishing COE in Integrative Membrane Biology



- Recognition of biomembranes as a higher-level integrated system consisting of lipids and proteins
- Interdisciplinary cooperation among world-class researchers with a variety of research interests and approaches

- Elucidation of the whole picture of the biomembrane functions
- Nurturing young scientists equipped with integrative knowledge and methodologies on membrane biology

#### Research Targets of This COE Program



**Program for Promoting High-Quality University Education**

A Program for Renovation of an Undergraduate-level Legal Education for the 21st Century: Introduction of Active Learning for Enhancing Students' Abilities of Policy Evaluation and Presentation Detailed HP in Japanese

*By the Faculty of Law [adopted in 2008]*

Program to foster human resources "on the job" through food and agricultural cooperative education

*By the Faculty of Agriculture [adopted in 2008]*

**Support Program for Distinctive University Education**

Developing a Systematic Interprofessional Work (IPW) Education for Collaborative Competencies

*By the Graduate School of Health Sciences [adopted in 2007]*

**Support Program for Contemporary Educational Needs**

The Education of Art Management to Restore Urbiculture

*By the Graduate School of Intercultural Studies, Graduate School of Human Development and Environment [adopted in 2007]*

ESD Development and Promotion: An Action Research Program

*By the Graduate School of Human Development and Environment, the Graduate School of Humanities, the Graduate School of Economics [adopted in 2007]*

**Support Program for Improving Graduate School Education**

Humanities Education Emphasizing the Importance of Interdisciplinary Classics and Dialogue

*By the Graduate School of Humanities [adopted in 2007]*

Interactive Health Science Education in Asia

*By the Graduate School of Health Sciences [adopted in 2007]*

Fostering Specialists Who Possess Modern Culture-Information Literacy

*By the Graduate School of Intercultural Studies [adopted in 2007]*

Giving Substance to Graduate School Education through Activities outside Standard Curriculum

*By the Graduate School of Human Development and Environment [adopted in 2007]*

Advanced Program to Foster Researchers of Business Administration

*By the Graduate School of Business Administration [adopted in 2007]*

Advanced Education Program on Computational Science in Collaboration with Universities

*By the Graduate School of Engineering in collaboration with 3 other universities [adopted in 2007]*

Center-Fusion-Type Education System to Foster Professional Clinical Experts

*By the Graduate School of Medicine [adopted in 2007]*

**Support Program for Strategic University Collaboration**

An active learning type student exchange program to enhance comprehensive collaboration among 28 Hyogo area universities

*A Joint Program with 27 Hyogo area universities [adopted in 2007]*

**Student Support Program Addressing Emerging Societal Needs**

Development of Symbiotic Power through Community and Project Based Learning

*By the Research Center for Urban Safety and Security & Kobe University Student Affairs Department [adopted in 2007]*

**Program for Fostering Practical Human Resources through University-Industry Collaboration**

Development of a human resources fostering program for creating innovation which creates and gets values in the service industry

*By the Research Institute for Economics & Business Administration [adopted in 2007]*

**Support Program to Meet the Working Population's Re-Learning Needs**

Fostering Program for Medical Device Development Coordinators

*By the Graduate School of Engineering in collaboration with Kyoto University [adopted in 2007]*

**Education Program to Foster Specialists in Professional Schools**

Advances in the MBA program through university-industry relations -Refining professional school education developed by fostering strategic quality control leaders-

*By the Graduate School of Business Administration [adopted in 2007]*

Research study of core curriculum for law schools

*By the Graduate School of Law in collaboration with Kyoto University and Tokyo University [adopted in 2007]*

**University Education Internationalization Promotion Program (International Collaboration/Joint Cooperation)**

International Platform for Asian Agricultural Education

*By the Graduate School of Agricultural Sciences in collaboration with the University of Kyushu, Tokyo University of Agriculture and Technology [adopted in 2008]*

Multiple Degree Education Program based on Trilateral Collaboration: Japan-Europe & America-Asia International Collaboration in the Fostering of Specialists in Asian Studies

*By the Graduate School of International Cooperation Studies [adopted in 2007]*

**Training Program to Promote the Fostering of High-Quality Medical Professionals to Meet the Needs of Regional Healthcare**

A Systematic Development of Brush-up Education for Female Doctors & Nurses

*By the Faculty of Medicine, the Faculty of Health Sciences, the Gender Equality Promotion Office [adopted in 2007]*

Training Specialists for Clinical Research and Research Support

*By the Faculty of Medicine, Graduate School of Medicine, Kobe University Hospital [adopted in 2007]*

**Cancer Professional Training Program**

Oncology Team Training Plan

*By the Graduate School of Medicine in collaboration with five other universities [adopted in 2007]*

**Fostering of Highly Skilled Medical Professionals through University Hospitals Collaborations**

A medical professional fostering program for an area between the Sanin Region and the Hanshin District

*A Joint Program with 3 other university hospitals [adopted in 2007]*

A medical professional fostering program in collaboration with magnet hospitals

*A Joint Program with 5 other university hospitals [adopted in 2007]*

A medical professional fostering program with a core education that leads to lifetime learning

*A Joint Program with 8 other university hospitals [adopted in 2007]*

A comprehensive medical professional fostering program originating in a regional city

*A Joint Program with 22 other university hospitals [adopted in 2007]*

A professional fostering program for the old Hizen Province originating in Dejima -Fostering medical professionals who possess a rich sense of the region and the world-

*A Joint Program with 8 other university hospitals [adopted in 2007]*

A medical professional and clinical researcher fostering program through multipolar type cooperation

*A Joint Program with 28 other university hospitals [adopted in 2007]*