





Fukuzawa's Spirit of Science – The Power to Pioneer the Future

Yukichi Fukuzawa, the founder of Keio University who lived through a period of dramatic upheaval before and after the Meiji Restoration, wrote of his contemporaries in his book, *An Outline of a Theory of Civilization*: "We have lived two lives, as it were; we unite in ourselves two completely different patterns of experience." In such periods of major transition, we are unable to consider things based on preconceived ideas or old ways of thinking. Against this background, what Fukuzawa emphasized was the importance of "learning." By "learning," Fukuzawa meant *jitsugaku*, or "science," and in particular, "empirical science."

Today, we are also in the midst of major changes to economic and social structures. In times such as these, it is increasingly important for us to understand and determine the true nature of things based on empirical evidence, through learning such as in the natural sciences, social sciences and humanities. It is only through scientific and empirical learning, or thinking based on science, that we can create new values, find solutions to the problems we face and make level-headed decisions. Research at Keio University is always conducted in Fukuzawa's spirit of science.

Currently at Keio University, research activities are conducted extensively and in various forms, including advanced research, multidisciplinary research and international collaborative research. Some research activities evolve with a deep, narrow focus, while others evolve broadly and expansively. To promote the progress of these activities, Keio University has continued to improve its research environment and support structure, as exemplified by the stipulation and implementation of a code of conduct, the establishment of a compliance framework, the enhancement of international intellectual property activities and funding for the development of young researchers.

This Annual Report on Research Activities is intended to promote collaboration with outside institutions and to bring together new knowledge for the future generation. It indicates the current status and trends of the research activities at Keio University as clearly as possible, providing latest statistical data and information on areas of study. We hope that you will enjoy reading about the research capabilities of Keio University, as we strive to pioneer the future in Fukuzawa's spirit of science.

Professor **Atsushi Seike**
President, Keio University



c o n t e n t s

Keio University Annual Report on Research Activities

2009-2010

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* This publication introduces research activities from 2009 to 2010.
Titles and positions given from page 4 onward are as of April 2009.

Campus Research Centers and Office Organization for Research Advancement and Research Administration

Campus	Research Centers (Faculties, Graduate Schools, Institutes, and Others)		Office Organization for Research Advancement and Research Administration	Organization for Research Advancement and Administration (ORAA) ▶ P.04 Head Office of Research Administration ▶ P.08
Mita Campus ▶ P.11-12	• Faculty of Letters (Years 2 to 4) • Faculty of Economics (Years 3 and 4) • Faculty of Law (Years 3 and 4) • Faculty of Business and Commerce (Years 3 and 4) • Graduate School of Letters • Graduate School of Economics • Graduate School of Law • Graduate School of Human Relations • Graduate School of Business and Commerce • Law School	• Institute for Cultural and Linguistic Studies • Institute for Media and Communications Research • Institute for Economic and Industrial Studies (Sangyo Kenkyujo) • Institute of Oriental Classics (Shido Bunko) • International Center • Teacher Training Center • Fukuzawa Memorial Center for Modern Japanese Studies • Keio Institute of East Asian Studies (KIEAS) • Center for Japanese Studies • Research Center for the Arts and Arts Administration • Global Security Research Institute (G-SEC) • Research Institute for Digital Media and Content (DMC)	Mita Office of Research Administration	
Hiyoshi Campus ▶ P.13-14	• Faculty of Letters (Year 1) • Faculty of Economics (Years 1 and 2) • Faculty of Law (Years 1 and 2) • Faculty of Business and Commerce (Years 1 and 2) • School of Medicine (Year 1) • Faculty of Science and Technology (Years 1 and 2) • Faculty of Pharmacy (Year 1) • Graduate School of Business Administration (Keio Business School) • Graduate School of System Design and Management • Graduate School of Media Design	• Institute of Physical Education • Sports Medicine Research Center • Health Center • Keio Research Center for Foreign Language Education • Keio Research Center for the Liberal Arts • Research and Education Center for Natural Sciences • SDM Research Institute • KMD Research Institute	Hiyoshi Office of Research Administration	
Yagami Campus ▶ P.15-16	• Faculty of Science and Technology (Years 3 and 4) • Graduate School of Science and Technology	• Keio Leading-edge Laboratory of Science and Technology (KLL)	Office of Research Administration, Yagami Campus	
Shinanomachi Campus ▶ P.17-18	• School of Medicine (Years 2 to 6) • Faculty of Nursing and Medical Care (Year 3) • Graduate School of Medicine	• Center for Integrated Medical Research (Research Park) • Keio Center for Clinical Research • Keio University Hospital	Shinanomachi Office of Research Administration	
Shonan Fujisawa Campus ▶ P.19-20	• Faculty of Policy Management (Years 1 to 4) • Faculty of Environment and Information Studies (Years 1 to 4) • Faculty of Nursing and Medical Care (Years 1, 2, and 4) • Graduate School of Media and Governance • Graduate School of Health Management	• Keio Research Institute at SFC	Shonan Fujisawa Office of Research Administration	
Shiba-Kyoritsu Campus ▶ P.21-22	• Faculty of Pharmacy • Department of Pharmacy (Years 2 to 6), Department of Pharmaceutical Sciences (Years 2 to 4) • Graduate School of Pharmaceutical Sciences		The Group for Research Administration, General Affairs Office, Shiba-Kyoritsu Campus	
Shin-Kawasaki Town Campus ▶ P.23-24			Shin-Kawasaki Town Campus Office	
Tsuruoka Town Campus ▶ P.25-26		• Institute for Advanced Biosciences	Tsuruoka Town Campus Office	

Organization for Research Advancement and Administration

Research Advancement and Support at Keio University

<http://www.oraa.keio.ac.jp>

Keio University believes that its mission of returning the fruits of research to society is important. Based on the principle of "*Gakujutsu Sendo* (leadership for scientific progress)," the University aims to make significant contributions to international society in the 21st century through original and creative academic research. Keio University promotes numerous advanced research projects at six campuses: Mita, Hiyoshi, Yagami, Shinanomachi, Shonan Fujisawa, and Shiba-Kyoritsu. Traditionally, Keio University has been deeply involved in collaborative activities between industry, government, and academia. Activities such as commissioned research, joint research, and personnel exchanges are mainly undertaken at five research facilities: the Keio Leading-edge Laboratory of Science and Technology (KLL) at the Yagami Campus, the Center for Integrated Medical Research at the Shinanomachi Campus, the Keio Research Institute at SFC (Shonan Fujisawa Campus), the Shin-Kawasaki Frontier Research and Education Collaborative Square (K²) in Kawasaki City, and the Tsuruoka Frontier Research and Education Collaborative Square in Tsuruoka City.

Keio established the Organization for Research Advancement and

Administration (ORAA) in October 2003 to provide further support for these wide-ranging research activities undertaken at these facilities, which we believe should boost the university's ability to create, promote interdisciplinary studies and return the fruits of research to society.

Roles and Functions of the ORAA

The ORAA comprises various centers and committees, including: the Center for Research Promotion (CRP), the Intellectual Property Center (IPC), Keio Advanced Research Centers (KARC), the Intellectual Property Mediation Committee, and the Research Ethics Committee. Head Office, Office of Research Administration is responsible for the administration of each organization under the ORAA. Together with the Offices of Research Administration, the ORAA promotes and supports all aspects of research-related activities, from the start of strategic research to the transmission and contribution of results to society. The major roles and functions of each organization in the ORAA are as follows.

Offices of Research Administration (p. 8)

Support research activities at all campuses

The campuses of Mita, Hiyoshi, Yagami, Shinanomachi, Shonan Fujisawa, Shiba-Kyoritsu, Shin-Kawasaki, and Tsuruoka each have an Office of Research Administration. Each office supports research by maintaining close contact with individual researchers, acts as an on-campus contact point for external organizations, and promotes research collaboration with ORAA. Specifically, the Offices provide information to researchers in areas such as research resources, research environments, and opportunities for research subsidies from inside and outside Keio University (public calls for subsidy applications), and also offers a variety of other support services including negotiations and the signing of contracts for joint or commissioned research, management of research expenses and research spaces, and compilation and presentation of research results.

Keio Advanced Research Centers (KARC) (p. 7)

Supports and promotes the formation of advanced, interdisciplinary research centers

The Keio Advanced Research Centers (KARC) flexibly performs activities related to the establishment, restructuring and/or abolition of the research centers, as well as the operations of the research centers and their personnel. The research centers function as university-wide organizations that transcend the boundaries of the university faculties and graduate schools. KARC is an organization that invigorates and accelerates such research activities. Each research center at KARC uses external funds as the fiscal resources for its activities. The campuses that are to serve as the centers of these activities are designated and tasked with research assignments. A center is established over a limited period of time (center formation period). This limit on the period for the formation of centers is expected to promote research results and the development of the research itself, in keeping with the development of research contents; for example, when a given formation period is complete, new research centers can be formed to carry on that work, or new organizations can be created within the university.

Center for Keio Frontier Research and Education Collaborative Square (K-FRECS) (p. 23, 25)

While the university's main campuses maintain the traditional functions of research and education, the Frontier Research and Education Collaborative Square (K-FRECS) functions as a base for cutting-edge, collaborative research based on cooperation with the community, as well as essential research that cuts across various university faculties and graduate schools.

Center for Integrated Education System

The Center for Integrated Education provides front-line support in the primary and secondary education facilities affiliated with Keio University.

Center for Research Promotion (CRP) (p. 5)

Comprehensively promotes collaboration between industry, government, and academia

The Center for Research Promotion (CRP) plays the role of a general contact point for planning and promoting integrated and strategic research efforts based on collaboration between industry, government, and academia. In addition, the CRP serves as a gateway to coordinate collaboration between companies, universities, and research institutes in Japan and overseas. The CRP is responsible for advancing interdisciplinary research and comprehensive research collaboration. Specifically, the CRP advances joint research projects through discovering and combining university resources that match business needs. It supports the application process to obtain public funding on research themes together with industry and the launching of the research themes. The CRP manages university research grants-in-aid to create and support joint research between industry, government, and academia. Through symposiums, it also advances exchange and communication of research results with external organizations. These activities are advanced through discussions with the CRP Advisory Board, which is commissioned to give advice by the CRP.

Intellectual Property Center (IPC) (p. 6)

The Technology Licensing Organization (TLO) for Keio University

As Keio University's Technology Licensing Organization (TLO), the Intellectual Property Center (IPC) has a wide range of responsibilities, from management and operation of intellectual property rights generated by the university to promotion of collaborations with society based on those intellectual property rights. Based on applications for inventions submitted by researchers, the IPC closely examines patentability and the potential for licensing, taking into consideration the researchers' concepts of practical applications. It then makes selections, files patent applications, and maintains and controls those successful patents. These technology licensing operations open the door to a wide range of other activities, including licensing of Keio University's patented technologies to companies, the creation of new companies with foundations in intellectual property rights, and joint research with companies aimed at developing products for practical applications.

The IPC also supports and promotes the incubation activities of Keio University overall while carrying out all the steps, from education and research to return of the fruits of research to society, together with each campus and in collaboration with industrial circles.

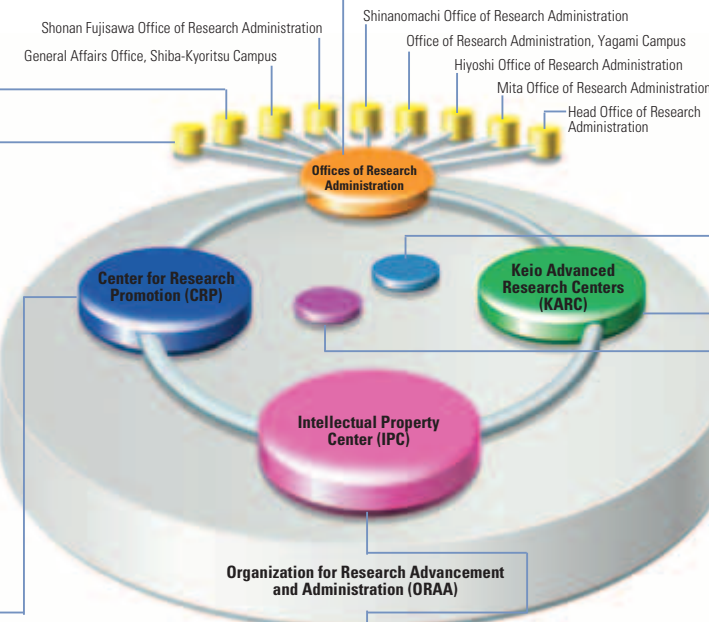
* The Keio Incubation Center was integrated into the Intellectual Property Center in April 2010.

Intellectual Property Mediation Committee

When an inventor lodges an objection regarding a given patent application, the Intellectual Property Mediation Committee acts as a mediator based on the Keio University Regulations for the Handling of Inventories.

Research Ethics Committee

The Research Ethics Committee coordinates and manages policies and regulations related to issues such as research ethics and conflicts of interest. Its main goal is to create structures that are capable of promoting fairness and safety in research activities in response to demands from society, particularly with regard to compliance problems in relation to recent university research activities, and the conflicts of interest that can arise in activities involving collaboration among industry, government, and academia.



Center for Research Promotion (CRP)

Development of collaboration between industry, government, and academia

<http://www.crp.keio.ac.jp/en/index.html>
E-mail: crp@info.keio.ac.jp

The Center for Research Promotion (CRP) functions as a general contact point in the planning and promotion of comprehensive, strategic research (research across faculties and interdisciplinary research) through collaboration between industry, government, and academia, and in collaborations with companies, universities, and research institutes in Japan and overseas. In particular, the CRP is responsible for advancing interdisciplinary research and comprehensive research collaborations.

1. Collaborations with Outside Institutions

(1) Nippon Telegraph and Telephone Corporation (NTT)

Keio University and Nippon Telegraph and Telephone Corporation (NTT) signed a comprehensive partnership agreement in March 2006, and have been successful in increasing the number of individual joint research agreements. In FY2009, the number of joint research projects stood at 14 and 10 patent applications were filed, while there were 4 cases of development, including software development, and 24 external presentations and papers.

(2) RIKEN Japan

Keio University and RIKEN Japan signed a collaboration and cooperation agreement in December 2008, and are continuously engaged in collaborative activities. The Research Centre for Human Cognition was established by researchers from both institutes in April 2009 to drive progress in specific collaboration activities.

Keio and RIKEN Japan held four symposiums in FY2009: "Toward Integrative Understandings of the Human Intelligence," "Future of Brain, Body and Human Interface Design," "Toward Sustainable Social Systems," and "Neurobiological Basis for the Brain Evolution and Mind."

(3) Itochu Corporation

"Next-generation Web service planning/development program 2009" was implemented, with Itochu Corporation as its sponsor, targeting students of Keio University and Waseda University.

2. Acquisition of Public Funds

Project coordinators of CRP, in cooperation with researchers, played a key role in applying for and obtaining major public funds including A-STEP of the Japan Science and Technology Agency (JST).

3. The External Collaborative Research Creation Fund

Under the grant system, nine joint research proposals were selected and implemented in FY2009, with an emphasis on the novelty of research activities (new research themes, new collaborative partners, and new research teams) and on the social impact of the proposed research, following FY2008.

4. Open Symposiums

Keio University hosted the following five open symposiums in FY2009, with particular focus on the bioscience and life science fields:

"Demonstrative Research on Metabolomics: From the Basis to the Clinic of Drug Discovery;"

"Collaborative Seminar by the School of Medicine and the Faculty of Science and Technology at Keio University;"

"Food and Medical Science, and Health and Longevity;"

"Elucidation of the Neural Basis that Produces the Mind;" and

"Challenging Cancer - Forefront of Basic and Clinical Research."



Keynote lecture given at a symposium

5. Other Activities

Keio University also focused its efforts on the environmental field in FY2009.

The university successfully received funding under the "Project to Formulate a Vision for New Regional Energy and Energy Conservation", sponsored by the New Energy and Industrial Technology Development Organization (NEDO), and the university's proposal was accepted. Investigations were conducted to verify the introduction and effective operation of new energy and energy conservation facilities to enable the Hiyoshi Campus and the Yagami Campus to go green.

In addition, Keio University proceeded with planning the Library of Existing Drugs of the School of Medicine of Keio University as a project based on collaboration between industry, government, and academia, and collected existing drugs (pharmaceuticals whose pharmacology and safety have already been verified, namely over-the-counter drugs and pharmaceutical lozenges in phase II and phase III clinical trials, etc.) and turned them into a library. Keio plans to carry out a research in which chemical compounds will be evaluated using this library. The research aims to develop new uses and expand applications (mainly anticancer agents of these chemical compounds) at the School of Medicine.

Intellectual Property Center (IPC)

Intellectual property rights and technology transfer

<http://www.ipc.keio.ac.jp/english/>
E-mail: toiawasesaki-ipc@adst.keio.ac.jp

The transfer of technologies from universities to the industrial world began with the enactment of the "Act on the Promotion of Technology Transfer from Universities to Private Business Operators" in August 1998. Keio University established the Intellectual Property Center (IPC) in November 1998, and has worked actively towards returning the benefits of research created by the university as an authorized Technology Licensing Organization (TLO) to society in the form of products and technologies.

The IPC, which absorbed the Keio Incubation Center in April 2010, aims to create social and economic values by collaborating with each campus and supporting venture companies originating from Keio University in cooperation with the industrial circles.

1. Promoting Technology Transfer Activities

The IPC returns benefits of research results at Keio University to society by turning research results created by researchers in various faculties and graduate schools on Keio University's campuses into industrial property rights and transferring them to industrial circles. Technology transfers are conducted in three forms: (1) licensing to companies; (2) commissioned/joint research with companies based on Keio University's intellectual property; and (3) the creation of venture companies.

2. Creating a Venue for Information Exchanges between Industry, Government, and Academia

The "Leading Innovation Network," a series of gatherings to introduce technologies aimed at transferring research results from Keio University to industry in the form of concrete technologies, was held twice in FY2009.

The Venture Private Conference, including presentations by venture business managers on business strategies and the outlook for the future, as well as the introduction of specific businesses, was also held in FY2009.

3. Intellectual Property Center Awards / Education

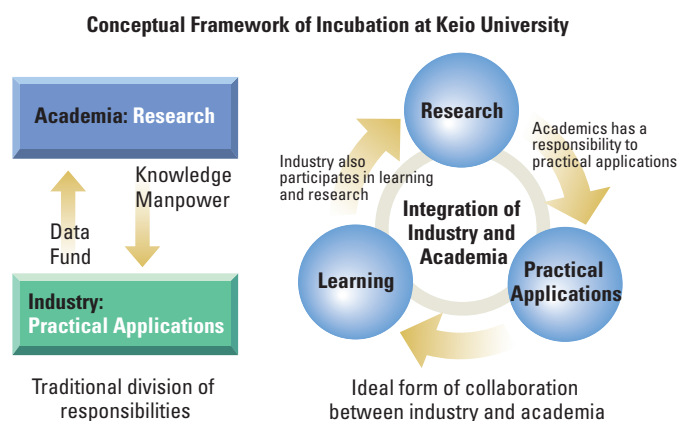
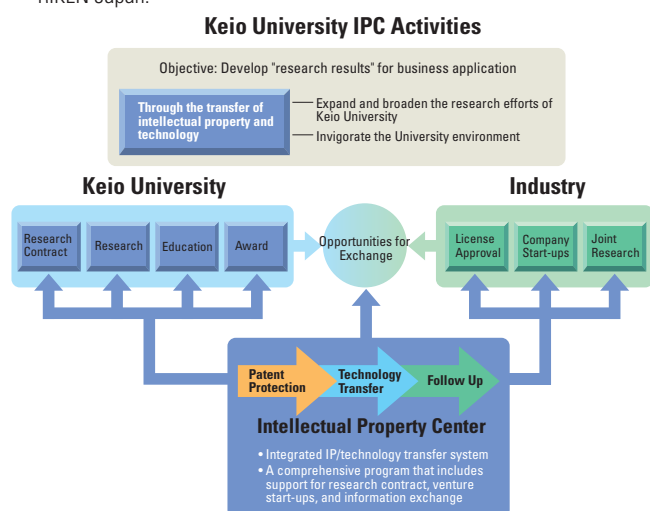
The 10th Intellectual Property Center Award, in FY2009, was presented to Professor Kunihiro Takahashi, Faculty of Science and Technology, for the project entitled, "The Pathway Analyzer Based on the Load Transfer Pathway Method." A lecture course entitled, "On the General Theory of Intellectual Property", is run by the Intellectual Property Center using the Nateglidine Memorial Toyoshima Research and Education Fund (an internal grant-in-aid program). This course, implemented for the students of all faculties, provides educational opportunities in relation to intellectual property.

4. Developing Industry-Government-Academia Collaboration Strategies

In FY2009, various activities were undertaken in the following two fields as part of Industry-Government-Academia Collaboration Strategy Development program by the Ministry of Education, Culture, Sports, Science and Technology (MEXT): "Promoting international Industry-Government-Academia Collaboration activities" and "Building Intellectual Property Portfolio Formation Model."

Activities included:

- (1) Establishing international intellectual property strategies and methods for international research development, and carrying out investigations / analysis into technological trends regarding model themes;
- (2) Holding an international forum with a focus on U.S. bioscience-related venture businesses and an international symposium under the theme of regenerative medicine;
- (3) Holding an international workshop to transmit information on the establishment of venture businesses concerning fledgling ideas with 27 Asian universities, making the most of the SOI Asia Network;
- (4) Creation of an introductory tool for overseas corporations by visualizing fledgling ideas for research patent, as an international technology transfer method; and
- (5) Preparation and analysis of an intellectual map concerning joint research themes with the National Institute of Advanced Industrial Science and Technology and RIKEN Japan.



Keio Advanced Research Centers (KARC)

Supporting revitalization of advanced, interdisciplinary research activities

<http://www.karc.keio.ac.jp/index.html>
E-mail: karc-jimu@adst.keio.ac.jp

Keio University established the Keio Advanced Research Centers (KARC) in February, 2007, in response to an increasing number of requests to form new types of research centers (or education and research centers) that merge and connect a wide range of research fields. KARC aims to further revitalize research activities by flexibly performing activities related to the establishment, restructuring and/or abolition of the research centers, as well as the operations of the research centers and their personnel. The research centers function as university-wide organizations that transcend the boundaries of the University faculties and graduate schools. The research centers use external funds as resources for activities, and undertake these activities by designating campuses that serve as centers for these activities. As a rule, the Centers are established over a period of five years (Center formation period), but this period can be extended to 10 years if conditions, including funds, are met. This limit on the period for the formation of the Centers is expected to promote research results and the development of the research itself, in keeping with the development of the research contents; for example, when a given formation period is complete, new research centers can be formed to carry on that work, or new organizations can be created within the university.

One Center Director is appointed at each Center, and the Director of KARC, supervises all Centers.

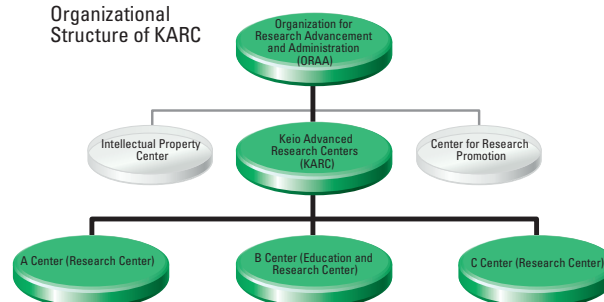
1. Unique Features of KARC

Thirty-four Centers were created after the establishment of KARC. Eight of these Centers have already completed their activities. The following are some of the unique features of KARC:

- Forms advanced, strategic research centers at Keio University;
- Proposes and develops new domains, including fusion areas, that are not restrained by frameworks of existing academic disciplines;
- Has an organizational structure that is capable of handling dynamic research projects; and
- Closes research centers immediately after they complete their missions.

KARC has also introduced a unique system called the "Starting Up Center" (SU). This is a preparatory center for research groups with clear academic objectives and concrete plans. It is utilized to set up a more formal research center later. The four new Centers set up in FY2009 were established under this scheme.

Organizational Structure of KARC



2. The Mission of KARC

KARC is an interface for a wide range of centers that are representative of Keio University. It operates these centers in a wide range of formats, including Global Centers of Excellence and centers funded by Japanese public funds (such as the Special Coordination Fund for the Promotion of Science and Technology), as well as EU Centers of Excellence and centers undertaking joint research with private corporations. Campuses hosting such research centers can be found on virtually all of Keio University's campuses: Mita, Hiyoshi, Yagami, Shinanomachi, Shonan Fujisawa, and Shin-Kawasaki.

KARC seeks to utilize the unique characteristics of the centers' respective faculties and campuses and merge those characteristics to create new frameworks for and approaches to carrying out research at Keio University.

Centers within KARC (as of May 1, 2010)

Center Name	Center Director		Period	Research Base	Introduction of Research
Center for Human Metabolomic Systems Biology	Makoto Suematsu	Professor, Graduate School of Medicine	2007/02/01~2012/03/31	Shinanomachi	P.29
International Center of High-Level Global Cooperation for Leading-Edge Platform on Access Spaces	Kouhei Ohnishi	Professor, Graduate School of Science and Technology	2007/02/01~2012/03/31	Yagami	P.29
Centre for Advanced Research on Logic and Sensibility	Shigeru Watanabe	Professor, Graduate School of Human Relations	2007/02/01~2012/03/31	Mita	P.30
The Center for Civil Society with Comparative Perspective (CCC)	Yoshiaki Kobayashi	Professor, Graduate School of Law	2007/04/01~2012/03/31	Mita	
Center for Integrative Mathematical Sciences (CIMS)	Yoshiaki Maeda	Professor, Graduate School of Science and Technology	2007/05/01~2011/03/31	Yagami	
GSP Center (Center for Genome Super Power)	Jun Kudo	Professor, School of Medicine	2007/06/01~2012/05/31	Shinanomachi	
Co-Mobility Society Research Center	Ikuyo Kaneko	Professor, Graduate School of Media and Governance	2007/07/01~2015/03/31	Shin-Kawasaki	
Market Quality Research Center at Keio University	Eiji Hosoda	Professor, Faculty of Economics	2007/09/01~2012/03/31	Mita	P.31
Panel Data Research Center at Keio University	Yoshio Higuchi	Professor, Faculty of Business and Commerce	2007/09/01~2012/03/31	Mita	P.31
Keio Jean Monnet COE Centre for EU Studies	Katsuhiro Shoji	Professor, Law School	2007/09/01~2012/08/31	Mita	
Education and Research Center for Stem Cell Medicine	Hideyuki Okano	Professor, School of Medicine	2008/01/01~2012/12/31	Shinanomachi	P.30
Research Center for Life-Conjugated Chemistry	Koji Suzuki	Professor, Faculty of Science and Technology	2008/03/01~2011/03/31	Yagami	
Center of Governance for Civil Society	Yoshihisa Hagiwara	Professor, Faculty of Law	2008/03/01~2013/03/31	Mita	P.32
Work-Life Balance Research Center	Kikuko Ota	Professor, Faculty of Nursing and Medical Care	2008/07/01~2011/03/31	Shonan Fujisawa	P.32
Center for Education and Research of Symbiotic, Safe and Secure System Design	Takashi Maeno	Professor, Graduate School of System Design and Management	2008/07/01~2013/03/31	Yagami/Hiyoshi	P.31
Career Development Center -Medical and Life Science-	Toshio Suda	Professor, School of Medicine	2008/07/01~2013/03/31	Shinanomachi	P.33
Center for Advanced Light-Wave Control Technologies	Fumihiko Kannari	Professor, Faculty of Science and Technology	2008/08/15~2013/07/14	Yagami	
The Twin Research Center for Behavioral Development	Juko Ando	Professor, Faculty of Letters	2008/09/01~2013/03/31	Mita	P.35
Collaborative Innovation Center for Cutting-Edge Life Science Research	Nobuhide Doi	Associate Professor, Faculty of Science and Technology	2009/01/01~2014/03/31	Yagami	
Keio-Med Open Access Facility	Hideyuki Okano	Professor, School of Medicine	2009/02/01~2013/03/31	Shinanomachi	
Spintronic Research Center	Kohei Ito	Professor, Faculty of Science and Technology	2009/03/01~2012/03/31	Yagami	
Nursing Best Practice Center (SU)*	Yuko Takeda	Professor, Faculty of Nursing and Medical Care	2009/03/01~2011/02/28	Shinanomachi/Shonan Fujisawa	
Research Centre of Human Cognition (SU)*	Shigeru Watanabe	Professor, Faculty of Letters	2009/04/01~2011/03/31	Mita	
Global Center for Learning Science and Technology (SU)*	Keiko Okawa	Professor, Graduate School of Media Design	2009/04/01~2011/03/31	Mita	
Center for Energy and Environment (SU)*	Yoko Wake	Professor, Faculty of Business and Commerce	2009/04/30~2011/03/31	Mita	
Negotiation Research Center (SU)*	Jiro Tamura	Professor, Faculty of Law	2009/06/01~2011/03/31	Mita	

*SU stands for "Start Up Center."

The Office of Research Administration (ORA) was established in 1999 as an administrative department to provide direct support for researchers affiliated with Keio University. In addition to the Head Office, each of its offices is located on the Mita, Hiyoshi, Yagami, Shinanomachi and Shonan Fujisawa Campuses. Today, a total of eight offices, including those on the Shin-Kawasaki, Tsuruoka and Shiba-Kyoritsu Campuses, and the Head Office collaborate with each to enhance research activities inside and outside Keio University by offering flexible and appropriate administrative support for each of the rapidly diversifying and advancing internal and external research projects.

1. Administrative Support for Collaborative Projects among Industry, Government, and Academia

In recent years at Keio University, collaborative projects among industry, government and academia have been steadily growing, both in terms of the number of projects and in the rate at which they are being acquired. These projects represent unconventional proposals and combinations between campus-wide fledgling ideas for research/technology discovered from an interdisciplinary perspective and the needs of external organizations. The promotion of these projects involves ORA on each campus acting as a liaison from CRP to support the researchers engaged in these projects and to contribute to the realization of high-quality research activities.

Representative research support services

- Collection of information on research aids, provision of related data to researchers
- Liaison among related internal and external divisions
- Support for application and report processes
- Overall project management
(Progress management, research expense management, and negotiation and completion of contract/service agreement on research, etc.)
- Support for the presentation of achievements and public relations

2. Administrative Support for Research Projects Initiated on Each Campus

Numerous innovative research projects have been developed on each campus at Keio University. Various forms of research and personnel exchanges in each field are currently undertaken actively at such organizations as the Keio Leading-edge Laboratory of Science and Technology (KLL) on the Yagami Campus, the Center for Integrated Medical Research on the Shinanomachi Campus, the Keio Research Institute at SFC on the Shonan Fujisawa Campus, Frontier Research and Education Collaborative Square (K-FRECS) - Shin-Kawasaki in Kawasaki City, and the Institute for Advanced Biosciences in Tsuruoka City. Each ORA plays a role in supporting the operations at the research institutes and engages in a diverse range of activities, including setting up the concept of the research structure at each campus, the mediation of agreements on outsourcing and joint studies, negotiation/completion processes, the process for appointing research staff, public relations/publication activities (such as the introduction of researches/researchers, study results), control of the research expenses/facilities and event management.

3. Application Process/Management of Public Research Funds and Arrangement of University Research Grant-in-aid Programs

The Head Office, serving the central function of ORA, supervises large-scale competitive funds and Matching Fund Subsidy for Private Universities (special aid), such as the Global COE Program, Grant-in-Aid for Scientific Research (*KAKENHI*), MEXT and Special Coordination Funds for Promoting Science and Technology, from the application process to the reporting of study results and accounting in collaboration with each ORA. The supervising activities include a "compliance approach." With social interest in the appropriate use and management of research expenses at research institutions increasing every year, ORA provides researchers and the related administrative departments in Keio University with a research expense manual and training activities in the form of workshops.

Keio University also has many special grant-in-aid programs financed from university funds as well as a budget for running expenses. The University facilitates researchers in making effective use of the funds for their own research activities. The Head Office also supervises the management of these university grant-in-aid programs. In addition to these programs, the Head Office handles applications from public foundations and manages a researcher information database.



Example of administrative process guidelines issued by the Head Office, ORA
("Special Research Fund Manual" and "Research Handbook")

Research PICK UP

Formation of the Basis of Worldwide Comparative Research on Illustrated Books in the 15th to 17th Centuries

Toru Ishikawa

Professor, Faculty of Letters

I have been involved in a project that undertakes worldwide comparative research of illustrated books that have been created in various countries and regions mainly during the Age of Discovery (the 15th to 17th centuries), when countries came to establish mutual relationships. This project, the "Formation of the Basis of Worldwide Comparative Research on Illustrated Books in the 15th to 17th Centuries" (popular name: Illustrated Book Project; abbreviation: EIRI), is a project for MEXT in order to support the formation of strategic research bases at private universities.

During the Age of Discovery, many beautiful hand-made picture books, called *Nara Ehon* (Nara picture books), and illustrated scrolls were made in Japan. Even though countries around the world possess *Nara Ehon* and illustrated scrolls as cultural assets that are symbolic of Japan, they have unfortunately never been the subject of comprehensive research. As they are very beautiful and their themes are centered on works of classical literature, they are now often included in junior and senior high school colored textbooks. Most examples of *Nara Ehon* and the illustrated scrolls were not autographed, so the identity of the people who created them and the time they were created has been lost. However, advances in the digitalization of such works have finally managed to elucidate their production process. Under the Illustrated Book Project, we prepared a catalogue of the locations of *Nara Ehon* and illustrated scrolls, purchased works that are valuable as materials, and then pursued various types of research. We also engaged in publicity activities through international symposiums and lecture meetings.

Various illustrated books were also made in the West during this age following the widespread introduction of printed books that started with the Gutenberg Bible. As part of the project, we run workshops and attend international symposiums after researching and collecting early printed books, called *incunabula*, and illustrated books, called the *Book of Hours*. In addition, we collect information and conduct research on fortunetelling books from this age, which have expanded globally. As you can see, our aim is to conduct worldwide comparative research based on comparative research on illustrated books in East Asian countries, while centering on Japan, China, and Korea. Our comparative research also includes illustrated books in Western nations as well as Islamic and Indian illustrated books.

Although we are still in the early stages of our research, various aspects have emerged from a

global standpoint, including the similarities between the *Nara Ehon* of Japan and the miniatures of the Islamic and Indian world, as well as the similarities between the coloring of the early printed books of Japan, called *Tanrokubon*, printed books from the Ming era of China and early printed books in the West. We intend to verify whether these similarities are the result of physical limitations in the Age of Discovery.

The digitalization of books is indispensable in verifying these hypotheses. As part of this project, we are digitalizing various illustrated books so that we will be able to compare them with other illustrated books from around the world. The valuable books purchased and the information obtained under this project will be stored in the Keio University Library, while the digital equipment purchased, together with the relevant technologies, will be taken over by the research centers affiliated with Keio University.

Relevant URL: <http://dbs.humi.keio.ac.jp/naraehon/>



Illustrated book on Urashima Taro

The Development and Evaluation of Training Programs for Improving Risk/Crisis Communication Skills of Health Crises Management Personnel

Toshiko Kikkawa

Associate Professor, Faculty of Business and Commerce

The outbreak of the H1N1 pandemic in 2009 had an enormous impact on society. Many people have realized that the effects of the pandemic could increase unexpectedly, depending on how information is conveyed.

In times of various health crises, including infectious diseases, the outbreak of large-scale food poisoning and other disasters, the communication capabilities of the people handling the crises become important. However, no systematic training programs to develop these skills and capabilities are currently available.

Against this backdrop, our group is actively engaged in research aimed at developing and making widely available training programs for the staff working in the crisis management divisions of local governments and the Ministry of Health, Labour and Welfare. In 2009, the first year of the three-year research project, we collected relevant training programs from a wide range of sources at home and abroad, and analyzed them. We also launched several provisional training programs.

Following is the brief introduction into our two major training programs. One was held at Keio University as a two-day session on September 26-27, 2009. First, Mitsuo Uehara, Director-General of Crisis Management, Yokohama City, and Kazuyuki Nakagawa of Jiji Press gave lectures on the frontline system for handling the H1N1 pandemic in 2009. Following the lectures, participants shared their experiences of responding to the pandemic and identified problems. Then, training was conducted under the theme, "the importance of flexibility in crises." As part of the program, we invited two researchers from the National Center for Crisis Management Research and Training (CRISMART) at the Swedish National Defense College. Together, we have worked in such areas as staff exchange and evaluation of training courses based on detailed analyses of the training.

The other program, designed to teach the basics of communication, was held at the Ministry of Health, Labour and Welfare. We held a series of six training sessions over about half a year. We could continue training interactively in a relaxed but serious atmosphere, effectively using educational tools such as blocks. Based on this training program, we published a brochure entitled, "The First Step in Communication," and released it to the public.

This research group is comprised of researchers, including Professor Fumitoshi Kato of the

Faculty of Environment and Information Studies and researchers from the Aichi University of Education, Ryutsu Keizai University, and Sanno University. Researchers from the National Institute of Infectious Diseases and Juntendo University are also taking part in the team to engage in study from a medical standpoint. In addition, we have also solicited local government officials and journalists to cooperate with us in evaluating the training.

As the leader of the research project, I am confident that I have appointed suitable people to the research group. I am sure that our research will help in improving the qualities of health crisis managers and indirectly help in reducing the social impact of health crises.



Training session held at the Ministry of Health, Labour and Welfare

Research and Development of Photonics Polymers Toward the Creation of a Face-to-Face Communication Industry

Yasuhiro Koike

Director of the Keio Photonics Research Institute (KPRI) / Professor, Faculty of Science and Technology and Graduate School of Science and Technology

A program entitled "Research and Development of Photonics Polymers toward the Creation of a Face-to-Face Communication Industry" was adopted for funding by the Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST) of the Cabinet Office in FY2009. The Keio Photonics Research Institute was established at the Faculty of Science and Technology and the Graduate School of Science and Technology of Keio University, marking the formal start of the research.

Two decades ago, I stood at a crossroad in my research: I pondered whether it is possible to create high-speed plastic optical fiber (POF) that could transmit optical signals at a speed of one gigabit per second or more. The POF made as a trial was not very transparent, and it transmitted light for only six meters. To obtain a transmission speed of one gigabit per second or more, it was necessary to form a refractive index distribution by adding another material (dopant) to the inside of the fiber in order to create a density distribution in the radial direction. However, a major issue at that time was how to eliminate impurities in order to make the POF transparent. It was a great challenge to achieve high-speed optical communication by adding dopants (impurities?) to form a refractive index distribution, which was contrary to the ideas prevailing at that time.

When I started focusing on elucidating the origin of light scattering in an effort to reduce the amount of light lost due to scattering in the optical polymer, researchers had observed light scattering in the polymer that exceeded the theoretical explanation. Since it was not possible to reduce this light scattering, there was a vague idea that light scattering is a feature of optical polymer. However, detailed and basic research into the light scattering had not been fully conducted on a global scale. Under these circumstances, I pursued detailed theoretical and experimental analysis. I demonstrated that the various speculations were false, and proposed a new light scattering polymer model^[1]. The views at that time concerning the origin of light scattering caused a dramatic advance in the research and development of graded-index polymer optical fiber (GI-POF). In an experiment in 2009, we successfully achieved a transmission speed of over 40 gigabits per second over a distance of 100 meters for the first time in the world. The success marked the instance when the transmission speed of GI-POF exceeded that of GI-type glass optical fiber.

The Internet has drastically changed our lives. However, the more convenient it becomes, the more difficult it seems to avoid using small displays and keyboards. Even the elderly are forced to use such keyboards. On the other hand, if face-to-face communication technology, which features

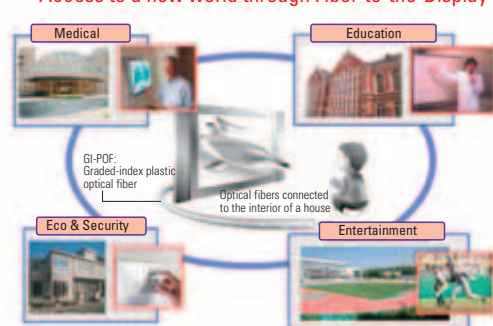
realistic video images created by large, life-sized displays with superior picture quality, becomes possible, parents who are confined to nursing homes will be able to experience the warmth of face-to-face communication through the display, feeling as if they were near their children who are in distant locations. This is a different world that cannot be achieved by pursuing the current culture of small displays and keyboards. Face-to-face communication technology requires displays and terminals to be connected to a high-speed network that can transmit data faster than one gigabit per second. The key innovation to that end is photonics. We have introduced and are promoting a concept called "Fiber-to-the-Display," which uses photonics polymer technology. Under this technology, GI-POF is directly connected to displays. We are targeting human-compatible innovation, whereby technology is designed to be compatible with humans instead of forcing people to be compatible with technology that is based on the keyboard.



GI-POF

[1] *Macromolecules*, 25, pp4807-4815 (1992)

Access to a new world through Fiber-to-the-Display



Breakthrough in Bioscience by Bringing Together Medicine, Pharmacology, Science, Technology and Agriculture

Masaru Tomita

Director, Institute for Advanced Biosciences / Professor, Faculty of Environment and Information Studies

Cells that form the basis of life are so complicated that it is thought absolutely impossible to understand them in their entirety. We took up the challenge of disproving this view head-on through the use of IT (Information Technology), and in 1997, we succeeded in reproducing a virtual cell (an E-Cell) on a computer for the first time in the world^[1].

In 2001, the Institute for Advanced Biosciences was established in Tsuruoka, Yamagata Prefecture, where we developed the ultimate in analytical technology to comprehensively measure cellular components. We made optimum use of these technologies in conducting a thorough analysis of intracellular components of bacteria, which are unicellular organisms. We obtained a large amount of data, which was described in *Science* as "cell data of one of the largest studies in the world." The publication was highlighted at the beginning of the journal in Perspectives^[2].

We have coined the term, "data-driven biology," to refer to understanding biological processes from an enormous amount of comprehensively analyzed biological data. "Data-driven biology" has the potential to bring about a major reform in the framework of bioscience and produce breakthroughs in various fields.

By conducting a thorough analysis and by comparing cancer cells and normal cells, we discovered that cancer cells have a special energy metabolism that enables them to survive even when there is insufficient oxygen and nutrients are depleted. Since this special metabolism is very similar to that of parasitic roundworms, we opened a new avenue in the treatment of cancer using "vermifuges"^[3].

We are also researching the practical use of an "ultimate blood diagnosis" to detect diseases at an early stage by thoroughly analyzing components in human blood. We have been studying methods of diagnosing various kinds of cancer, Alzheimer's disease, psychiatric diseases such as depression, hepatitis, nephritis and other conditions by blood analysis. We have also developed a method for detecting throat cancer, breast cancer and pancreatic cancer from saliva^[4].

In the environmental field, we are researching oil-producing algae, unicellular organisms that transform carbon dioxide in the air into oil through photosynthesis in the presence of water and light. In a sense, it is the ultimate eco-friendly microorganism. To make the algae synthesize oil

more efficiently, we are conducting a thorough analysis under various conditions with the aim of putting it into practical use.

In addition, we developed a technology that artificially mass-produces spider's silk, which is called "dream fiber" using microorganisms. The material is strong, lightweight, highly heat resistant and biodegradable, and the manufacturing process is not dependent on petroleum. Using this technology, graduate school students launched the bio-venture start-up, "Spiber Inc.," which won the highest award at the 9th Bio-technology Business Competition Japan.

When we engage in completely original research, we need to make full use of every technology and area of knowledge, free of the boundaries of academic fields. After all, academic fields have been defined as a matter of convenience by humans. They sometimes impede free, creative thinking. Young students, who can think freely and without inhibition, without being swayed by fixed ideas, play a leading role in our research projects. The means of establishing a research environment in which students can play an active, starring role is the secret of the success of state-of-the-art research. I believe that creating such an environment provides the ideal education for cultivating human resources that will enable us to improve the future.

[1] Tomita et al. *Bioinformatics* 15 (1): pp72-84 (1999) Explanatory article: *Science* 284 (5411): pp80-81 (1999)

[2] Ishii et al. *Science* 316 (5824): pp593-597 (2007)

[3] Hirayama et al. *Cancer Res* 69 (11): pp4918-4925 (2009)

[4] Sugimoto et al. *Metabolomics* 6 (1): pp78-95 (2010)



Research on algae that produce oil



Mita Campus

Pathways to the Future for the Humanities, Social Sciences, and Natural Sciences: Centers for Comprehensive Research and Education

Mita Campus

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The Mita Campus is home to undergraduate departments (primarily for third- and fourth-year students), six graduate schools, and independent research institutions. Following is the introduction into the recent status of activities at research facilities at the Mita Campus.

Research Institute for Digital Media and Content (DMC Institute) <http://www.dmc.keio.ac.jp/en/>

The Research Institute for Digital Media and Content (DMC Institute) is funded by the "Strategic Research Center Development Program Special Coordination Funds for Promoting Science and Technology" in 2006 through 2008. As a research center, it has worked on reforming university system produce research outputs. Also, the DMC Institute has worked on various research activities in digital media technologies and digital content creation. Institute's activity is evaluated and it has received the highest evaluation "A" from MEXT. In FY2009, the Institute pursued possibilities of advanced digital media content through many activities, such as special showing of *Takigi Noh* (torchlight noh performance) archive films at celebration of 150th anniversary of the founding of Keio University, HD relay broadcasting of a total solar eclipse over the Internet, and joint research with companies.

To accelerate the research activities, DMC Institute made a structure change in April 2010.



Film presentation celebrating *Takigi Noh* "Tsuchigumo" (Ground Spider)

Global Security Research Institute (G-SEC) http://www.gsec.keio.ac.jp/index_e.html

The G-SEC carries out research on the global affairs with an emphasis on "watching and warning." In other words, the Institute constantly keeps watch on problems in various fields and transmits the necessary warnings. Based on this notion, the Institute participates in industry-government-academia collaborations with an eye toward providing policy advice and creating objective evaluations, while at the same time carrying out our research activities. The goal is to contribute to the sustained development of society.

In FY2009, the Institute held conference in November and "Watch and Warning" seminars, published newsletters, and conducted multiple projects. The Institute also set up an endowed course and held an open lecture jointly with Minato Ward.



The 3rd G-SEC Conference

Research Center for the Arts and Arts Administration (RCAAA, Keio) <http://www.art-c.keio.ac.jp/en/>

The Research Center for the Arts and Arts Administration at Keio University pursues research in areas including the fine arts, architecture, music, literature, theater, cinema, and dance, as well as cultural appreciation of these areas in contemporary society from a holistic and academic stance. In cooperation with experts inside and outside Keio University, the Center develops and carries out activities that transcend multiple domains, such as seminars, lectures, exhibitions, performances, workshops, case studies for art management, construction of art archives, and commissioned projects.

Events in FY2009 included a Butoh performance, a video symposium, a project commissioned by Minato Ward, and a course endowed by the Recording Industry Association of Japan. The Research Center was also commissioned to work on a project concerning the formation of joint use/joint research bases by MEXT. The results of the research are also published and disclosed in various publications.

Publications: "Annual Report (2008/09)" No. 16; "ARTLET" No. 32 & 33; "BOOKLET" No.18



"Concert," cosponsored by Minato Ward and RCAAA (November 28, 2009)

Center for Japanese Studies <http://www.ic.keio.ac.jp/nncenter/>

The Center for Japanese Studies offers Japanese language and Japanese studies courses to international students. In addition, research into practical techniques for teaching Japanese as a second language and the theory behind those techniques is carried out for the education and training of the next generation of Japanese language teachers.

Japanese classes are provided by the Center to first- and second-year students enrolled at the Hiyoshi Campus and international students belonging to the Graduate School of Science and Technology, as well as to 192 international students from 30 countries and regions enrolled in the Japanese Language Program.

In FY2009, reflecting the increase in the number of international students, the Center opened a beginners' course in Japanese at the Hiyoshi Campus for students enrolled in the Keio International Program (KIP), international students belonging to graduate schools, and researchers. The Center Published: *Nihongo to Nihongo Kyoiku* No. 38 (Japanese and Japanese Language Education, March 31, 2010).



Nihongo to Nihongo Kyoiku No. 38 (Japanese and Japanese Language Education)

The Keio Institute of East Asian Studies (KIEAS) <http://www.kieas.keio.ac.jp/english/index.html>

In FY2009, the Keio Institute of East Asian Studies (KIEAS) established the Center for Contemporary Korea Studies (Director: Masao Okonogi), following the establishment of the Center for Contemporary China Studies (Director: Ryosei Kokubun) in 2007, to further enhance its research on East Asia, centering on Japan, China and Korea. KIEAS actively carried out interdisciplinary, international research activities in FY2009 as well. KIEAS implemented academic projects (four projects underway), which have been launched successfully on an annual basis since 1985, supported by the Takahashi Industrial and Economic Research Foundation. KIEAS has also been participating in the "Fellows Program on Peace, Governance, and Development in East Asia" organized by the East Asia Institute in Seoul, which targets mid-standing researchers in the U.S. It also planned and operated numerous study meetings, and the Japan-Korea Millennium Forum (held at Keio University in FY2009), centering on the session of the Presidents of four Japanese and Korean private universities: Keio University, Waseda University, Yonsei University, and Korea University.



Symposium "Revisiting Japan as a normal country" (December 15, 2009)

Fukuzawa Memorial Center for Modern Japanese Studies <http://www.fmc.keio.ac.jp/fmc/eng.html>

With the establishment of a new grant-in-aid research program within the Keio Gijuku Koizumi Memorial Fund for the Advancement of Education and Research, the Fukuzawa Memorial Center for Modern Japanese Studies launched a joint research, represented by a full-time staff member, and successfully published a collection of letters written by Shinzo Koizumi. With regard to education, seven courses to the students were held at Mita and Hiyoshi Campuses, and the second series of lecture course to the public were held at the Keio Osaka Riverside Campus.

It also held two lecture meetings and a symposium entitled, "What is Family?" The Center played a leading role in organizing two of Keio University's 150th anniversary events: the "Fukuzawa Yukichi: Living the Future" exhibit (a traveling exhibit held in Tokyo, Fukuoka and Osaka) and "Fukuzawa Yukichi and Kanagawa." It also worked on compiling "An Encyclopedia of Yukichi Fukuzawa", which is scheduled to be published in 2010.

Publications: *"Bulletin of Modern Japanese Studies"* No. 26 (2009); *"Newsletter of Fukuzawa Memorial Center for Modern Japanese Studies, Keio University"* No. 11 & 12; *"Letters of Shinzo Koizumi: 114 letters in total to Shigeo Iwanami and Isamu Kobayashi"* (The Fukuzawa Memorial Center Documents Series Related to Modern Japan: 9); and *"Answer Sheets for the compositions by Harue Okuyama"* (The Fukuzawa Memorial Center Documents Series Related to Fukuzawa Yukichi and Keio Gijuku: 12)



Lecture meeting held in the spring semester by the Fukuzawa Memorial Center for Modern Japanese Studies (June, 2009)

Teacher Training Center <http://www.ttc.keio.ac.jp/>

The Teacher Training Center, established in December 1982 as a university-wide organization for training instructors, has turned out many outstanding teachers. A Director, Deputy Director and seven full-time instructors are engaged in research related to education and the teaching profession. In FY2009, the Center focused on education and research activities aimed at further enhancement of the "Teacher Logbook," a Web system developed through the MEXT Teacher Training "Good Practice" Project. To motivate students to become teachers, the Center also held a forum, "Speaking with young teachers," as in the previous fiscal year. Furthermore, it developed activities opened to both inside and outside Keio University: the launch of a course in the renewal of teachers' licenses (required, elective) and the implementation of open study meetings and training for teachers in Minato Ward.

International Center <http://www.ic.keio.ac.jp/en/index.html>

The International Center is at the core of Keio University's international activities. It is responsible for sending numerous students and scholars abroad every year, as well as welcoming those coming to the University. The Center provides support to international students on both academic and lifestyle matters, and is also in charge of exchange programs. For that purpose, it holds overseas study fairs and information sessions on studying abroad in general, and also provides information on exchange programs. There are also International Studies and Japanese Studies courses in which both overseas and Japanese students can study subjects such as the culture, history, politics, and economics of Japan and other countries in English, to promote mutual understanding of different cultures and to strengthen exchanges between Japanese and foreign students. (In FY2009, a total of 104 subjects were launched.) The Center also implemented six overseas short-term research programs in FY2009 (summer course at Downing College at the University of Cambridge; summer course at the College of William and Mary; summer course at University of Washington; summer course at Lincoln College of the University of Oxford; spring course at Institut d'Études Politiques de Paris (Sciences Po); and spring course at Yonsei University).

Shido Bunko, Institute of Oriental Classics <http://www.sido.keio.ac.jp/>

The Institute of Oriental Classics or "Shido Bunko" is an institute with a Director, six full-time instructors, and six part-time instructors. Its mission is to conduct bibliographical research related to Japanese and Chinese literature. During FY2009, it welcomed Akihiko Niimi, Associate Professor of Notre Dame Seishin University, to the 23rd *Shido Bunko* Lecture Meeting, where he gave a presentation entitled, "Computer Unitization in the Classification of Various Books - Potential and Challenges." The Institute also exhibited the "Shido Bunko Storage: Century Cultural Foundation Collection" at the Mita Library of Keio University from November 24 to December 4. Publications in FY2009 included, *"Bulletin of the Shido Bunko Institute"* No. 44 (February 26, 2010).



Century Cultural Foundation Collection exhibit (November 24 to December 4, 2009)

Keio Economic Observatory http://www.sanken.keio.ac.jp/index_e.html

The Keio Economic Observatory (KEO) was set up as an affiliated institute in 1959, as part of the commemoration of the 100th anniversary of the founding of Keio University. Since then, it has conducted academic research in the three fields of Economics, Law, and Behavioral Science. The membership consists of full-time members of the Institute, members from related faculties, and co-researchers from Japan and overseas. Currently, projects include the construction and analysis of databases on subjects such as input-output analysis, the environment, and flow-of-funds analysis; the history of labor-management relations; a proposal for applying the Antitrust Law to public utilities; and environmental and social assessments of solar powered satellites (SPS). From FY2007, the Institute initiated a project relating to productivity in Asian countries, and the results of the project are made public each year through publications.

Publications during FY2009 included *the Library of Keio University Sangyo Kenkyujo* (three volumes) and *Keio Economic Observatory Discussion Papers* (five volumes).

Institute for Media and Communications Research <http://www.mediacom.keio.ac.jp/english/about.html>

In FY2009, the Institute for Media and Communications Research conducted five research projects using research funds, special contributions, and educational promotion funds (an internal grants-in-aid program). The results of the research were published in a journal outline and an independent volume.

Published research included:

Keio Media and Communications Research No. 60 (March 2010)

Keio Communication Review No. 32 (March 2010)

Sociology of Globalization: Collective Life and the Media in Circulation by Yoko Ogawa (Nishiaki), Kenichi Kawasaki, Mayuko Sano, eds.; Kouseisha-kouseikaku Corporation (March 2010)



Part of the research results

Institute of Cultural and Linguistic Studies <http://www.icl.keio.ac.jp/>

The Institute of Cultural and Linguistic Studies has full-time staff and conducts basic research on subjects such as the various languages, cultures, and philosophies around the world, and on linguistics and linguistic theory. The Institute promotes a varied range of research projects together with scholars both from within Keio and outside. In FY2009, it issued *Report of The Keio Institute of Cultural and Linguistic Studies* No. 41 (March 2010) and *"The People and Its culture Viewed by Literary Men of Asia"* (March 2010).

The Institute also invites eminent scholars from Japan and overseas to a wide range of international conferences, symposia, and lecture meetings, such as the Tokyo Conference on Psycholinguistics (TCP), linguistics colloquia (six times a year), an Islam lecture meeting, and three courses that are open to the public. The TCP report was published as a collection of research papers in English. In addition, the Institute has set up special courses relating to languages that are not offered by any academic department (23 courses on 11 languages).



Hiyoshi Campus

Research and Education Centers Open to the Neighborhood, Aiming for Collaboration with Society and the Local Community

Hiyoshi Campus
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The Hiyoshi Campus houses seven faculties (Letters, Economics, Law, Business and Commerce, Medicine, Science and Technology, and Pharmacy) for first and second year students; three graduate schools (Keio Business School (KBS), System Design and Management (SDM), and Keio Media Design (KMD)); and six research institutes. The Campus expects to develop collaborated research activities in various academic domains.

Graduate School of System Design and Management (SDM) <http://www.sdm.keio.ac.jp/>

The Graduate School of System Design and Management (SDM) is eager to promote international collaboration. On October 26, 2009, SDM signed a comprehensive bilateral agreement on human exchanges and joint research with the Faculty of Technology, Policy and Management of Delft University of Technology (TU Delft TPM), with the attendance of Dr. Ronald Plasterk, Minister of Education, Culture and Science of the Netherlands. At the same time, SDM held the first joint workshop, inviting President Jacob Fokkema of TU Delft and 15 professors from the TU Delft TPM. After three keynote lectures, sessions were held in four groups. The project for the alliance has been named "Kompas" (originating from the Dutch word for compass). The second joint workshop was held at TU Delft in late May 2010. In FY2009, three students from each institution participated in a student exchange program under the comprehensive bilateral agreement.



First joint workshop with the TU Delft TPM

Graduate School of Media Design (KMD) <http://www.kmd.keio.ac.jp/>

The Graduate School of Media Design (KMD) has celebrated its first graduates since it was established. The unique value of KMD lies in the extensive domains of its activities. Its graduates will play an active part in various fields, including the doctoral program.

KMD is actively engaged in a variety of activities such as "10,000 Women Initiative," in collaboration with Goldman Sachs Group, Inc., aimed at fostering 10,000 entrepreneurial women in emerging countries. Other activities include joint research with corporations, joint research with overseas universities, research commissioned by government-affiliated agencies, including the Core Research for Evolutional Science and Technology (CREST) of JST, and co-sponsoring of the Workshop Collection.



"Workshop Collection," held at the Hiyoshi Campus

Graduate School of Business Administration (KBS) <http://www.kbs.keio.ac.jp/>

KBS sponsored a symposium focusing on the values of "Business School Programs," as well as a workshop specialized in manufacturing, both in October 2009. It also held the second international joint research workshop with Tsinghua University (China) and KAIST (South Korea) in December 2009.

In January 2010, KBS signed a comprehensive agreement with Kobe University Graduate School of Business Administration and Graduate School of Management, Kyoto University, and held a symposium entitled, "Initiatives for and the Direction of Education of Fully Fledged Members of Society," at Kobe University. The agreement is aimed at expanding the awareness of business school programs, developing new teaching materials, and promoting joint research and collaborated classes, through the collaboration of three business schools each with a different feature focus on research based learning (Kobe University); unification of humanities and sciences (Kyoto University); and case method (Keio University).



Symposium focusing on the values of "Business School Programs"

Research and Education Center for Natural Sciences <http://www.sci.keio.ac.jp/>

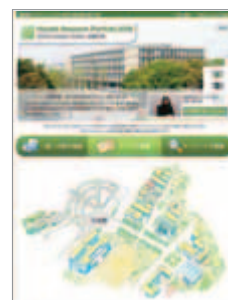
Various research and educational activities in natural sciences are conducted at the Research and Education Center for Natural Sciences, which was founded in April 2009. The activities vary widely in their areas and range from cutting-edge academic research to practical research performed in collaboration with corporations. The activities are quite diverse in their contents and their scales. The center further promotes collaboration within the Keio Gijuku Educational Corporation. In November 2009, the Center organized its first symposium, entitled, "Diversity and Fun in Natural Sciences". The Center also held four colloquia, given by invited speakers from various fields of natural sciences.



Eddies for a liquid metal turbulent flow in a square duct, to which a local magnetic field is applied

Hiyoshi Research Portfolio (HRP) 2009 - A Place to Introduce Research and Education Activities at the Hiyoshi Campus

The Hiyoshi Research Portfolio (HRP), which started in 2005, was held in 2009 for the fifth time. HRP 2009 featured an exhibit using a website that included pages to present research/education activities by faculties. The website included a video to present the directors of the research centers and the directors of the three graduate schools. In addition, there were pages for searching and reading about the research/education activities conducted at the Hiyoshi Campus that used three parameters: the campus map, the field of research, and a research keyword. The website exhibit ended in success with access from both inside and outside Keio University and from overseas.



Campus map search display of the HRP2009 website

The Keio Research Center for the Liberal Arts <http://lib-arts.hc.keio.ac.jp/en/index.html>

The Keio Research Center for the Liberal Arts was founded in July 2002 to search for the ideal systems that liberal arts education should adopt through multifaceted investigations and researches conducted in Japan and overseas, planning and making proposals for specific programs, and at the same time validating the effectiveness of those proposals through experiments. The approximately 200 members, from a wide range of educational organizations from affiliated schools and various campuses and institutes of the university, have been actively conducting research.

In FY2009, the Center promoted "Core Research" in two areas ("Keio University Educational Curriculum Research" and "Body and Mind Project") and "Specialized Research" (consisting of the university education promotion program of MEXT and the "Project to Foster the Capability for Education Language through Education of the Body and Mind"). The Center has been establishing partnerships with research facilities and scholars within and outside Keio University to expand research network in liberal arts. It has also offered experimental courses, open lectures, and seminars, together with publishing and validating research results both in print and on the web.

Periodicals issued by the Center include: *Annual Research Reports, Newsletters, Symposium Reports, CLA Archives, Activity Reports, and Liberal Arts Research Center Library.*



New literary education experimental class

Keio Research Center for Foreign Language Education <http://www.flang.keio.ac.jp/>

The Keio Research Center for Foreign Language Education was founded in October 2003. One of the Center's primary missions is to consider foreign language education across all Keio-affiliated schools. The Center has a total of approximately 90 staffs and researchers working from elementary school to graduate school level, and is driving forward with its research activities. The Center was selected as a center for the Academic Frontier Program for Promoting Research Excellence at Private Universities for its "Action Oriented Plurilingual Language Learning (AOP) Project." This project furthers research into a comprehensive understanding of all study stages from primary school to graduate school and increases the consistency of foreign language study, centered on English-language education. In addition, the project focuses on the challenge of enhancing plurilingual and pluricultural capabilities in communication. (<http://www.aop.flang.keio.ac.jp/>)

Periodicals: *Journal of Foreign Language Education, Summary of Research Activities, and Keio Research Center for Foreign Language Education Symposium.*



Foreign Language Lounge

Health Center <http://www.hcc.keio.ac.jp/>

The field of the Health Center's research is divided into physical and mental health. The Center is conducting research into hypertension, diabetes, metabolic syndrome, obesity and other lifestyle-related diseases, as well as anorexia nervosa, cardiac diseases, liver diseases, infectious diseases, respiratory diseases, and mental disorders. The Center is collaborating internationally on research into hypertension, strokes, and metabolic syndrome, and has published papers on these fields.

The Center published 47 papers written in English between 1972 and 1994, and 214 papers between 1995 and 2008. The Center has published 20 to 25 papers a year since 2008. Members of the Center have also made presentations at international conferences such as those held by the International Society of Hypertension and the American Diabetes Association.

Periodicals: *The Bulletin of Keio University Health Center and the Annual Report of Keio University Health Center* (published once a year).



Health Center (Hiyoshi)

Sports Medicine Research Center <http://www.hc.keio.ac.jp/sports/>

The Sports Medicine Research Center covers a broad range of activities in the field of sports medicine. It provides medical support and education to collegiate as well as other recreational and professional athletes. The Center also emphasizes clinical research on exercise and dietary therapy for the prevention and treatment of lifestyle-related diseases.

Since 2007, the Center has held open annual lectures on "Sports and Health" in partnership with the Graduate School of Health Management. In 2009, the Center introduced the latest information on "Sports and Mental Conditioning" through lectures and workshops. The Center also cosponsored "Considering University and Sports," a symposium through an endowment from Yamato Transport Co., Ltd. Its major research projects include: intervention study on metabolic syndrome and measurement of running energy expenditure (joint research with a corporation). With other research as well, the Center reports its results at domestic and international conferences on sports medicine and lifestyle-related diseases.

Periodicals: *Open Course Report and Newsletters.*



Measurement of oxygen uptake while running

Institute of Physical Education <http://www.hc.keio.ac.jp/ipe/>

Since its foundation in 1961, the Institute of Physical Education has promoted the importance of health and sports to Keio University students and teaching staff, and also local residents, through physical education courses within the university, symposiums, and open courses. At the same time, the Institute has implemented a wide range of research related to physical education, health, and sports. In FY2009, the Institute established an environment that enables photography and feedback using underwater cameras in the pool of Kyoseikan, and started biomechanics research into swimming and sports methodological research. It also served as the secretariat of the Japan Association for Laser Medicine and Sports Science and held an academic gathering.

Periodicals: *Bulletin of the Institute of Physical Education and Activity Report of the Institute of Physical Education.*



Photography using an underwater camera



Research Centers

Yagami Campus

Opening Up the Next Frontiers of Science and Technology

For Inquiries:

Secretariat of the KLL
c/o Office of Research Administration,
Yagami Campus
 TEL: +81-45-566-1794
<http://www.kll.keio.ac.jp/>
 E-mail: staff@kll.keio.ac.jp

KLL Liaison Office
 TEL: +81-45-566-1438
<http://www.kll.keio.ac.jp/liaison/index.html>
 E-mail: liaison@educ.cc.keio.ac.jp

Faculty / Graduate School of Science and Technology

The Faculty and Graduate School of Science and Technology are located at the Yagami Campus, where research and education centered on scientific and technological fields are conducted. With over 280 researchers, approximately 1,800 Master's and Doctoral students in the Graduate school are pursuing their studies and research, together with third and fourth-year undergraduate students. To inaugurate an education/research organizational system that enables graduate students to pioneer unexplored fields with a liberal intellectual approach, the Graduate School of Science and Technology established three schools in the year 2000 that make interdisciplinary approaches possible: the School of Fundamental Science and Technology, the School of Integrated Design Engineering, and the School of Science for Open and Environmental Systems. We also provide an environment that cultivates a global perspective through various international exchange programs, including the Double Degree Program. Based on our principle of "emerging", we consider it our mission to cultivate human resources who will open up the next frontiers for themselves, take the initiative in contributing to science, technology and society, and play an active role on the world stage.

<http://www2.st.keio.ac.jp/english/>



Point of Contact for Research Collaborations

Keio Leading-edge Laboratory of Science and Technology (KLL) <http://www.kll.keio.ac.jp/>

The Keio Leading-edge Laboratory of Science and Technology (KLL) was established within the Graduate School of Science and Technology (Yagami Campus) in April 2000 as a research center for promoting collaboration between industry, government, and academia. It aims at making a social contribution through the creation of new businesses, energizing research activities, and providing a university environment for exchanges with society in the field of science and technology. As a point of contact for research collaborations with industry and public organizations, the KLL provides support relating to research agreements and operates and manages research space. It also coordinates joint research and commissioned research projects.

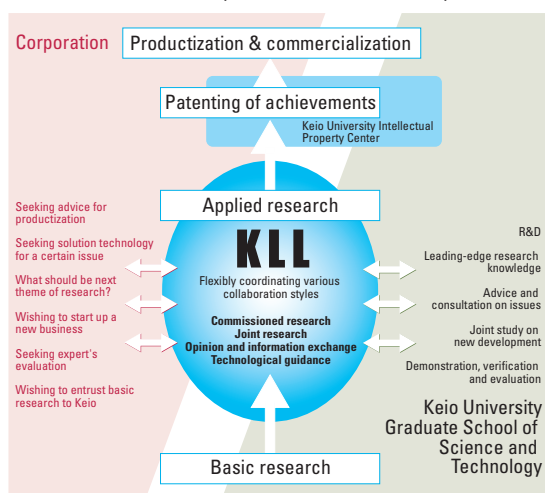
To promote the social benefits of research achievements, the KLL provides a forum for networking with groups outside Keio University, including industries through the operation and management of the database for introducing researchers' projects, the publication of a bulletin, "New Kyurizukai", KLL Industry-Academia Collaboration Seminars and Keio Techno-Mall, Keio Science and Technology Exhibition (Refer to p.16).



Research Coordination (Liaison Function)

The KLL, centering on the KLL Liaison Office, is promoting cooperation for research work in the prepatent, or nascent stage. Experienced staff members introduce the research activities of the Yagami Campus from various viewpoints and respond flexibly to individual concerns. The KLL creates an interactive flow between corporations and university research activities, and coordinates optimal joint and commissioned research projects, whether within Japan or internationally.

Features of Industry-Academia Collaboration by KLL



"KLL Specified Research Projects" and fostering of nascent research and young researchers

Every year, the KLL calls for "KLL Specified Research Projects" with the objective of focusing on the development of emerging research fields that are considered to be important to society in the future, to create new research fields and encourage the fostering of leaders in those fields.

The KLL also provides research grants to master's and doctoral program students, with the objective of fostering outstanding scholars in the fields of science and technology. In FY2009, the KLL extended grants of ¥300,000 to each of 122 students in doctoral programs. It has also set up a system to assist with partial travel expenses to students in master's programs, to enable them to present their research at international academic conferences. A total of 112 students used this system.

Selected "KLL Specified Research Projects" in FY 2009 (Examples)

"A Study on Advanced Methods for Cause-Effect Analysis and their Application to Consumer's Cognitive Modeling in Service"

Hideo Suzuki, Associate Professor, School of Science for Open and Environmental Systems

"Development of Carbon Nanotube Electroluminescence Device"

Hideyuki Maki, Assistant Professor, School of Integrated Design Engineering

"Development of a Spectrometer for Radio Observations of X-ray Dissociation Regions in the Galactic Center Region"

Kunihiko Tanaka, Research Associate, School of Fundamental Science and Technology

Promotion of Leading-edge Research

Changes in Research Funds by Type Over the Past Five Years (Yagami Campus)

Type of Research Funds	FY2005	FY2006	FY2007	FY2008	FY2009
University Funds	136,014	137,721	96,222	160,759	144,370
Subsidies	1,677,319	1,753,579	1,246,782	1,637,905	1,538,944
Grants	85,039	53,300	33,680	57,760	89,720
Specified Donation	129,969	104,720	101,467	118,557	123,256
Commissioned Research	1,440,404	1,198,498	1,768,086	1,172,136	1,442,880
Joint Research	329,835	346,359	306,365	290,801	157,311
Others	26,875	8,475	3,295	1,221	4,192
Total	3,825,455	3,602,652	3,555,897	3,439,139	3,500,673

Changes in research funds by type over the past five years (from FY2005 to FY2009) are as shown in the table above. Projects through collaboration between industry, government, and academia are actively carried out on the Yagami Campus. With regard to the number of projects by fund source in FY2009, private corporations accounted for 216 cases and government agencies, public-service corporations, etc. accounted for 103.

Research Subjects (Examples)

MEXT Grant-in-Aid for Scientific Research (S)
 "Development of Innovative Nano-Micro Level Thermophysical Properties Sensing Techniques and Their Applications"
 Yuji Nagasaka, Professor, School of Integrated Design Engineering

MEXT Grant-in-Aid for Young Scientists (S)
 "Strategic Research to Solve Certain Conjectures in Arithmetic Geometry"
 Kenichi Bannai, Assistant Professor, School of Fundamental Science and Technology

JST Exploratory Research for Advanced Technology ERATO NAKAJIMA Designer Nanocluster Assembly Project
 "Study on Fine Controlled Synthesis, Designer Assembly, and Characterization of Advanced Functional Nanoclusters, Aiming at New Nano-Material Science Consisting of Nanoclusters"
 Atsushi Nakajima, Professor, School of Integrated Design Engineering

JST Core Research for Evolutional Science and Technology Fundamental Technology on Dependable SoC and SiP for Embedded Real-Time Systems
 "Research and Development on Dependable SoC and Dependable OS"
 Nobuyuki Yamasaki, Associate Professor, School of Science for Open and Environmental Systems

Keio Photonics Research Institute (KPRI) (Location: Keio University Shin-Kawasaki Town Campus)

The Keio Photonics Research Institute (KPRI) was founded in April 2010 as a laboratory affiliated with Keio University's Faculty and Graduate School of Science and Technology. Its objective is to carry through research on the "Creation of Face-to-Face Communication Industry by Ultra High-Speed Plastic Optical Fiber and Photonics Polymers for High-Resolution and Large-Size Display" (Chief Researcher, Yasuhiro Koike, Professor, School of Integrated Design Engineering, Graduate School of Science and Technology), a FY2009 program funded by the Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST) of the Cabinet Office. This institute is solely responsible for the unified management of funds and R&D support in regards to this research.

<http://kpri.keio.ac.jp/>

Professor Yasuhiro Koike, Chief Researcher



Returning of Research Achievements to Society / Introduction of Researchers

Science and Technology Exhibition (Keio Techno-Mall)

The KLL holds the Science and Technology Exhibition (Keio Techno-Mall) every December to inform the public about the Faculty and Graduate School of Science and Technology's research achievements and to attract corporate interest in collaborative projects. The exhibition emphasizes demonstrations and hands-on exhibits that visitors can actually see and touch the research results.

In 2009, when the KLL celebrated its 10th anniversary, an exhibition was held to present the latest developed technologies and research, under the theme of "Shaping the Future through Science," featuring approximately 70 booths to introduce research achievements, 14 collaboration technology seminars by researchers and two roundtable sessions: "A Society where humans and robots can coexist" and "Living in the wireless age." A talk session was also held to look back on the 10 years of the KLL and consider the optimum means by which industry and academia should collaborate. The 1,300 visitors engaged in enthusiastic exchanges. The 2010 exhibition is scheduled for December 10 in Halls B7 and B5 of the Tokyo International Forum in Yurakucho.



Scene at the Keio Techno-Mall 2009 exhibition



Demonstration at a booth

New Kyurizukai

Today in the 21st century, science and technology continue to become increasingly diverse and difficult. The Faculty of Science and Technology launched a bulletin, "New Kyurizukai," in 2009, with the aim of explaining research in the field of science and technology in an easy-to-understand way. The bulletin returns to the starting point of "Kinmo Kyurizukai," the first scientific guide in Japan published by Yukichi Fukuzawa in 1868. Three issues are published in each fiscal year, with each issue featuring a young researcher. The Faculty issues the bulletin in the form of booklet in Japanese and also PDF files in both Japanese and English. A full version of the interview that is featured in the booklet is available on the website.

<http://www.st.keio.ac.jp/kyurizukai/index.html>



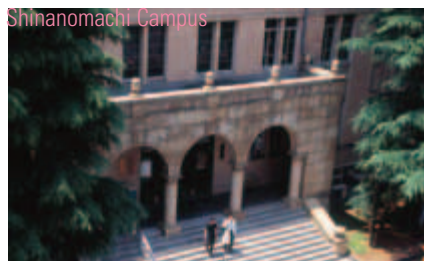
Initial issue: Junichi Ushiba, Assistant Professor

KLL Industry-Academia Collaboration Seminars

The KLL holds Industry-Academia Collaboration Seminars three times a year in cooperation with Yokohama Industrial Development Corporation and Institute of Industrial Promotion Kawasaki, mainly targeting the relevant people in industrial circles in the regions that are considering joint research/joint development with the Faculty and Graduate School of Science and Technology. A specific topic is set for each seminar, and a researcher specializing in the topic introduces latest research achievements and technology. In FY2009, the KLL held the following seminars, and many relevant company representatives attended them.

The 5th Seminar (July 17, 2009): "Initiatives for human interface"
 The 6th Seminar (October 23, 2009): "Green manufacturing"
 The 7th Seminar (February 26, 2010): "Colorfully expanding potentials of 'light'"

As for FY2010, two seminars were held on July 23 and October 29, 2010. The third seminar will be held on February 25, 2011.



Research Centers

Shinanomachi Campus

Center for Translational Research ~ from Bench to Bed ~

For Inquiries:

Shinanomachi Office of Research Administration

TEL: +81-3-5363-3879

<http://www.med.keio.ac.jp/researchers/>

E-mail: ras-shinanomachi@adst.keio.ac.jp

Keio University Medical Science Fund

TEL: +81-3-5363-3609

http://www.ms-fund.keio.ac.jp/index_jp.htm

E-mail: k-msf@adst.keio.ac.jp

The Shinanomachi Campus brings together medical education, research, and care facilities, such as the School of Medicine (second-year to sixth-year students), the Faculty of Nursing and Medical Care (third-year students), the Graduate School of Medicine, and the University Hospital.

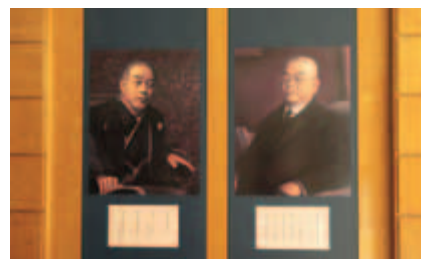
The Research Park at the Center for Integrated Medical Research houses research units involving other faculties, universities and research institutions, as well as business enterprises. It promotes strategic interdisciplinary research in the field of life sciences that extends beyond conventional paradigms of research areas and organizations.

The Center for Clinical Research is situated in the Building for Clinical Research completed in 2008 to provide support for clinical trials and translational research.

<http://www.sc.keio.ac.jp/>

School of Medicine and Graduate School of Medicine <http://www.med.keio.ac.jp/>

The School of Medicine was established in 1917, with a world renowned bacteriologist Shibasaburo Kitasato as the first Dean. To overcome the various problems caused by each department working independently, Professor Kitasato instituted a large-class system, which emphasized cooperation between basic and clinical medicine, and the practice of medicine as a practical science. In an effort to carry out the medical education that Professor Kitasato had envisioned, the doctoral program of the Graduate School of Medicine was launched in 1956 and the master's course in 1994 to foster trustworthy medical personnel who combine knowledge, skills, and a well-rounded personality.



Portraits of Yukichi Fukuzawa and Shibasaburo Kitasato

Center for Integrated Medical Research <http://www.cimr.med.keio.ac.jp/>

The Center for Integrated Medical Research aims to develop interdisciplinary research of medical science, science and technology, social science, and environment and information engineering. It also strives to make contributions to society through their research achievements.

Promoting expansion of diverse advanced research in life sciences, the Research Park, which acts as the Center's strategic research division, leases space (limited, in principle, to 3 years) to research units formed of researchers from various disciplines and institutions who share common objectives.

The Center's "Type J" system provides opportunities for young researchers to be principal investigators to develop groundbreaking research under favorable conditions. The Center also provides space for large-scale projects conducted with research funds from both inside and outside the university, and it functions as the research center for those projects.



Institute of Integrated Medical Research

Center for Clinical Research (CCR) <http://www.ccr.med.keio.ac.jp/>

The Center for Clinical Research is where the School of Medicine and the Keio University Hospital combine to conduct clinical trials and clinical/translational research (clinical research) that contribute to the development of innovative, advanced medical treatments and revolutionary drugs. The Center provides support for research implementation, starting with consultation at the planning stage and following through from subject recruitment to bio-statistical analysis. It also provides educational research programs for medical personnel.

Beyond clinical research by individual researchers or clinical departments, the Center promotes systematic clinical research, implementation of clinical trials, and the establishment of support systems backed by the School of Medicine, the University Hospital, and affiliated institutions.



Building for Clinical Research

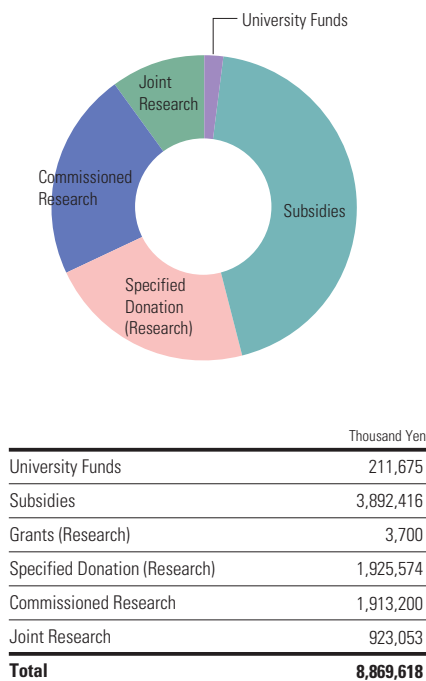
Keio University Hospital <http://www.hosp.med.keio.ac.jp/>

The Keio University Hospital has 29 clinical departments, 5 central treatment groups, and 7 cross-sectional cluster divisions of the School of Medicine and the hospital. The hospital receives an average of 4,000 outpatient visits per day and has about 950 inpatients. It accepts over 20,000 emergency patients and handles nearly 10,000 general-anesthetic surgeries per year. The hospital provides advanced medical treatments as a tertiary hospital and promotes regional medical care through staff exchanges and medical collaborations with over 100 hospitals all over Japan.



Keio University Hospital

Research Funds at Shinanomachi Campus



Endowed Laboratories in the School of Medicine and the Graduate School of Medicine

Kyorin Pharmaceutical, Asahi Kasei Kuraray Medical
Clinical Research Center of Inflammatory Bowel Disease

Bridgestone Laboratory of Developmental and Regenerative Neuroscience

Johnson & Johnson Ocular Surface Visual Optics

Department of Musculoskeletal Reconstruction and Regeneration Surgery

Inaida Research Center for Anti-Aging Medicine in Hepato-Gastroenterology

Endocrinology and Anti-aging Medicine

Center for Gastroenterology and Clinical Oncology Research (CGCOR)

Novartis Pharma Program for Clinical Therapeutics of Hematologic Malignancy

Novartis Pharma Program for Cerebrovascular Disease Prevention Medicine

Department of Cell Biology and Neuroscience

Department of Advanced Therapy for Spine and Spinal Cord Disorders

Schering-Plough Center for the Study of Chronic Liver Diseases

Department of Anti-Aging Musculoskeletal Research

Molecular Metabolism and System Medicine

Daiichi Sankyo Cardiovascular Inflammation

Tokyo Electric Power Company Advanced Medical Sciences and Environmental Preventative Medicine

Integrated Renal Replacement Therapy and Translational Medicine

Frontier Medicine on Metabolic Syndrome

Department of Integrated Bone Metabolism and Immunology (Teijin Pharma)

Department of Clinical Biomechanics (Hisamitsu Pharmaceutical)

Network Medicine on Endocrinology and Metabolism

Joint Research Projects

Novartis Pharma K. K.
Exploratory research for new therapeutic targets in cardiorespiratory medicine

Institute of Medical Molecular Design, Inc.
Renoprotective Drug Development targeted to NFKB

Ono Pharmaceutical Co., Ltd.
Search for and functional analysis of therapeutic targets in COPD

Kowa Company, Ltd.
Clarification of the physiological role of oxidant stresses in dry-eye

Shionogi & Co., Ltd.
Clarification of molecular structures in renal aging and cardiorenal linkages, and clinical application to cardiovascular accident outbreak control of chronic kidney disease

Mitsubishi Tanabe Pharma Corporation
Creation and functional evaluation of artificial blood platelets by nanoparticles supported by molecule recognition sites

Daiichi Sankyo Co., Ltd.
Molecular biological therapeutic strategies for prevention of metabolic syndrome and their clinical application

Toshiba Medical Systems Corporation
Non-invasive radiotherapy and diagnostic system for cancer management

Otsuka Pharmaceutical Co., Ltd.
Basic study for development of new therapies in digestive diseases

LinkGenomics, Inc.
Development program from diseases caused by epithelial to mesenchymal transition (EMT)

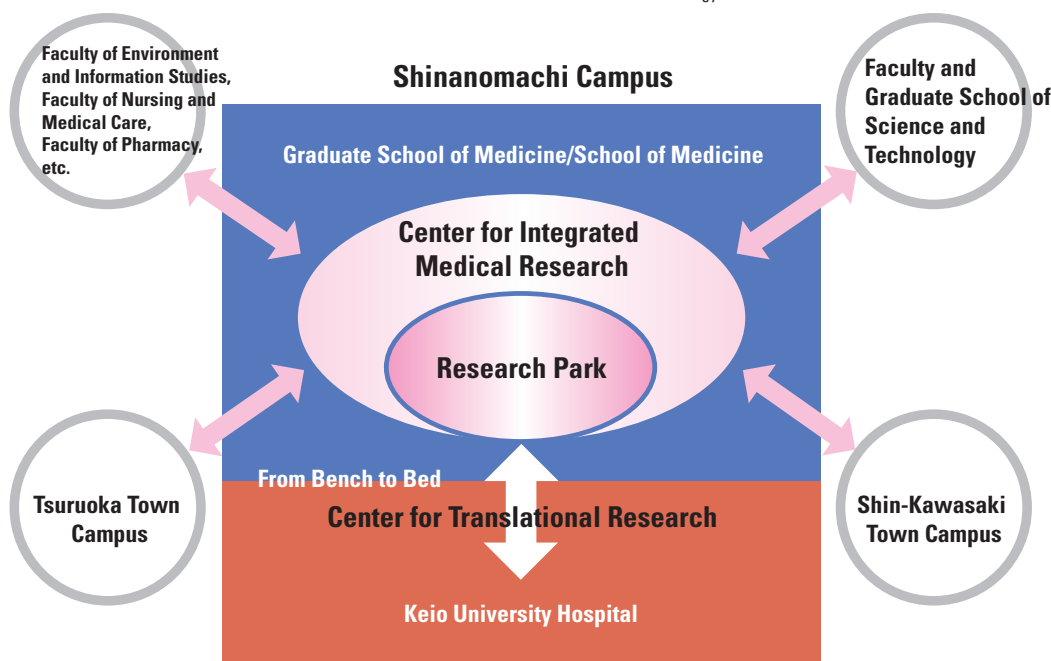
Ajinomoto Co., Inc.
The pharmacological action of amino acids in Crohn's disease and analysis of changes in amino acid metabolic balance under pathology

Kyowa Hakko Kirin Co., Ltd.
Expansion and Maintenance of Hematopoietic Stem Cells *in vivo* and *in vitro*

NIPRO Corporation
Research and Development of Artificial Oxygen Carrier

Eisai Co., Ltd.
Comprehensive research project of dementia toward the establishment of a dementia center in the School of Medicine of Keio University

Twelve other joint projects



Seminar



Research Park



University Hospital

Keio University Medical Science Fund

In fall 1994, Dr. Mitsunada Sakaguchi, a 1940 alumnus of the School of Medicine, donated five billion yen to Keio University, with the expressed desire that it be used to encourage medical research and its creative progress at Keio and to promote worldwide medical advances. To fully reflect Dr. Sakaguchi's commitment, Keio launched the Keio University Medical Science Fund on April 1, 1995. Dr. Sakaguchi made an additional donation of two billion yen in July 1999, bringing the fund to a total of 7 billion yen.

Keio Medical Science Prize

Keio Medical Science Prize honors the outstanding and creative achievements of researchers in the field of the medical and life sciences, in particular those contributing to scientific developments in medicine. The prize is awarded irrespective of nationality. Laureates receive a certificate of merit, a medal and a monetary award of 20 million yen. The award ceremony, commemorative lectures given by the laureates and commemorative symposium are held at Keio University.





Shonan Fujisawa Campus (SFC)

Contributing to Social Development with Cutting-edge Research Based on Interdisciplinary Cooperation

Shonan Fujisawa Office of Research Administration

TEL: +81-466-49-3436 FAX: +81-466-49-3594
E-mail: info-kri@sfc.keio.ac.jp

Website of Keio Research Institute at SFC:
<http://www.kri.sfc.keio.ac.jp/en/>

SFC

The Shonan Fujisawa Campus (SFC) was established in 1990 with the aim of creating a site for research and education based on completely new concepts adapted to the changing times. In addition to the three faculties of Policy Management, Environment and Information Studies, and Nursing and Medical Care, it also has the Graduate School of Media and Governance, which aims to foster highly professional people who will play a major role in 21st Century society, and the Graduate School of Health Management, which further expands and develops the concept of the Faculty of Nursing and Medical Care by providing a program that enables graduates of both the sciences and humanities to tackle the broad subject of "Health." Situated on a futuristic 330,000 square meter campus, SFC seeks to maintain a balance between advanced technology and a rich, natural environment. Research projects serve as the core of a participatory curriculum which instills students with specialized knowledge and practical skills.

<http://www.sfc.keio.ac.jp/en/>



Faculty of Nursing and Medical Care

Keio Research Institute at SFC

The Keio Research Institute at SFC is an affiliate institute of the three SFC faculties and the Graduate School of Media and Governance, which promotes research activities at SFC.

As a leading center of cutting-edge research in the 21st century, the Institute works to further enhance society's advancement by performing ground-breaking research based on interdisciplinary cooperation and by nurturing a two-way partnership between educational and research activities at the campus. This includes all related activities with industry, government, and academia both within Japan and overseas. Specific measures to achieve these objectives include the promotion of joint research projects with other organizations and the support of venture incubation efforts. A feature of the Keio Research Institute at SFC is the SFC Research Consortium, which encourages university-led collaborative research by multiple organizations. There are currently 12 such projects under way (as of June 1, 2010).

The Institute has also been commissioned to execute about 170 research projects per year, funded by approximately ¥2.07 billion from government agencies, local governments, and private companies (FY2009 data).

This research is performed not just by researchers within SFC, but also by approximately 430 visiting researchers from outside.

The Institute is committed to presenting the fruits of its research widely to the public so that the results of its efforts can be returned to society.

<http://www.kri.sfc.keio.ac.jp/en/>

Disseminating Research Results Broadly

SFC Open Research Forum (ORF)

Keio Research Institute at SFC, with the notion that dissemination of its achievements to the public is one of its crucial obligations, holds the SFC Open Research Forum as the occasion to announce broadly its research outcomes. In this forum future prospects and results of many ongoing research projects of the institute are introduced to industries, national and local governments through exhibitions, demonstrations and symposia.

The institute also makes proposals for societies at the forum through various sessions such as panel discussions between experts from industries and governments and researchers of SFC. The SFC Open Research Forum thus intends to facilitate and enhance industry-government-academia activities at SFC, and is an occasion for the institute to have external and objective assessments of its activities for development of its future research plans. The two-day SFC Open Research Forum 2010 will be held November 22 and 23 at Roppongi Academyhills 40 in Tokyo.

<http://orf.sfc.keio.ac.jp/>

SFC Research Yellow Page

Keio Research Institute at SFC runs a web search service named "SFC Research Yellow Page" to publicize diverse research activities by researchers of SFC to an even larger number of enterprises and organizations. The service is for promotion of transdisciplinary research endeavors leading to actualizations of new research projects as well as consequent technology transfers and generations of new businesses through producing opportunities of encounter between social needs and research activities at SFC.

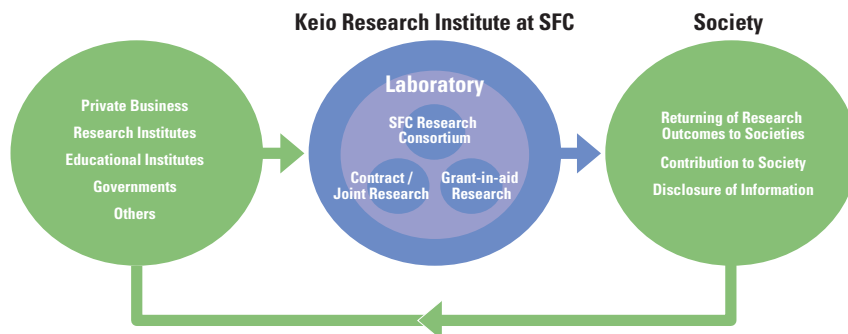
<http://www.kri.sfc.keio.ac.jp/kris-yp/>



SFC Open Research Forum 2009



SFC Research Yellow Pages



Structure of Keio Research Institute at SFC

World-Leading Fusion Research Technology

Laboratory

The Keio Research Institute at SFC provides a laboratory system which enables SFC's researchers to form research groups with people who have different academic backgrounds yet share the same research interests and objectives. These groups carry out interdisciplinary collaborative research projects. Currently, the following 20 laboratories are active (as of June 1, 2010):

- Career Resource Laboratory
 - Internet Research Laboratory
 - Geo-informatics Laboratory
 - Systems Biology Laboratory
 - Auto-ID Laboratory
 - Ubiquitous Computing & Communication Laboratory
 - Platform Design Laboratory
 - Healthcare Informatics Research Laboratory
 - Keitai Laboratory
 - Interaction Design Laboratory
 - Community Collaboration Laboratory
 - Open Wireless Broadband Platform Laboratory
 - Asian Laboratory
 - Mieru-ka Laboratory
 - Advanced Web Application Laboratory
 - Agri-Informatics Laboratory
 - e-Government Research & Development Laboratory
 - Japan Studies Platform Laboratory
 - Shonan Institute for the Computational Research of Acoustics and Music
 - Internet and Society Laboratory
- <http://www.kri.sfc.keio.ac.jp/en/activity/laboratory.html>

SFC Research Consortium

The SFC Research Consortium is a unique form of research collaboration in which the university sets the central research theme, invites a number of external organizations such as business enterprises and governments for collaborations, and tackles large research issues while sharing mutual benefits. Currently, the following 12 consortium projects are active (as of June 1, 2010):

- Building Advanced Information Infrastructure
 - Sharing Human Intellect Project
 - VCOM
 - VSI (Virtual Systems Institute)
 - E-CELL Consortium
 - e-Care Consortium
 - Keio SFC Innovation & Entrepreneurship Platform Consortium
 - Referenced Code Development for IMS/SIP system
 - Unwired Research Consortium
 - Internet Business Innovation consortium
 - Regional Informatization Research Consortium
 - Agri-Platform Consortium
- <http://www.kri.sfc.keio.ac.jp/en/activity/consortium.html>

Ground-Breaking Partnerships with Industry, Government, and Academia

SFC Forum

The SFC Forum is a hub of communication, where leaders of the business world and university faculty can hold discussions spanning a wide range of fields. The program for the regular lunch meetings, which are a pillar of the movement, reached a turning point at the 100th meeting in 2010. Having marked its 20th anniversary, SFC provides seminars by instructors in various specialist fields for the new decade.

<http://sfc-forum.sfc.keio.ac.jp/>



SFC forum

Venture Incubation Support

Keio University has set up incubation facilities (Keio Fujisawa Innovation Village) in cooperation with the Organization for Small & Medium Enterprises and Regional Innovation, Fujisawa City, and Kanagawa Prefecture.

These facilities are offered for rent, subject to local conditions suitable for industrial startups, to those who wish to utilize the fruits of university research to create new businesses, or to those who wish to form new companies in partnership with university researchers who already have suitable expertise.

A number of incubation managers are available on-site to give support such as advice on industrial startups and matchmaking with corporations.

Since their establishment in March 2006, the facilities have maintained an occupancy ratio of over 80%. The facilities offer various kinds of support for fund-raising, legal matters, intellectual property, collaborative activities between industry and academia, etc., enabling industrial startups to proceed smoothly to full commercialization.

Presentation of Case Examples

Case 1:

Jiro Kokuryo's Laboratory, Faculty of Policy Management:

Contemplating an image of the future of the Internet economic society and the shape of policies

The Internet Business Innovation Consortium has been striving to identify the requirements for increasing the creativity of Internet businesses and returning innovation to the society, enabling society to benefit from the results. In February 2010, vice ministers of the government ministries who draw up Japan's IT policies, as well as the high-ranking executives of IT companies, gathered to attend a symposium to discuss face-to-face an image of the future that will be brought about through the creative and comprehensive use of the Internet. The attendees also discussed the obstacles to attaining this future image.

At the event, several thousand individuals simultaneously watched a live program distributed through Ustream, and there were more than 10,000 tweets, which made proceedings very exciting. The Consortium will continue with its research in cooperation with Consortium members to make recommendations that will enable the research results to be reflected in policies.



Kick-off Symposium (Feb. 2010)

Case 2:

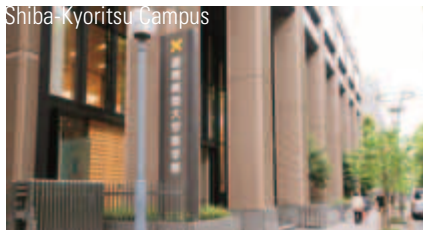
Open Wireless Broadband Platform Laboratory: A new service using the wide-area wireless network by WiMAX: Digital Signage

Wireless telecommunications, such as mobile phones and wireless LAN, now play a critical role in everyday life because of their convenience. However, there are many problems associated with wireless telecommunications. These include technical problems, such as radio interference and band limitation, as well as issues concerning laws, regulations and standardizations related to radio transmissions. However, with the advances made in technology and standardization, it has become possible to install radio technology in information systems as a functional block, and new methods of utilizing radio technology are being studied.

The Open Wireless Broadband Platform Laboratory researches new communications and new services that have become possible by opening up the wireless platform from the business and technological aspects. Digital Signage (an electronic message board system) is one such service. Within the SFC campus, the Laboratory performed a test demonstration of the Dynamic Digital Signage, a new type of information distribution service that provides regional and other information that matches the attributes of people around the display. In addition, the Laboratory has been developing Fujisawa Signage, a system through which citizen reporters can distribute regional information to the designated message board at the designated time in cooperation with the Fujisawa municipal government. This is facilitated by using means such as the wide-area wireless network by WiMAX, which has been established in the Shonandai area.



Digital Signage



Shiba-Kyoritsu Campus

Platform for the dissemination of information to guide the future of pharmaceutical sciences

**The Group for Research Administration,
General Affairs Office, Shiba-Kyoritsu campus**
1-5-30 Shibakoen, Minato-ku, Tokyo,
105-8512 Japan
TEL: +81-3-5400-2653
<http://www.pha.keio.ac.jp/>
E-mail: skc-shien@adst.keio.ac.jp

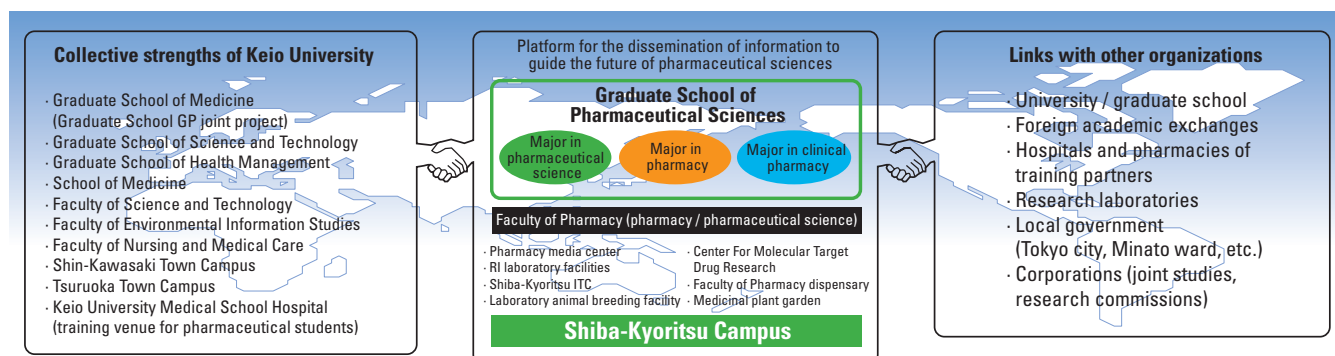
Faculty of Pharmacy / Graduate School of Pharmaceutical Sciences

The Faculty of Pharmacy and the Graduate School of Pharmaceutical Sciences were set up in April 2008 as the result of a merger with Kyoritsu University of Pharmacy. After this merger, we continued to use the equipment and facilities at the Shiba-Kyoritsu Campus in Shibakoen, Minato Ward for education and research. Over the period of eight decades since its establishment in 1930, Kyoritsu University of Pharmacy has turned out some 13,000 pharmacists and pharmaceutical researchers and has attained a leading position in the field of pharmaceutical research. By carrying on this outstanding track record and building on the comprehensive capabilities of Keio University, we hope that this new Faculty and Graduate School will continue to lead the way forward in the field of pharmaceutical sciences with regard to education, research and contributing to society.

Aims of the Graduate School of Pharmaceutical Sciences

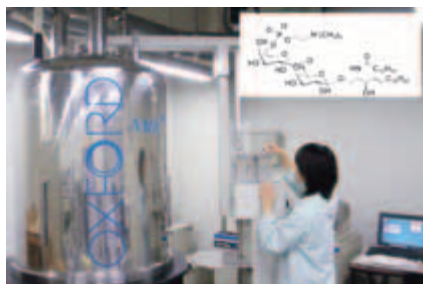
Pharmaceutical sciences are under increasing pressure to deliver results not only for the benefit of society but also for improving the quality of medical care. To promote the latest medical advances and contribute to the nation's health, the mission of the Graduate School of Pharmaceutical Sciences is to foster the ability to gather information from around the world, acquire knowledge of advanced leading-edge medical treatments, and educate talented individuals with specialist skills.

At the Graduate School of Pharmaceutical Sciences, we carry out advanced pharmaceutical education and research in a diverse range of pharmaceutical disciplines including pharmaceutical science, chemotherapy, biochemistry, drug targeting (delivery), patient compliance instruction/drug dispensing, medical product information, pharmacokinetics, drug information, pharmacology and pathology. Our aim is to produce researchers and engineers capable of developing new medical products, and to nurture talent in all manner of situations including clinical research organizations (CROs), food manufacturers, the chemical industry, developers of cosmetics, and government facilities. In each of these fields, we aim to incorporate international aspects into the education and research activities at the Graduate School in order to produce individuals who are capable of operating on an international level.



Center For Molecular Target Drug Research

This center was established to contribute widely to the development of molecular targeted therapeutic research and to efficiently promote the formation of a DVD research and development center for cell signaling targeted drug discovery in support of strategic research by private universities and MEXT. It does this by bringing together leading researchers at the Graduate School of Pharmaceutical Sciences and by carrying out basic research and development. The center also takes care of the administrative and business aspects of research apparatus necessary for leading-edge research.



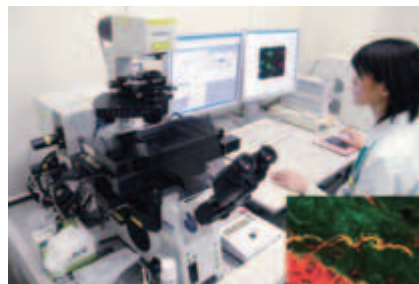
Nuclear magnetic resonance (NMR) equipment

This equipment obtains information about the 3D structure and specific nuclear bonding states in chemical compounds by subjecting them to electromagnetic pulses tuned to resonate with atomic nuclei that spin when the compound is placed in a magnetic field. This is a powerful technique for the structural analysis of natural materials and organic compounds.



Flow cytometer

This equipment rapidly separates cells by using various indicators such as surface antigens. This makes it possible to analyze the properties of cell groups in a short time, and to separate still-living cells based on their individual properties.



Confocal laser scanning microscope

This microscope can produce high-definition 3D visualizations of the structure of biologically active molecules such as proteins and nucleic acids, and the locations of these molecules inside cells. Uses include making prolonged observations of living cells, and stimulating cells with light of a specific wavelength.

From drug discovery to clinical trial — Conducting extensive research on the "Pharma Sciences" to utilize the multi-faceted nature of pharmaceuticals

At the Graduate School of Pharmaceutical Sciences, we aim to build on the collective strengths of Keio University while improving our research level links with other graduate schools, and we will continue to promote links between government, business and academia in the field of pharmacy by promoting exchanges of students and teaching staff. In addition, we aim to teach and research the latest technology, and are working at further strengthening our research infrastructure by actively inviting eminent researchers from outside the university, especially from foreign educational establishments.

Supporting the Formation of a Strategic Research Infrastructure

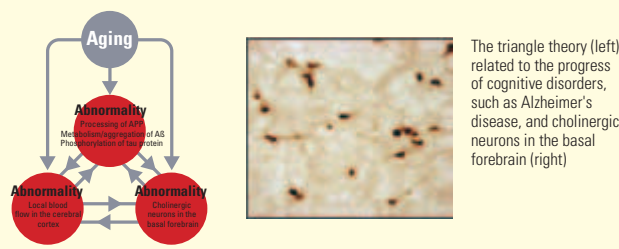
In addition to the independent research achievements made in each of the 20 or so courses we have on offer, the Graduate School of Pharmaceutical Sciences has also been selected to participate in the Strategic Research Base Development Program of MEXT, which is a cross-disciplinary research project that includes participation from external organizations.

Formation of a DVD research centre in cell signaling drug discovery for molecular targeting therapies

(2009-2013 Research Representative: Professor Hideko Kanazawa, Faculty of Pharmacy)

Due to recent pharmaceutical developments including the molecular-targeted drug, substantial improvements have been made in the treatment of hitherto intractable diseases, and as a result many patients now experience a better quality of life. We aim to lead the world in drug discovery by establishing a research system with deeper links to facilities such as the Graduate School of Medicine and Graduate School of Science and Technology centered on the Center For Molecular Target Drug Research which was established as a research center in the Graduate School of Pharmaceutical Sciences. Specifically, we will construct a centralized drug discovery research system that brings together the know-how and technology of drug discovery, such as drug design and synthesis, drug screening (D; design), analysis of pharmacological / biological action, investigation of pharmacokinetics and metabolites (V; validation), and drug delivery (D; delivery). Furthermore, by strengthening our research links with other universities, we aim to discover new drug discovery targets and seeds originating from universities, and to encourage new growth in practical research.

Within the research period, we aim to (1) design promising candidate compounds for therapeutic drugs, (2) focus on the target diseases of cancer, immunity, dementia, and diabetes, and search for target molecules and analyze their interaction, and (3) elucidate the mechanisms of drug delivery for the clinical application of therapeutic drugs that target the disease at the molecular level, and establish delivery systems. We will create the basis for drug discovery research, and also promote research as the foundation for drug discovery with the aim of developing therapeutic drugs for intractable diseases, such as cancer and neurological refractory diseases that target signal molecules. To start the project, we held a kick-off meeting to which we invited Dr. Hachiro Sugimoto (Professor, Kyoto University Graduate School of Pharmaceutical Sciences; former executive board member and director of Drug Discovery Research Laboratories I, Eisai Co., Ltd.) who developed Aricept, a therapeutic drug for Alzheimer's disease and who is highly regarded internationally, to give us a lecture on the theme of "the Long Road to Drug Discovery - Pursuing the dream of development of a therapeutic drug for Alzheimer's disease." In addition, project members attended a presentation to report the plan for promoting research from this point and to report on its progress.



Establishment of efficient drug development method and side effect reduction method by analysis of factor that influences pharmacokinetics

(2007-2011 Research Representative: Professor Tadahiko Mashino, Faculty of Pharmacy)

It takes significant cost and time to develop drugs, and the success rate is very low. This is partly due to the pharmacokinetics of candidate compounds, whereby candidates that show good activity *in vitro* often fail to result in useful drugs due to issues with their *in vivo* kinetics. The side-effects and interactions of drugs are also closely related to their *in vivo* kinetics. To address this issue, we aim to make drug development more efficient and reduce side-effects and drug interactions by developing methods for improving pharmacokinetics by analyzing the two factors, "the chemical structure of candidate compounds" and "the control of transporters and metabolic enzymes." In the search for new drug candidate compounds, pharmacokinetic prediction systems are also being developed, but these are passive predictions based on the analysis of prior data. We are therefore actively analyzing factors that have pharmacokinetic effects by carrying out a wideranging study including fields from organic chemistry, natural products chemistry, molecular biology, analytic chemistry and clinical research, with the aim of providing the precise control of *in vitro* kinetics.

Funded Research Achievements

- Pharmaceutical tests in the phase III clinical trials of famciclovir in the treatment of herpes zoster
- Action of prostaglandin D2 receptors (DP) on activity of the lymphocyte cholinergic system
- Performance evaluation of the newly-developed HPLC column, and its application to real (clinical) samples
- New medication methods for novel compounds and known compounds
- Effects of MEK inhibitors on the expression of P-glycoproteins
- Creation of novel anti-human urate transporter-1 (URAT1) antibodies
- Idiosyncrasies of transporter inhibition, and the effects of these compounds on transporter expression
- Investigation of the social contribution of OTC pharmaceuticals
- Regulation Mechanism of Natural Moisturing Factor Synthesis and Estrogen Metabolism in Epidermis
- Construction of Carbohydrate Antigens Toward the Diagnostic Drugs for Parasite Infection
- Elucidation of P-glycoprotein molecular complex toward the discovery of tissue-selective drug distribution promoters

Development of new treatments for intractable diseases based on clarification of molecular mechanisms in response to stress

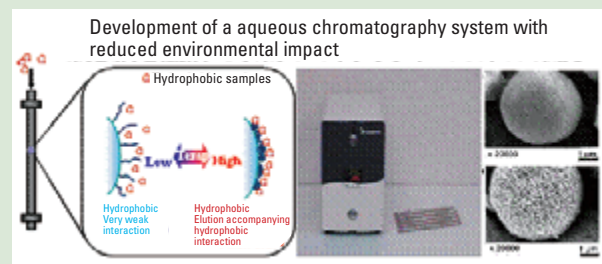
(2005-2009 Research Representative: Professor Yoshikazu Sugimoto, Faculty of Pharmacy)

A stress response is a natural defense mechanism whereby a living organism protects itself from various external stimuli. However, in recent years it has become clear that problems such as neurological disorders and allergic diseases can be caused by failure of stress response mechanisms, or even by stress responses themselves. In cancer treatments, the stress response of cancer cells leads to increased drug resistance and apoptosis resistance, so controlling the stress response of cancer cells is thought to be essential for increasing the efficacy of cancer drug treatments. In this project, we have elucidated from various viewpoints the biological stress response mechanisms in such terms as oxidative stress, inflammation, allergies and reactions between cancer and drugs. We have also evaluated the activities of 659 chemical compounds in 24 evaluation systems for the purpose of developing new drugs that are effective in weakening or modifying the stress response. The results of this project are expected to lead to the development of preventative medicines and the diagnostic methods and treatments for diseases that are on the increase in our aging society, such as cancer, neurological disorders, heart disease and allergic disease.

Links between industry, government and academia - research examples

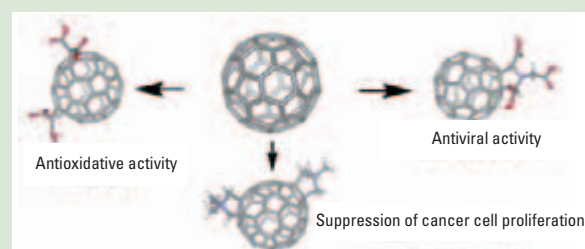
Ministry of the Environment: Development of an aqueous chromatography system with lower environmental impact

In this study, we developed a novel chromatography technique that uses no environmentally harmful organic solvents and requires no waste water treatment. We also developed a sophisticated method for analyzing biological samples and environmental samples based on this chromatography technique. For five years from 2005 to 2009, the National Institute for Environmental Studies and a group led by Professor Hideko Kanazawa of the division of Physical Pharmaceutical Chemistry continued a study commissioned by the Ministry of the Environment. The initial objective of this study, to establish environment methods of analysis that are environmental friendly, was fully achieved.



Vitamin C60 BioResearch Corporation The effects of the antioxidant, fullerenes, on inflammation and physiological responses

Fullerenes exhibit various novel activities such as antioxidant activity, suppressive effects on cancer cell proliferation and antiviral activity. These activities are being clarified by the Division of Medicinal Chemistry, Graduate School of Pharmaceutical Sciences, Keio University, and are being put to practical use in cosmetic products linked to their antioxidative activity. In this funded research, we are studying the anti-inflammatory effects as a new function of fullerenes, together with the venture business Vitamin C60 BioResearch Corporation.





Shin-Kawasaki Town Campus

Open and Cutting-edge Research Facility Pursuing Industry-Government-Academy-Region Collaboration

Shin-Kawasaki Town Campus
Shin-Kawasaki Frontier Research and Education Collaborative Square
 7-1 Shin-Kawasaki, Saiwai-ku, Kawasaki, Kanagawa,
 212-0032 Japan
 TEL: +81-44-580-1580 FAX: +81-44-580-1570
<http://www.k2.keio.ac.jp/>
 E-mail: k2-tc@adst.keio.ac.jp

The Shin-Kawasaki Town Campus, popularly known as K² Town Campus, was established in the spring of 2000 as a facility responsible for cutting-edge joint research among industry, government, academy and region through collaboration and cooperation with Kawasaki city. K² ("K Square") represents the double meaning of (1) Keio (one "K") and Kawasaki (another "K") teaming up and thereby producing a squared effect by joining forces, and (2) the campus square (plaza). Keio and Kawasaki city signed a basic agreement in November 2009. In March 2010, the 10th year after its establishment, a new agreement was signed to promote the "Shin-Kawasaki Creative Forest Project." K² Town Campus is a leading-edge, collaborative, interdisciplinary research-oriented campus. With the three central tenets of "advancing leading-edge research," "creating new industries and business," and "contributing to society and the community," we promote various research activities as a campus that paves the way to a new age.

● Advancing Leading-edge Research

Currently, 14 research projects are being developed and about 400 registered researchers (including faculty members, joint researchers and postgraduate / undergraduate students) are carrying out interdisciplinary research activities. In 2010, the Keio Photonics Research Institute Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST Program) was started under Yasuhiro Koike, Professor, Faculty of Science and Technology, as the project leader.

● Creating New Industries and Businesses

Corporate business networking events and similar events have been held to further advance each research project and to achieve collaboration with companies based on research results, with the aim of creating new industries and businesses.

● Contributing to Society and the Community

In partnership with Kawasaki city, we hold many events for community residents and businesses, and provide learning opportunities concerning science and technology. We also carry out workshops and on-site science learning for children in the community.



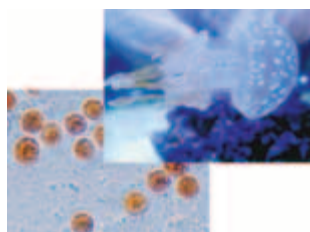
Research Projects * Completed in FY2009 ** New Project starting in FY2010

K-Building	Project on Search and Development of Intriguing Chemicals for Health Foods Daisuke Uemura (Professor, Faculty of Science and Technology)
K-Building	New Generation Terabit Core/Access Network Research Project Naoaki Yamanaka (Professor, Faculty of Science and Technology)
K-Building	Project on Advanced Light-Wave Control Technologies Fumihiko Kannari (Professor, Faculty of Science and Technology)
K-Building	Technology of Air Cleaning for Creating the Comforts of Life Shigeru Tanaka (Professor, Faculty of Science and Technology)
K-Building	Project on Naturally Occurring Huge Molecules Daisuke Uemura (Professor, Faculty of Science and Technology)
K-Building	Keio Photonics Research Institute Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST Program) Yasuhiro Koike (Professor, Faculty of Science and Technology)**
K-Building	Distributed Real-time Controlling Project Nobuyuki Yamasaki (Associate Professor, Faculty of Science and Technology)
K-Building	Research Project on Secure and Reliable System Software Kenji Kono (Associate Professor, Faculty of Science and Technology)

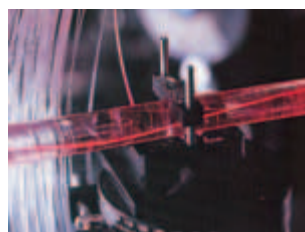
E-Building	ERATO-SORST Koike Photonics Polymer Project Yasuhiro Koike (Professor, Faculty of Science and Technology)
I-Building	High-Level Global Cooperation for Leading-Edge Platform on Access Spaces Kouhei Ohnishi (Professor, Faculty of Science and Technology)
O-Building	Next Generation Nano-technology Thin Film Project Seimei Shiratori (Associate Professor, Faculty of Science and Technology)
O-Building	WIDE Project Jun Murai (Professor, Faculty of Environment and Information Studies)
O-Building	Future Vehicle Project Hiroshi Shimizu (Professor, Faculty of Environment and Information Studies)
O-Building	Co-Mobility Society Creation Project Katsuhiko Ogawa (Professor, Faculty of Environment and Information Studies) (Assumed the post in 2010)
K-Building	Project on Development of Integrated Communication Network Technology by Visible Light Communication Masao Nakagawa (Professor, Faculty of Science and Technology)*



Ultrabroad Femtosecond Ti:sapphire Oscillator



Exploring pharmaceutical resources from marine organisms



Graded Index Plastic Optic Fiber (GI-POF)



Electric Vehicle, "Eliica"

Advancement of Leading-edge Research

The research projects described in the following are some representative examples of those currently being undertaken at K² Town Campus.

Co-Mobility Society Creation Project MEXT Special Coordination Funds for Promoting Science and Technology Representative: Hironao Kawashima (Professor, Faculty of Science and Technology)

The "co-mobility society," namely, a creative and civilized society in which everyone from children to the elderly can move around freely and safely, intermingle easily, and live comfortably, is the target of this research project - which aims to create the social infrastructure for underpinning such a society. This research is aiming to establish the "co-mobility society infrastructure" for linking the real and virtual worlds by means of expanding and integrating each research theme around the three axes of "community science," "mobility science," and "human-harmony science," creating new hybrid communities, and propagating these communities through society on a grand scale. Moreover, for application to the everyday world, several model districts were set up, and cooperative agreements were signed with Kurihara City, Miyagi in 2007, Okutama Town, Tokyo in October 2008, and Aomori city in February 2009.

In 2009, after strengthening the collaboration system with these local governments, we conducted many demonstration experiments, such as the test operation and test driving of small electric vehicles with an auto-control function (see the photo at the right), the revitalization of downtown areas, the restoration of information networks in the event of a disaster. The results of each demonstration experiment have consistently been successful up to 2010, the fourth year since research started. At the Co-Mobility Society Research Center, which manages and controls this project, efforts are also being made for other projects, such as the development of a system to provide a high-speed operating service, which is safe and secure with a small environmental burden.

*Katsuhiko Ogawa (Professor, Faculty of Environment and Information Studies) took over the role of representative for this project in 2010.



Small Electric Vehicle with Auto-Control Function

High-Level Global Cooperation for Leading-Edge Platform for Access Spaces MEXT Global COE Program

Representative: Kouhei Ohnishi (Professor, Graduate School of Science and Technology)

To develop a world-wide stronghold for global research cooperation, at Shin-Kawasaki Town Campus, Building I, about 100 affiliated researchers (including research assistants) are involved in cutting-edge research activities on the following four projects: (P1) Basic engineering physics for innovative photonic/electronic device creation; (P2) Environment- embedded device technology; (P3) Real-world and real-time network for multi-dimensional processing and communication; and (P4) Perception and expression technology.

On November 13, 2009, at the Shin-Kawasaki Town Campus, we held the 2nd Global COE PhD Forum to strengthen exchanges with industry. The event was attended by officials from the Ministry of Economy, Trade and Industry, and many researchers and technicians working in the area of robot engineering/media engineering from companies with closely related technologies. Young researchers presented the latest research results.

*For more details of activities for this project, see the lower portion of page 29.



A scene on the day of the PhD Forum

Creation of New Industries and Businesses

Business Fellowship Event

At the business networking event, four demonstrations on visible light were held, and attendees centered around company researchers were engaged in discussions on the creation of new things (*monozukuri*) and the possibility of new businesses, centered around company researchers.

Date: March 3, 2010

Venue: Nakagawa Research Laboratory, facilitated by Shinichiro Haruyama, Professor, Graduate School of System Design and Management



Demonstration

Kawasaki Business Incubation Center (KBIC)

The Kawasaki Business Incubation Center (KBIC) is an incubation facility that was built adjacent to the campus by Kawasaki city. The Center is currently engaged in seven research projects, including research laboratories that have already been commercialized, with the aim of achieving commercialization and creating new business start-ups based on the research results.



Kawasaki Business Incubation Center

Contributions to Society and Community

Seminar for Children

We held two events in which children could actually experience the enjoyment of science.

"Let's see the total solar eclipse"

Date: July 22, 2009

"A Happy Day of Playing with Science"

Date: September 26, 2009



Workshop for children

Open Campus

All projects were made public. A great many members of the public, students, and company employees came to the meeting.
Date: November 14, 2009



A scene at the open seminar

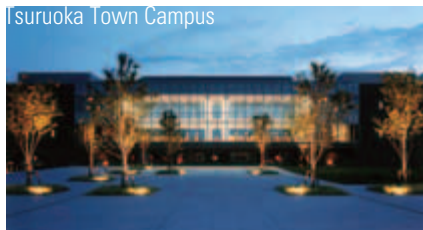
Open Seminar

As a cooperative project with Kawasaki city, three open seminars were held in which cutting-edge technologies were presented to members of the public as well as company employees and agency representatives.

1st seminar: November 14, 2009 "Toward Face-to-Face Communication"
Lecturer: Yasuhiro Koike, Professor, Faculty of Science and Technology

2nd seminar: November 14, 2009 "Future Electric Vehicles"
Lecturer: Hiroshi Shimizu, Professor, Faculty of Environment and Information Studies

3rd seminar: March 3, 2010 "Advanced Technologies of Visible Light Communication and Its Application"
Lecturer: Shinichiro Haruyama, Professor, Graduate School of System Design and Management



Tsuruoka Town Campus

The World's Leading Pioneer in Integrative Systems Biology

Tsuruoka Town Campus

Keio Frontier Research & Education Collaborative Square at Tsuruoka

14-1 Baba-cho, Tsuruoka-shi, Yamagata, 997-0035 Japan

TEL: +81-235-29-0800 (Main) FAX: +81-235-29-0809

<http://www.ttck.keio.ac.jp/>

E-mail: office@ttck.keio.ac.jp

In April 2001, Keio University established Tsuruoka Town Campus of Keio (TTCK) in Tsuruoka City, Yamagata Prefecture, with the cooperation of Yamagata Prefecture and the municipalities of Shonai region. The cornerstone of the campus is the Institute for Advanced Biosciences (IAB).

Research at IAB is conducted at two facilities: the Campus Center and the Bio-lab.

TTCK conducts, closely and jointly with the other campuses of Keio, research and development in advanced areas and enhances research and educational activities. It proactively transfers newly created technologies to local governments and businesses to encourage industry-government-academia collaboration, for contributing to regional development as well as to the advancement of science and technology in Japan.



Bio-lab

Institute for Advanced Biosciences (IAB)

The Institute for Advanced Biosciences (IAB), Keio University, located in Tsuruoka city, Yamagata prefecture, is recognized as a world pioneer in integrated systems biology, a new approach to bioscience of the 21st century.

Having developed leading-edge biotechnologies, we measure and analyze the cellular and metabolic activities of human and other organisms including microbes, try to understand various cellular functions and physiological activities using computer simulations, and apply their findings to medical, environmental, and food sciences.

<http://www.iab.keio.ac.jp/>

Major Research Projects

Cabinet Office, Government of Japan

•Super Special Consortium for Supporting the Development of Cutting-edge Medical Care

"Project of Early Clinical Development for Anti Cancer Medicine and Device" (2008-2012)

Ministry of Education, Culture, Sports, Science and Technology (MEXT)

•Global COE Program

"Global COE for Human Metabolomic Systems Biology" (2007-2011)

•City Area Program

"Project for creation of high-functional food science industry cluster" (2009-2011)

Ministry of Health, Labour and Welfare

•Health and Labour Science Research Grants

Research on the Risk of Chemical Substances:

"Research related to the development of methods for evaluating the harmfulness of chemical substances using metabolome analysis and biomarkers"(2007-2009)

•Health and Labour Science Research Grants

Research into Biological Markers for New Drug Development

"Biomarker discovery of drug induced hepatitis by global analysis of intracellular molecules" (2008-2012)

•Grant-in-Aid for Cancer Research

"Establishment of evaluation systems for therapeutic approaches utilizing cancer-specific biological processes" (2009-2011)

New Energy and Industrial Technology Development Organization (NEDO)

•Functional RNA Project

"Analysis of the functions of functional RNA"(2005-2009)

Japan Science and Technology Agency (JST)

•Basic Research Programs (PRESTO)

"Development of ultramicro-electrospray ionization approaches for -omics research" (2006-2009)

•Bioinformatics Operations

"Development of Metabolome MS Spectral Integration Database" (2006-2010)

•Comprehensive Support Programs for Creation of Regional Innovation Science and Technology Incubation Program in Advanced Regions (Promotion Research)

"Protein phosphorylation display for drug discovery and diagnosis" (2008-2010)

Yamagata Prefecture and Tsuruoka City

"Development of Fundamental Technologies Using Systems Biology (Simulations Software Techniques, Metabolome Analysis Techniques, Genome Design Techniques, Proteome Analysis Techniques) and Their Applications (Medical, Food, and Environment)" (2006-2010)

Research System

Major Joint Research Organizations:

The Faculty of Science and Technology, the School of Medicine, Shonan Fujisawa Campus, RIKEN Japan, Human Metabolome Technologies, Inc., BioSigma S.A. (Chile), Denso Corporation, Kirin Holdings Company, Limited, Kao Corporation

Educational Activities

The IAB develops and deploys educational activities for students with different majors in undergraduate or graduate school at Keio University under the ideal that advanced research and education should be inseparable. In FY2009, 40 students in the spring semester and 40 students in the fall semester participated in the programs and activities offered at TTCK.

Bio Camp

The Bio Camp is a program for students of the Shonan Fujisawa Campus (SFC) of Keio to spend two semesters (or one semester) at the TTCK and experience the basics of biotechnology. The program begins with an introduction to the handling of laboratory instruments because the students have no experience with experiments. Each student extracts Human DNA and analyzes the gene for alcohol-degrading enzymes, and diagnoses through genetic testing level of tolerance for alcohol is high or low. At the end, the students decode the genome sequences through state-of-the-art DNA sequencers.

Systems Biology Program

This Program is a rare graduate program in the world in the sense that students can earn credits using the abundant research resources of both the SFC (bioinformatics) and IAB (Systems Biology). At TTCK, a number of experiments and laboratory trainings are provided, such as "metabolome analysis" and "proteome analysis," using the most advanced DNA sequencers, bioreactors, and CE-MS equipment.

Events

Introduction to Bioscience for Tsuruoka Citizens

The introductory bioscience course for general public and taught by researchers of the IAB. There were 99 participants in FY2009.

Summer Bio College

This is a basic hands-on program in biotechnology aimed at high school students in the Keio's affiliated high schools. There were 16 participants in FY2009.



Bio College of Summer

Keio Summer Bio Camp

This is a basic hands-on program in biotechnology for any high school students from all over Japan. There were 13 participants in FY2009.

Spring Science Camp

This is a basic hands-on program in biotechnology for any high school students from all over Japan. (Sponsored by: Japan Science and Technology Agency) There were 16 participants in FY2009.



High-throughput and quantitative CE-MS methods that can measure thousands of charged intracellular metabolites. This is a powerful new device for metabolome research developed by IAB.

Other Related Facilities

Tsuruoka Metabolome Campus was founded in 2005 as a research facility by Tsuruoka City which aims at cluster formation of bioresearch and development with IAB as its cornerstone. In addition to IAB's Metabolome group, Human Metabolome Technologies Inc., RIKEN Japan, School of Medicine, Keio University, NISHIKAWA KEISOKU Co., Ltd., BioSigma S.A. (Chile), and Spiber Inc. are on the campus conducting research.



Tsuruoka Metabolome Campus

Commercialization

A Bio-Venture Company from Keio University Human Metabolome Technologies, Inc. (HMT)

Human Metabolome Technologies, Inc. (HMT) is a venture company established in July 2003 by Professor Masaru Tomita, Professor Tomoyoshi Soga, and others from the IAB. HMT is based on the IAB's measurement and analysis technology for metabolomes (all intracellular metabolites). HMT conducts R&D aimed at industrial applications in medical care, drug discovery and food fermentation, etc.

In October 2003, HMT became the first company to attract investment from the Entrepreneur Assistant Fund of Keio University. HMT has realized cost reductions for custom metabolomes analysis by automating the analytical process. In addition to broadening the custom base for pharmaceuticals, chemistry, and the food industry, HMT is advancing the exploratory research into disease biomarkers in the areas of mental and lifestyle diseases by cooperative research in association with public institutions and other entities.

<http://humanmetabolome.com/>

Spiber, Inc.

A bio-venture company from Keio University which was founded by IAB graduate students, etc. in 2007 based on the spider silk artificial synthesis/production technology which was carried forward at this laboratory. Toward the world's first practical application of spider silk which is said to be a dream fiber material, the company was established with the mission of moving away from oil in the textile industry. The company is sponsored by Keio University.

At the 9th Japan Biotechnology Business Technology Competition, the company won the first highest award as students, and was also selected for top 20 Most Promising University-based Startups (announced by the Ministry of Economy, Trade and Industry). The company's strength is a platform for consistent material development from design to synthesis and fiber production technologies for spider silk-based biomaterials that make optimum use of bioinformatics. Based on its strength, the company is progressing with R&D with the aim of creating new materials and finding practical application in collaboration with major manufacturers.

<http://www.spiber.jp/>

Major Awards

November 2001

"Yamagata Keizai Doyukai (Association of Corporate Executives) Grand Prize, Yamagata Landscape Design Award"

June 2003

"Nihon Kogyo Shimbunsha Award in the 17th Dokusousei wo Kirihiroku Sentan Gijutu Taishou (Leading-edge Technology for Originality and Creativity)"

November 2003

"IBM Shared University Research Award"

June 2004

"Industry-Academia-Government Collaborative Distinguished Service Commendation (Award of the Minister of State for Science and Technology Policy)"

April 2005

"First Prize in the 5th Japan Biotechnology Business Competition"

April 2007

"Prize for Science and Technology in the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science, and Technology"

April 2009

"19th Nikkei BP Technology Award, Category of Medicine & Biotechnology"

July 2009

"2009 The Prize of the Chairman of Hatsumeji Kyokai (Japan Institute of Invention and Innovation)"

September 2009

"Award for Distinguished Service to the Metabolomics Society"

Introduction to Publicly Funded Research

In recent years, Keio University has had an excellent record of accomplishment in obtaining the following prominent competitive research grants. Both the educational research activities and the research results supported by these grants have been highly regarded in Japan and abroad.

Global COE Program

Out of its original 12 programs that were established under the "21st Century Center of Excellence (COE) project," a government-sponsored initiative to develop advanced research centers at Japanese universities, Keio University is currently operating seven Global COE programs. These programs set up individual research and education "hubs" in Keio University's Advanced Research Centers, that are flexible and maneuverable interdisciplinary organizations transcending the boundaries set by faculties and graduate courses. In each of these programs, dovetailing with existing education and research platforms, internationally distinguished research and education centers are created through the strengthening and enhancement of the education and research functions of Keio's graduate school, and processes to foster the development of young researchers have been established. By doing so, Keio is moving forward to create a university that meets the highest global standards.

Centers Selected in the Global COE Program

Page	Adopted Year	Field	Home Campus *	Program Title	Program Leader
P.29	2007	Life sciences	Shinanomachi	Global COE for Human Metabolomic Systems Biology	Makoto Suematsu, Professor, Graduate School of Medicine
P.29	2007	Information sciences, electrical and electronic sciences	Yagami	High-Level Global Cooperation for Leading-Edge Platform on Access Spaces (GCOE)	Kouhei Ohnishi, Professor, School of Science and Technology
P.30	2007	Humanities	Mita	Center for Advanced Research on Logic and Sensitivity	Shigeru Watanabe, Professor, Graduate School of Human Relations
P.30	2008	Medical sciences	Shinanomachi	Education and Research Center for Stem Cell Medicine	Hideyuki Okano, Professor, Graduate School of Medicine
P.31	2008	Mechanical, civil engineering, architectural and other fields of engineering	Yagami, Hiyoshi	Center for Education and Research of Symbiotic, Safe and Secure System Design	Takashi Maeno, Professor, Graduate School of System Design and Management
P.31	2008	Social sciences	Mita	Raising Market Quality - Integrated Design of Market Infrastructure	Naoyuki Yoshino, Professor, Graduate School of Economics
P.32	2008	Social sciences	Mita	Designing Governance for Civil Societies	Yoshihisa Hagiwara, Professor, Graduate School of Law

*Home Campus: Affiliate Campus of research representative

Special Coordination Fund for the Promotion of Science and Technology

The Special Coordination Fund for the Promotion of Science and Technology refers to expenses for comprehensively accelerating and adjusting important matters necessary for the promotion of science and technology in accordance with the plans and objectives of the Council for Science and Technology Policy. In line with the three policies shown below, the funds provided are used for policy-directed research projects that have a high degree of effectiveness. The funds support projects such as the following: projects that relate to government ministry policy initiatives; boundary projects that cannot be covered by the policies of each ministry; projects from which the benefits of synergy can be expected due to inter-agency cooperation; and projects that require a flexible approach.

- (1) Reform of scientific and technical systems to create and implement superior results,
- (2) Strategic response to emerging, promising research areas, and
- (3) Promotion of the internationalization of scientific and technical activities.

Concerning the specific methods of using the funds, the Council for Science and Technology Policy creates budget request policies and basic policies for allocating the funds, MEXT uses the funds for such activities as public offering, review, fund allocation, interim/after-the-fact assessments, etc. in line with these policies. In 2009, Keio University received subsidies for five themes as work-in-progress research.

Research in Progress from 2009

Affiliation	Position	Project Leader	Program	Research Theme
Faculty of Science and Technology, Faculty of Environment and Information Studies, and Graduate School of Media and Governance	Professor	Hironao Kawashima	Creating of Innovation Centers for Advanced Interdisciplinary Research	Creating a Co-mobility Society*
Faculty of Environment and Information Studies	Professor	Masataka Watanabe	Promotion of International Joint Research	Development of Environmental Resources Management Technology for Sustainable Use of Biomass
School of Medicine	Professor	Toshio Suda	Improvement of Research Environment for Young Researchers	Career Development Program for Young Investigators in "Cell and Metabolism Research" (Keio Kanrinmaru Project)*
School of Medicine	Professor	Koichi Matsuo	Encouraging Innovative and Creative Young Researchers	Medical Biologist Support (MEBIO) Training Program*
Faculty of Nursing and Medical Care	Professor	Kikuko Ota	Developing Models for Supporting Woman Researchers	Project for Developing Social Capital and a Good Working Environment for Women Researchers*

*The University President has final responsibility for these research projects.

JST Basic Research Programs

JST Basic Research Programs are handled by the Japan Science and Technology Agency (JST). In sponsoring these programs, the Agency takes a top-down approach in promoting target-oriented basic research directed toward the achievement of national government objectives. The purpose of these programs is to create the seeds of new technologies for responding to social and industrial needs and generating future scientific and technical innovation. The key persons in these programs are researchers from universities, public agencies, and private corporations, and they carry out research through formation of flexible, mobile cross-organizational research project teams that disband upon completion of the project. This system of directed research programs contrasts with the characteristics of funding for bottom-up scientific research that places a high value on the proposals of individual researchers. These two systems, like the two wheels of a cart, are designed to play a major role in promoting Japan's science and technology from different aspects. JST establishes specific areas of research, based on the strategic objectives of MEXT. Under the leadership of its research directors, JST brings together researchers from industry, government and academia, and sets up the most appropriate research organization.

Two major types of research are promoted at JST: open research and JST-supervised research. In open research, a JST-designated research director calls for submission of research proposals in a research area specified by the JST, selects proposals, and promotes the work of the selected researchers. Open research are categorized into two types: team research, called CREST (Core Research for Evolutional Science and Technology), and individual research, for path-breaking work to be done by individual scientists.

In supervised research called ERATO (Exploratory Research for Advanced Technology), the research targets are based on the unique perspectives of JST's research directors. Based on these targets, researchers are brought together to engage in the projects. The ERATO research also includes joint research with overseas research organizations.

CREST Research Representatives

Affiliation	Position	Name	Research Theme
Graduate School of Media Design	Professor	Masahiko Inakage	The Research of Ubiquitous Content Production Authoring System
Graduate School of Media Design	Professor in special research	Susumu Tachi	Construction and Utilization of Human-harmonized "Tangible" Information Environment
Faculty of Science and Technology	Professor	Tadahiro Kuroda	Generation of High-performance, Ultra-low-power, Short-range Wireless Mobile Information System
Faculty of Science and Technology	Professor	Hideo Saito	Technology to Draw Three-Dimensional Contents in Free Space
Faculty of Science and Technology	Associate Professor	Nobuyuki Yamasaki	Research and Development of Dependable SoC and Dependable OS
Faculty of Science and Technology	Associate Professor	Kenji Kono	Producing Highly Attack-resistant Secure Operating Systems
School of Medicine	Professor	Michisuke Yuzaki	Role of C1q Family Signaling in Regulation of Synapse Formation in the Mature Brain
School of Medicine	Professor	Toshio Suda	Metabolism in Hematopoietic Stem Cells
School of Medicine	Professor	Hideyuki Saya	Analysis of Abnormal Regulation of Cell Differentiation and Drug Development Research by Using Induced Cancer Stem Cells
School of Medicine	Professor	Akihiko Yoshimura	Reprogramming of Immune System by Modulation of Intracellular Signal Transduction
School of Medicine	Associate Professor	Mikiko C. Siomi	Regulation of Gene Expression Mediated by RNA Silencing
Faculty of Environment and Information Studies	Professor	Masaru Tomita	Development of Modeling/Simulation Environment for Systems Biology
Faculty of Environment and Information Studies	Professor	Hideyuki Tokuda	A Dependable Operating System for Micro Ubiquitous Nodes

PRESTO Researchers

Affiliation	Position	Name	Research Theme
Faculty of Science and Technology	Assistant Professor	Akinobu Yamaguchi	Study in Novel Electromagnetic Properties of Modulated and/or Periodic Magnetic Structure Composed of Nanoscale Magnets
School of Medicine	Assistant Professor	Motoaki Sano	Metabolomic Analysis of Heart Failure and Cardiac Senescence
School of Medicine	Instructor	Go Nagamatsu	Establishment of Novel Reprogramming Methods Based on Germ Cell Specificity
School of Medicine	Associate Professor	Takeshi Miyamoto	Regulation of Bone Metabolism through Osteoclast Cell-cell Fusion
School of Medicine	Assistant Professor	Takeshi Kawauchi	Elucidation of Roles of Inter cellular Functional Domain in Formation of the Cerebral Cortex
School of Medicine	Research Associate	Kyoko Shirakabe	Physiological Roles and Regulatory Mechanism of Ectodomain in Shedding in Innate Immune Response
Faculty of Environment and Information Studies	Associate Professor	Yasuto Nakanishi	A Design and Development Support System for Spatial Information Systems
Faculty of Environment and Information Studies	Assistant Professor	Yasuaki Takehi	Creation of Real-World Oriented Interactive Media for Artistic Expression
Graduate School of Media and Governance	Associate Professor	Yasushi Ishihama	Development of Ultramicro-electrospray Ionization Approaches for -Omics Research

SORST Researchers

Affiliation	Position	Name	Research Theme
School of Medicine	Professor	Hideyuki Okano	Nerve Regeneration Strategy Based on Endogenous Neural Stem Cell Activation
Faculty of Science and Technology	Professor	Yasuhiro Koike	Photonics Polymers for Fiber to the Display
Faculty of Pharmacy	Professor	Takeshi Sugai	Synthesis and Utilization of Heterochiral Synthons based on Biocatalytic Transformations

*JST: From the Basic Research Programs website <http://www.jst.go.jp/kisoken/> *The list above shows research themes continuing since FY2009.

*SORST refers to a project that has completed its initial period of examination under the Basic Research Programs and that is continuing because it is regarded as having great potential for future benefits and expansion.

Grants-in-Aid for Scientific Research (*Kakenhi*)

Kakenhi or grants-in-aid for Scientific Research of MEXT, are subsidies for research in all areas of inquiry, from the humanities and social sciences to the natural sciences. Grant money is given to various kinds of academic research, from basic to applied. From research based on the free, inventive thinking of researchers, the grants aim to generate results that will bring about social breakthroughs. Over the years, many research projects conducted under these grants-in-aid, have achieved results of the highest order and have received worldwide recognition, from Nobel Prizes to other awards for scientific endeavor given in Japan and overseas. The program makes use of approximately six thousand judges to carry out peer review of the proposals submitted. Projects chosen every year are of all kinds, from those in the incubation stage to those at the cutting edge in their field. The *Kakenhi* program represents approximately 5% of the government's total expenses related to science and technology and 40% of the government's total budget for competitive research funds.

About 138,000 applications were submitted in FY2009. Among these, about 59,000 applications qualified for research funding, and the total amount (in direct expenses) was about 158,400 million yen. The table shows the number of projects for the top twenty institutions receiving grants (new and those continuing from the previous year) in FY2009 and the total amount distributed. The amount received by the top 10 institutions represents about 44% of the total amount distributed. Looking at the number of projects, in FY2009, Keio University ranked 10th overall (first among private institutions), an improvement on the rank in the preceding FY 2008.

A: Total amount distributed (research expenses) B: Total of the top 10 institutions C: Total of the top 20 institutions

* Source: Japan Society for the Promotion of Science, <http://www.jsps.go.jp/>

* The amount distributed includes direct and indirect expenses.

* The figures are rounded off to the nearest 100,000 yen.

* Data here is classified by the research institution with which the research representative is affiliated; it may not reflect the overall ranking by institution.

FY2009 *Kakenhi* Distributed by Institution

Rank	Institution	Number of Projects	Amount (Million yen)
1	University of Tokyo	3,090	24,493
2	Kyoto University	2,403	14,164
3	Osaka University	2,016	10,619
4	Tohoku University	1,969	10,411
5	Kyushu University	1,480	6,056
6	Hokkaido University	1,390	5,947
7	Nagoya University	1,331	6,333
8	University of Tsukuba	970	3,602
9	Hiroshima University	868	2,646
10	Keio University	749	2,941
11	Kobe University	735	2,714
12	Tokyo Institute of Technology	707	4,692
13	RIKEN Japan	665	3,949
14	Okayama University	636	1,946
15	Chiba University	621	2,200
16	Waseda University	620	2,155
17	Kanazawa University	563	1,629
18	Niigata University	478	1,349
19	Kumamoto University	463	1,525
20	Nagasaki University	434	1,141
A			197,000
B			87,211
B/A			44%
C			110,511
C/A			56%

Health Labour Sciences Research Grant

The public administration of health, labour and welfare is essential in dealing appropriately with the aging of the population, which is resulting from the decline in the birthrate, changes in the types and incidence of diseases, changes in the social environment, the diversification and sophistication of public needs, etc. Administrative measures need to be based on appropriate and proper scientific grounds. For this reason, it is necessary not only to conduct research at national research institutes, etc. under the jurisdiction of the Ministry of Health, Labour and Welfare, but also to create new knowledge through cooperation among various areas in industry, government and academia. Health Labour Sciences Research is the general term for MHLW research conducted for these purposes.

The Health Labour Sciences Research projects consist of 17 projects in four areas: administrative policy research, basic health sciences research, anti-disease/disorder research, and health/security comprehensive research. Taking into account the opinions of external experts, administrative requirements, etc., targeted research themes are established to resolve issues through research projects in public healthcare, welfare, life hygiene, workplace safety/hygiene, etc. On that basis, research themes and research groups are invited through public offering, and are decided through evaluation by the evaluation committee. At Keio University in FY2009, there were a total of 159 projects adopted, including grants-in-aid and contribution arrangements, accounting for a total of about 1.05 billion yen.

* Source: Ministry of Health, Labour and Welfare: <http://www.mhlw.go.jp/bunya/kenkyu/jijigou/index.html>

Center for Human Metabolomic Systems Biology

Program Leader: Makoto Suematsu (Professor, Graduate School of Medicine)
<http://www.gcoe-metabo.keio.ac.jp/>

This program is promoting "*in vivo* human metabolomic systems biology" in which the subjects of research in metabolomic systems biology are specialized into revealing regulatory mechanism for physiologic and pathologic conditions in humans. We aim to create a center for interdisciplinary educational research at the highest level in the world to nurture young scientists who create new life science research that represents the fusion of medical sciences, science and engineering, information sciences, pharmaceutical sciences and so forth. The main achievements in FY2009 were as follows:

Promotion of Exchange Projects with Overseas Collaborative Organizations

In relation to our objective to conduct all graduate school lectures in English, in which we have been engaged since FY2008, we held the Spring School with Karolinska Institute (hereinafter, "KI"). Four RAs, selected on basis of their English-language ability and achievements, participated in the School. The Spring School featured for the first time the credit transfer for the doctoral course, and these four RAs received a certificate from KI.

Promotion of Interdisciplinary Fusional Research Utilizing Humanized Animal Model Platform

Using various humanized animal models that have been developed since the start of the program in FY2007, we have been conducting research into metabolic systems in relation to the items shown below, and have been promoting projects through our inter-disciplinary research across four research clusters, namely, (1) analysis of bio-defense system metabolism, (2) development of *in vivo* models, (3) analysis of the metabolic network, and (4) analysis of cell differentiation/metabolism regulations.

1. Analysis of *in vivo* cancer metabolic pathways by using human tumor-bearing NQO mice.
2. Metabolic properties of organ-specific metabolic regulatory molecules (HIF, aldehyde dehydrogenase, various gas mediator receptors, etc.) were analyzed in knockout mice, and new regulatory mechanisms of related metabolic systems were elucidated.
3. Receptors of CO, a gas molecule which increases through ischemia and oxidative stress, were searched for by metabolomic analysis, and it was elucidated that cystathionine β -synthase is a receptor of CO in mammals.
4. Experiments were conducted for the analysis of the properties of sulfur amino acid metabolism / energy metabolism in a host-parasite a model of *Entamoeba histolytica*, and a ne

cysteine metabolic pathway was discovered.

5. Viral regions responsible for abnormal glucose metabolism and abnormal iron metabolism that are said to occur easily in humans through the action of the hepatitis C virus were searched for using the *in vitro virus* method. The relationship between hepatitis C and abnormal lipid metabolism was elucidated through an experiment involving HCV replicon proliferation.
6. A model that reproduces the human liver cell for an extended period in the mouse liver was created for the first time in the world.
7. A quantitative evaluation system to elucidate the anatomical relationship between abnormal energy metabolism and oxygen supply in low-oxygen pathological conditions was established by using a multi-functional microscope system that enables the real-time monitoring of energy metabolism and cellular behavior in the brain microcirculation of mice, marmoset monkeys and other animals.
8. Continued implementation of the developmental engineering research that contributes to the development of Down's syndrome animal models using marmoset monkeys.



Spring School held at Karolinska Institute (March 2009)

High-Level Global Cooperation for Leading-Edge Platform on Access Spaces

Program Leader: Kouhei Ohnishi (Professor, Graduate School of Science and Technology)
<http://www.gcoee.keio.ac.jp/>

This GCOE Program is creating an outstanding international research and education center with the aim of producing scientists and engineers who have rich humanity tendencies and the ability to take an active role on the international stage. On the research front, we are pursuing new human-centric science and technology to provide digital support that meets the needs of particular activities. We are making progress in coordinated research that integrates areas from photonic/electronic devices to network communication and haptics. Specifically, to provide advanced human support in access spaces, we are pursuing research that heightens the benefits of synergy in the following four fields: Basic engineering physics for innovative photonic/electronic device creation, environment-embedded device technology, real-world and real-time networks for multi-dimensional processing and communication, and perception and expression technology. Concerning human development, we are cultivating scientists and engineers who can assume an active role as leader on the international stage through advanced programs such as the double supervisor system (an educational system by multiple supervising professors, including instructors at overseas partner and collaborator sites) and a joint research promotional overseas dispatch system. As of FY2009, we have employed 74 COE research assistants (RAs) who are registered as doctoral students and 13 post-doctoral fellows (PDs) under the competitive scheme, and cultivated them through our activities.

Specific Achievements in FY2009

(1) Strengthening international collaboration

The number of international partner institutions increased by 13 to reach 52. In the fiscal year, advanced collaborative activities such as joint research were conducted with 29 institutions. Specifically, we held six workshops jointly with Xi'an Jiaotong University (China), the University of Sydney (Australia) and other overseas institutions. In addition, 12 RAs were sent to partner institutions, such as Technische Universität München, Queen's University and Ghent University in order to advance our joint research into haptics, nanotechnology, network technology and other fields. Furthermore, under the double supervisor system, five RAs obtained their degrees by receiving supervision from instructors at the University of London, Harvard University, and elsewhere.

(2) Presentation of information to and exchanges with society and industry

We invited researchers and engineers from various companies, and held three PhD forums in which RAs reported their research results, thereby enhancing exchanges with industry. We held several events in which young researchers presented the results of their endeavors. These

events included Keio Techno-Mall (December 2009), the PhD student paper contest and the GCOE symposium (both in March 2010).

(3) Research achievements

We are producing many solid research results, including 191 journal papers, 31 invited talks, and 306 presentations at international conferences.

The main results are as follows:

- Low-density quantum dots for quantum cryptographic communication was successfully created through joint research with ECL in France.
- 128-die NAND-flash memory stacking was achieved for the first time in the world by using wireless inter-chip communication utilizing inductive coupling.
- A press release was issued regarding the results of the research on the access system using an ultrafast PLZT optical switch, which was jointly developed through a start-up company in the United States.
- Research into bilateral control technology for haptic sense and media expression technology using mixed reality were conducted, and the access spaces using perception and expression media were increasingly sophisticated.

We intend to continue to intensively engage in our activities in the next fiscal year.



Panel discussion in English at the Winter Camp



Joint research with the Queen's University (in UK)

Centre for Advanced Research on Logic and Sensibility

Program Leader: Shigeru Watanabe (Professor, Graduate School of Human Relations)

<http://www.carls.keio.ac.jp/english/>

Under the Global COE Program, we are striving to fully understand the integration of logic and sensibility from the most basic biological level to the cultural level. Specifically, we are trying to clarify the following five points: (1) the biological bases for logic and sensibility; (2) genes and developmental changes in logic and sensibility; (3) relationship between cognition/language and logic/sensibility; (4) logic and sensibility in philosophy/aesthetics and their cultural constraints; and (5) logical expression of logic and sensibility. In addition, through research into these areas, we are cultivating humanities researchers with experimental techniques and experimental researchers with humanities-based intelligence.

Research Achievements this fiscal year

We achieved some important research results this fiscal year, too. One achievement was improvement of the time-resolution of functional magnetic resonance imaging (fMRI). We successfully achieved a time-resolution at the level of 100 msec through joint research with Professor Seiji Ogawa (advisor for this center). We pioneered a new area called pharmacological NIRS in collaboration with Boehringer Ingelheim Co., Ltd. This fiscal year, we established a method for testing cognitive safety in children by making optimum use of the non-invasiveness and low-restrictive features of NIRS. In other experiments by the NIRS, it was revealed that there were no differences in the brain response between the mother language and non-mother language in newborn infants, whereas a left-dominant brain response that is stronger to the mother language is exhibited by in children at the age of four months. And an experiment using TMS revealed that when part of the brain is suppressed, priority is given to the meaning of the conclusion of logical inference, and when other part is suppressed, priority is given to the inference *per se*. In the research on aesthetics, research results on shadows in painting were compiled and published as a paper. From an animal experiment, it was reported that the pigeon can differentiate between good and bad paintings drawn by children. This research was covered by many media outlets overseas.

Nurturing of Human Resources

Nurturing of young scientists is an important issue for the center. At the center, we have engaged the services of 10 research instructors and 17 researchers, with the new addition of one assistant professor and eleven researchers (including foreign researchers) through

international public recruitment. In addition, nine people have completed a project course in which participation in research at the center counts as a credit for graduate students.

Internationalization

International collaboration is important along with the nurturing of human resources. In this fiscal year, we signed a new collaborative agreement with McGill University to bring the number of overseas collaborative institutions to eight. We have been periodically holding joint seminars for young researchers with University of Cambridge, the University of South Florida and Gachon University of Medicine and Science. Program leaders conducted intensive university courses overseas at Bielefeld University and Ecole Normale Supérieure. And the project leader was invited by the Chinese Academy of Sciences to give a lecture.

Domestic Collaboration

We cannot underestimate our domestic networks. We formed the "Global COE Network of Mind Research" in collaboration with five centers of Global COE for the mind at other universities, and held a joint symposium at the annual meeting of the Japanese Psychological Association. This network aims at the establishment of an all-Japan system for the world's most advanced mind researches.

Public Relations Activities

During this fiscal year, we published four newsletters, and improved the content on our website. We were also able to publish the third edition of our research results. In addition, we held open symposiums for the general public and, in particular, enjoyed the participation of large audiences for topics related to English education.

Interim Evaluation

We had an interim evaluation this fiscal year. We were able to receive a high evaluation. We are grateful to people who have supported the center.

Education and Research Center for Stem Cell Medicine

Program Leader: Hideyuki Okano (Professor, Graduate School of Medicine)

<http://www.gcoe-stemcell.keio.ac.jp/>

Since FY2008, the continuous aim of our GCOE Program, "The Education and Research Center for Stem Cell Medicine," has been to establish a new academic domain that should be called "stem cell medicine." On the model of the nature of stem cells, this group has formed the center for education and research characterized by a continuous education system through the reorganization of the Graduate School of Medicine (self-renewal capacity), the nurturing of many different types of human resources who have the ability for international leadership (multipotency), and the exchange of human resources to establish an international collaborative system (migration capacity). We are progressing the project with the aim of producing many young scientists who, at the end of the program, will become international leaders in stem cell research. This program consists of the following five subgroups consisting of several persons in charge of promoting the project:

1. Regulation of somatic stem cell and *in vivo* experimental medicine;
2. Inflammation/immunological control and tissue regeneration;
3. Development of new therapeutic methods for cancers targeting cancer stem cells and EMT (epithelial mesenchymal transition);
4. Development of regenerative medicine for intractable diseases; and
5. Practical implementation of feasible regenerative medicine.

The subgroups are engaged in their own pioneering research in active mutual collaboration. FY2009, the second year of the program, was actually a year that yielded a large number of research results. Many of academic papers released from this group were published in internationally renowned journals, such as *Nature*, *Nature Medicine*, *Nature Neuroscience*, *J. Clin. Invest.*, and *J. Exp. Med.* Our basic medical research include the successfully genetically-modified marmoset monkey that may contribute to the creation of primate models of various diseases, the discovery of a natural helper cell playing an important role at the time of allergy and parasite infection, the report of an evaluation of the diversity in the safety in iPS cell strain that is said to hold the key to stem cell medicine, and the elucidation of the system in which Langerhans cells, which are involved in an immune response of the skin, gain external antigens. In addition, researches toward clinical application may include the confirmation that the transplantation of human ES/iPS cells-derived neuronal progenitors can enhance the recovery of the function from spinal cord damage at the thoracic level, and the discovery of a method of concentrating myocardial cells generated from ES cells or iPS cells at a high level of purity. And as an actual clinical application, we successfully transplanted a cultured corneal epithelium sheet

into patients with corneal damage.

With regard to education, we have held the GCOE Stem-cell Seminar 17 times and the international symposium twice as was originally scheduled, where we invited internationally acclaimed scientists from overseas. The opportunities to witness the trends in international research while on the campus of Keio University School of Medicine were greatly valued by the participants as productive initiatives. In addition, we have continuously established collaborative interactions with the University of California, Irvine, the University of Texas MD Anderson Cancer Center, and the Lund University Stem Cell Center, who are the leaders in regenerative medicine research and cancer stem cell research. We believe that there are almost no other institutions that have such rewarding environments for education and research among research programs specializing in stem cell medicine research in the world. After the third year, we will strive to maintain and improve on our efforts to be the world leader both in terms of research and education.

Main Events Held in FY2009

Summer School Keio-Lund 2009 (August 3-4, 2009)

Education and Research Center for Stem-Cell Medicine (February 25-26, 2010)



Young scientists giving a poster presentation at the symposium (Feb.25-26, 2010)



Summer School KEIO-LUND 2009 (Aug.3-4, 2009)

Center for Education and Research of Symbiotic, Safe and Secure System Design

Program Leader: Takashi Maeno (Professor, Graduate School of System Design and Management)

<http://www.gcoe-s4design.keio.ac.jp/en/index.html>

This center was established for the purpose of establishing the methodology of designing systems that explicitly take into consideration social values, such as symbiosis and safety, conducting specific research into symbiotic and safety system design, and nurturing the human resources who understand them. The center has concluded the second year since it was established. In FY2009, we placed importance on establishing a platform for the methodology of symbiotic and safety system design and the methodology of education, as well as advancing specific research into system design, in close cooperation with the parent organizations, namely, the Graduate School of Science and Technology and the Graduate School of System Design and Management.

First, our activities concerning the methodology of symbiotic and safety system design and the methodology of education yielded results in educational engineering research related to the creation of the Graduate School of System Design Management, which was started simultaneously with this center and which has many concepts that overlap those at this center. These results are among those of the 21st century COE program. The research is the result of the practical cooperation and collaboration of members at the center, including members at international collaborative facilities (MIT, Stanford University). It is an innovative result in the area of educational engineering, which demonstrates the innovative qualities of the center *per se*. One of its core courses is the design project, ALPS (Active Learning Project Sequence).

The specific research into system design yielded many international research results that are

mutually related as a system. First, in the area of energy and resources, we obtained results from research into cluster-type energy management system, research into fuel reforming devices that supply hydrogen to fuel batteries, the core of distributed energy systems, research into modeling and crystalline growth of clathrate hydrate system, research into life architecture, research into the methods of assessing the influences of the effects on health of indoor environmental pollution on the life cycle, research into integrated safety management systems, etc. In the area of mobility, we obtained results from research into control technology for active suspension, taking into consideration the safety and ride quality, research into intellectual flight control technology taking fault-tolerance into consideration, research into technologies for engine development support/craft design support for hypersonic aircraft, research into safe intellectual control technology for mobile robots, etc. In the area of human-mechanical systems, we obtained results from research into the touch perception of humans, research into the cognition of intentions and gestures of robots and humans, research into the modeling of sensor networks, research into immersive driving simulators, research into built-in real-time systems of robots, research into human safety, etc.

In addition, we presented the above results at many symposiums and other events indicated below, engaged in active discussions with experts inside and outside Japan, and also achieved international recognition.



Design Project comprising international collaborative lectures: ALPS (Active Learning Project Sequence)



Lecture and poster sessions at the international symposium on symbiotic and safety system design (Feb. 26, 2010)



International symposium on clathrate hydrate (Mar. 15, 2010)

Raising Market Quality – Integrated Design of "Market Infrastructure"

Program Leader: Naoyuki Yoshino (Professor, Graduate School of Economics)

<http://www.coe-econbus.keio.ac.jp/>

Raising Market Quality

This program sets four core themes: (1) complexity system analysis of the dynamics of market quality, (2) creation and demonstration of panel data to verify the dynamics of the Japanese labor market, (3) verification of the theory of market quality from various viewpoints, such as applied economics, history, and enterprise system, and (4) presentation and actual introduction of a new policy ideas that replace market fundamentalism, called raising market quality.

Global COE, Education and Research

We are aiming to establish an attractive education system, to advance research at this center for the future, and to nurture many young economists who will become the leaders in raising market quality. Through these educational research activities, the objective of this center is to contribute to the establishment of the world economy with high-quality markets and to contribute to economic recovery after the financial crisis. We are drawing up the center's own unique plans for (1) managing the center's own unique education curricula, (2) arranging the research environments for many graduate students and young scholars, (3) providing financial support, (4) providing opportunities for the people in charge of education at the university to learn the necessary skills by giving reports at seminars, domestic academic conferences, international academic conferences, etc., and (5) expanding the opportunities for researchers to obtain employment and further their careers by approaching government agencies and companies. To create an open university, we reformed the system for graduate education, and we introduced a system for supporting overseas students and a scholarship system. In our research, we have continued with existing plans for activities such as domestic academic conferences and symposiums, and have also sponsored international conferences and held sessions in overseas academic conferences, in cooperation with the members of Kyoto University and with the involvement of graduate students.

Panel Data Analysis and Economic Policies

The "Joint Research Center for Panel Studies" was certified as a center for joint use/joint research by MEXT in FY2008, centered around the Panel Data Research Center at Keio University. The center at Keio University was established with funds for the formation of a research center for the 21st century COE program, Development of a Theory of Market Quality and an Empirical Analysis Using Panel Data. Researchers are progressing with the design/construction and investigative research for panel data in collaboration with this center. The

concept of market-based public-works projects advocated by this center has been having a great impact on international organizations and economic policies in many countries.

Theoretical Research

In theoretical research, we established the interface between theory and demonstration, focused on the complex system analysis of the dynamics of market quality, and obtained basic research results concerning the elucidation of the complex system dynamics between the industrial revolution and market quality. The biggest goal of collaboration with the Institute of Economic Research, Kyoto University, is to provide an attractive educational environment by making good use of its international network. Another major emphasis in the initial plan is to elucidate the dynamics of market quality with complex system models in collaboration with the members of Kyoto University, who are leading complex system scientists. The collaboration has yielded a breakthrough in the complex system analysis of market quality and disseminated the importance of the concept of market quality among complex system scientists, thereby creating a path to future joint research.

Dynamism of the Market

At the time of applying for the GCOE program, we pointed out the possibility of an economic crisis occurring due to a reduction in the quality of corporate financial markets. We also pointed out the efficacy of complex analysis in the dynamics of market quality. This prediction became a reality when the financial crisis occurred in September 2008. It was also an opportunity for us to become more acutely aware of the urgent need for complex system analysis of market quality in our research into the economic crisis.



Global COE Program follow-up session

Center of Governance for Civil Society (Designing Governance for Civil Society)

Program Leader: Yoshihisa Hagiwara (Professor, Graduate School of Law)

<http://www.cgcs.keio.ac.jp/>

The Center of Governance for Civil Society conducts world-class education and research on governance for civil society, not only in Japan, but in collaboration with partners in the United States, Asia, and other countries. The CGCS educates and trains young researchers to enable them to become active internationally. To achieve this objective, the CGCS conducted the following research activities in FY2009.

Attitude Survey on Governance for Civil Society

To analyze the factors that form and transform attitudes toward governance in civil society, the center conducted a panel attitude survey of members of the Japanese public. Also, to analyze the attitudes of people in local governments where local referendums have been held, the center conducted a mail-in survey. In addition, the center collected the election pledges of candidates in the Lower House general election, Upper House regular election, prefectural assembly election, and assembly elections of government ordinance-designated cities. We analyzed and coded the results. The center also conducted attitude surveys for all prefectural assembly members and assembly members of government ordinance-designated cities, and stored the surveys in the data archive.

The center created a new system that can semi-automatically collect and search for the minutes of meetings of the Lower House, Upper house, and prefectural assemblies.

International Educational Research Activities

The center conducted joint research on governance in civil society with overseas collaborative institutions (the University of California, Berkeley in the United States, Inha University and Yonsei University in South Korea). At the same time, the center expanded partnerships starting collaboration with Seoul National University and Dongseo University in South Korea, and National Chengchi University in Taiwan. Specifically, we sent researchers on internships from this center, and accepted researchers from collaborative institutions to promote international academic exchanges, and also held international conferences. We also sponsored the International Symposium on Designing Governance in a Civil Society in November 2009 and March 2010 as an opportunity for young scientists to give presentations.

To establish an international research network, this center has been working to promote the

international joint research project, East Asian Perspectives on Political Legitimacy. This international research project mainly focuses on political theories in East Asia and promotes discussions into the question, "what is the nature of good politics?" This topic is analyzed in the light of globalization, from the viewpoint of various intellectual traditions. Researchers in North America and various regions in East Asia are planning a total of six workshops from 2010 to 2012. This center is the contact for the project in Japan, and is preparing to sponsor a workshop titled "Citizenship and Governance" in 2011. The center will also set up postgraduate student sessions at each workshop, to promote active discussions and exchanges among young researchers.

Publications of Research Results

To become a hub of international discussions concerning governance for civil society, this year the center published two issues of the *Journal of Political Science and Sociology*, a refereed journal with articles written mainly in English. Also, English collections compiling the research results of this center, such as Yoshihisa Hagiwara (ed.), *Democracy and Governance for Civil Society* and Yuko Kasuya and Nathan Gilbert Quimpo (eds.), *The Politics of Change in the Philippines*, were published in FY2009.



A scene of the International Joint Symposium, "Designing Governance for Civil Society"

Special Coordination Fund for the Promotion of Science and Technology [Developing Models for Supporting Woman Researchers] FY2008

Project for Developing Social Capital and a Good Working Environment for Women Researchers

Project Leader: Kikuko Ota

(Director of Work-Life Balance Research Center and Professor of Faculty of Nursing and Medical Care)

<http://www.wlb.keio.ac.jp/>

*The university president has overall authority over this project.

The "Project for Developing Social Capital and a Good Working Environment for Women Researchers" refers to a series of support measures that aim at, conceptualize, plan, and implement a campus environment infrastructure that enables women researchers to have a way to reconcile research with life events such as childbirth and child-rearing, while continuing their careers as researchers. In this Project, we are striving to create a new movement through mutual cooperation among the university, graduates, and the community by utilizing and expanding the "Social Capital," a network of people that has been developed centering on Keio University. Centered on the Work-Life Balance Research Center, the Project has implemented support measures in the following four categories.

1. Development of Promotion Organization

The center is supporting the establishment of a university-wide system for gender equality in collaboration with the Office for Promotion of Gender Equality, established in March 2009. With regard to facilities, we have asked for baby chairs and diaper-changing tables to be provided in the handicapped stall at each campus. These facilities were set up in at least two locations at each of the campuses in FY2009.

Concerning the provision of a communications environment, we are continuously organizing the Web conference system so that women researchers can easily engage in communication or participate in conferences. We are also operating a community website at which information can be exchanged on the Internet.

2. Childcare Support

To provide a good balance for researchers during their child-rearing period, the center is operating a temporary childcare support project as a trial by cultivating and making use of childcare supporters consisting of students. We renovated part of the center office at the Shonan Fujisawa Campus to create a space for childcare. Since April 2010, the center has started a project providing care for children of personnel at the school. Students who have completed the training course (consisting of lectures and practical childcare work) are engaged in this service under the supervision of a nursery teacher.

Since FY2008, we have been continuously involved in the Research Support Program to employ research support personnel and non-institutional/visiting Childcare Support for Sick Children, leading to achievements from research into the people receiving support.

3. Empowerment Support

To understand the needs that differ among campuses and specialty areas, we are holding events for exchanges at each campus, and are supporting information exchanges among researchers. And we are striving to cultivate the next generation of people providing support through the presentation of interviews with women researchers as role models on the website, and lecture meetings at affiliated schools, and annual symposiums.

4. Promotion of Investigation and Research

We are continuously surveying work-life balance and promoting gender equality. In FY2009, we conducted a survey at each campus to segment the needs for and the actual circumstances surrounding support in researchers based on the results of the survey conducted in FY2008. The results of the survey are available on the website and elsewhere.



A scene of a panel discussion at the symposium, "Striving for gender equality at Keio University" (Dec. 12, 2009)

Career Development Program for Young Investigators in "Cell and Metabolism Research" (Keio-Kanrinmaru Project)

Project Leader: Toshio Suda (Professor, School of Medicine)
<http://www.careerpath-prj.keio.ac.jp/kanrinmaru/english/>

*The university president has overall authority over this project.



This project is funded by MEXT. Its aim is to introduce a tenure track program into Keio University by fostering the next generation of leaders in the basic research of cells and metabolism. A tenure track program refers to a system in which a young researcher gains experience as an independent researcher during fixed-term employment and achieves a more stable career in research through a rigorous screening. The project aims to establish a system to produce superior independent researchers, making a major contribution to the world, by providing various kinds of support to young researchers selected through open international recruitment, thereby leading to independent, tenured positions both in name and reality. Three associate professors (non-tenured) and ten assistant professors (non-tenured), who were employed in the first fiscal year of the project, have received support that includes research space and labor costs for research support personnel, in addition to start-up funds and research expenses for each fiscal year. These researchers have been working hard at their research activities while receiving support in the form of labor and facilities from advisor teachers and related existing laboratories.

The university president has overall authority over this project, which is managed by a tenure track steering committee as a university-wide organization covering all schools, comprising teaching staff from related faculties situated in the KARC Career Development Center.

Report on Activities in FY2009

Keio-Kanrinmaru Project Kick-Off Meeting (April)

Tenure track researchers gathered at the meeting, and presented the case for their own research themes, methods, and target results to people inside and outside the university. Yoshiko Takahashi, Professor, Graduate School of Biological Sciences, Nara Institute of Science and Technology, was invited as an external advisor, and everybody present engaged in worthwhile discussions.

Two international symposiums were held

- August: "Summer School Keio-Lund 2009"
(Co-sponsored with the GCOE program, "Education and Research Center for Stem Cell Medicine")
- October: "Keio-Kanrinmaru Project Autumn Symposium 2009"
(Co-sponsored with the JSPS Core-to-Core Program, "Stem Cells and Cancer Stem Cells")

At the symposiums, tenure track researchers gave presentations relating to their research as part of an interim evaluation. A lot of advice was offered from people invited as external evaluation committee members. These people included Professor Olle Lindvall and Professor Stefan Karlsson at the Stem Cell Center, Lund University, Sweden. The academic standard of this project was very highly regarded.

One tenure track researcher gained a tenure post outside the university (November)

Itsuki Ajioka, Assistant Professor, became an independent associate professor at the Center for Brain Integration Research, Tokyo Medical and Dental University, becoming the first tenure researcher from the Kanrinmaru project.

This post is a relatively new type of tenure post in the form of a "rolling" tenure, where the personnel are evaluated at intervals of several years. From this achievement, the formal Ajioka Laboratory was created.

One new tenure track researcher (assistant professor) was employed

In FY2009, the second international recruitment was conducted, and Ms. Kyoko Shirakabe was selected after a rigorous screening. She is the first female researcher from the Kanrinmaru project. Under the theme, "Proteomic Approach to the Physiological Roles and Regulatory Mechanisms of Shedding," she started her research activities in the Shinanomachi Campus in May 2010. This project provided her with start-up funds.



Members of the Keio-Kanrinmaru Project



Kyoko Shirakabe,
Research Associate

Medical Biologist Support (MEBIOS) Training Program

Project Leader: Koichi Matsuo (Professor, School of Medicine)
<http://www.keio-mebios.com/index.html>

*The university president has overall authority over this project.

MEBIOS (Medical Biologist Support)

This Program aims to cultivate young PhD students imbued with a high spirit of independence who are able to be active in society beyond their specialty areas, while having a high level of knowledge related to industrial techniques in the areas of science and engineering, information sciences, pharmaceutical sciences, and so forth centering on medical sciences.

To postdoctoral and Ph.D. students who have qualified for selection within the last five years after completing their degree, we have provided internships of at least three months by linking up and collaborating with businesses and research organizations both in Japan and overseas. We have also provided professional training courses, including open seminars.

At this Program, mentors who have experience as corporate executives are designing flexible and detailed programs that are suited to individual researchers taking part in the Program. The Program to date has accumulated various kinds of experience in helping young researchers to make career path plans, thereby fulfilling the system as one of the university's initiatives.

Report on Activities in FY2009

• Improvements made to the system for operating the MEBIOS Office

The preparation of documents related to the contract and the selection criteria in the screening examination (assessment sheet for the screening examination); preparation of the procedure for the MEBIOS Program.

• Selected MEBIOS candidates and MEBIOS members

PhD students that pass selection (selected MEBIOS candidates) are hired by the university for up to one year, and are able to participate in a program where they gain practical experience. Even without receiving a screening examination, they can be registered as MEBIOS members and can participate in career consultations and open seminars. This fiscal year, eighteen individuals are taking part in the Program, and the number of registered members has increased to double the number it was last year.

• MEBIOS corporate members

To expand the number of internship placements, we have newly entered into cooperative contracts with companies that are engaged in food, machinery, shipbuilding, automobiles, and an international patent office in addition to the existing partnership with pharmaceutical and biotech companies. A growing number of member businesses and cooperating businesses support the aim of this Program, and we are also continuously establishing links with new businesses to respond to the demands of researchers taking part in the Program.

• Practical program

Internships: Internships for three months to one year have been provided in places where R&D is conducted in businesses and other organizations in Japan and overseas, as well as places of joint studies at the Shinanomachi Research Park, Keio University. This fiscal year, internships were provided in a general pharmaceutical company, a biotech company, a 3D image analysis company, an international patent office, two general home electronics companies, a CRO company and elsewhere. Seven individuals were employed at the companies, with one individual being employed by an internship company.

Professional coaching: Two new initiatives were held as open seminars this fiscal year: "Gakumon no Susume" in MEBIOS-style, where participants could listen to the life experiences of people who have been active in various areas, and the MOT seminar, Introduction to Innovation Management. And individual training courses on communications, decision-making, business English, and business Japanese were also conducted.

Mentoring system: Mentors with experience as corporate executives provide regular individual consultations and suchlike as good advisers for young researchers. They also provide individual guidance in establishing a career path.

• MEBIOS symposium; meetings to report the results

Under the theme of exploring how to achieve a society in which people holding PhDs are able to realize extensive professional activities without difficulty, the underlying target for this Program, discussions were held based on the respective standpoints of businesses, the university, and the people holding PhDs. A symposium to consider the current situations comparatively in relation to overseas (North America) was also held in November.

In February, a meeting to report the results was held, where presentations and discussions were given centering on the experience of internships of individuals taking part in the Program. Some companies cooperating in the internship attended the meeting. Lively discussions were held and valuable exchanges were made with the participating companies.



MOT Seminar (Oct.2009)

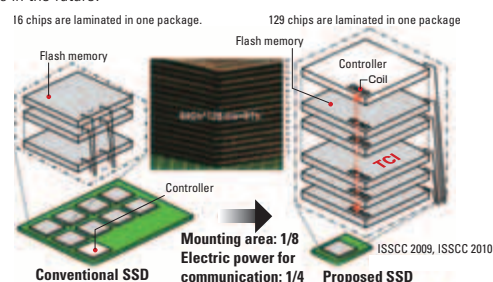
Creation of High-Performance, Ultra-Low-Power, Short-Range Wireless Mobile Information Systems

Representative Researcher: Tadahiro Kuroda (Professor, Faculty of Science and Technology)
<http://www.kuroda.elec.keio.ac.jp/>

Advances in computers have been supported by the advances in integrated circuits. Performance and reliability have been substantially enhanced, and costs have also been reduced by many digits. Things that once existed in computer rooms are now used in personal computers and mobile phones that we use every day. Downsizing has continued, wearable computers costing several thousand yen have appeared, and before long, computers measuring about one cubic centimeter may be embedded for several hundred yen in our living environments, increasing our quality of life. We will need to supply power to these countless computers, connect them to each other, and connect to the Internet. Wiring them together as before will no longer be realistic, and wireless connection technology will be required. It will also be necessary to reduce their power consumption as it may not be possible to connect them to a power source, and it may be bothersome to frequently charge batteries. In other words, reducing power consumption for wireless communication with computers and among computers will be an important issue in the near future. Against this background, the Kuroda Laboratory and the University of Tokyo started a research project with the support of JST CREST in 2005. Our goal was to achieve short-range wireless data communication that is higher by a factor of two digits, while consuming 1/1000 of the energy of conventional technology.

We have created a number of new circuit technologies and established a design theory for their maximization. This year, in 2010, we finally realized a reduction in power consumption by a factor of 1000. We achieved data transfer at 10^{15} bits per second between chips using only several watts of electric power. We have presented our research results every year at the International Solid-State Circuits Conference (ISSCC), an international conference sponsored by the IEEE. The ISSCC is the world's most widely respected academic conference on

semiconductor circuits. There have been almost no precedents where research papers have been published every year at this conference, indicating the high level of interest in and a high regard of this research around the world. In particular, the research paper demonstrating that data transfer is possible at high speed while using low power with lamination of 128 flash memory chips attracted much attention from industrial sectors as a symbolic achievement as we move into a new era. We have published a number of research papers at international academic conferences in addition to the ISSCC. Students at our project were also successful in showing a number of research achievements. Many of them have strived enthusiastically to be at the forefront of the research, published their research results in the international arena, and then launched high-achieving careers around the world. In FY2010, the final fiscal year of the project, we will work energetically to tackle greater research challenges in the future.



JST Exploratory Research for Advanced Technology (ERATO) FY2009

JST ERATO Suematsu Gas Biology Project: Innovation for Gas Biology and Medicine

Representative Researcher: Makoto Suematsu (Professor, School of Medicine)
http://www.jst.go.jp/erato/project/sgb_P/sgb_P-j.html

Diverse physiologic actions of gases such as O₂, NO, CO, CO₂, H₂S have attracted great interests, while mechanisms for the gas reception and their roles for regulating biological systems as a whole remain largely unknown. Recent metabolome analyses indicate that rate-limiting enzymes of major metabolic pathways with metal-centered prosthetic groups might sense gases and trigger post-translational modification of macromolecules, suggesting their crucial roles for stress-responsive adaptation involving management of energy metabolism and tissue repair and remodeling. However, molecular targets involving gas responses and their control reactions in the living body are difficult to analyze using conventional research techniques.

The project challenges to dissect these unknown mechanisms by utilizing advanced technologies as follows;

1. Nano-biotechnology core: Mining specific gas-responsive receptors and acceptors

We attempt to find out specific gas-responsive receptors and acceptors. To do so, we utilize a superior affinity nanobeads technology. Furthermore, we intend to utilize metabolome analysis to reveal the gas-responsive targets in various metabolic pathways.

2. Bioimaging core: Spatio-temporal detection of gas metabolism

We intend to elucidate the spatio-temporal distribution of various low-molecular weight metabolites *in vivo* by imaging mass spectrometry and multi-photon microscopy. Furthermore, we are developing a new detection system to visualize gas molecules *per se* by utilizing a new generation of surface-enhanced Raman scattering imaging.

3. Medical application core: Innovation of new medicine to regulate gas metabolism

Using gene-targeting mice & humanized animal platform, we attempt to apply basic findings in Gas Biology to remedy diseases. We intend to develop a novel diagnostic system and/or gas-delivery system controlling the release of gas molecules for practical use.

JST Basic Research Programs (PRESTO) FY2009

Creation of Real-World Interactive Media for Artistic Expression

Representative Researcher: Yasuaki Kakehi (Assistant Professor, Faculty of Environment and Information Studies)
<http://www.xlab.sfc.keio.ac.jp>

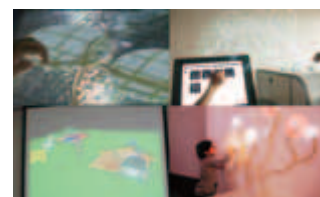
This research is intended to create and apply interactive media targeting the spaces in which we live, with the aim of enhancing artistic expression in the area of interactive art. For this purpose, we have been making an effort to consider intuitive interaction by using the presentation of appropriate images to combine the real and virtual worlds together and by using materials in everyday spaces. We have made an effort to produce works using them and to create a platform for artists. In FY2009, our specific achievements were: (1) development of a display that shows multiple images in actual space, (2) creation of an animation production support environment by using real objects and hand-painted characters, and (3) production of multimodal interactive arts that visualize scents.

Regarding (1), we developed a display system, *UteriorScape*, that can present multiple images on a screen placed above a table, which are different from the images on the table. In this way, we created multi-player participatory applications. In addition to implementing the optical system, we observed user behavior and listened to the opinions of users through exhibitions.

Regarding (2), we developed *Tablescape Animation*, a system that enables the intuitive manipulation of hand-drawn characters by using real objects like manipulating dolls, for the purpose of supporting spontaneous and intuitive expression of animations. This system

outputs 2.5 dimensional animation based on the movement of actual objects on the tabletop display. We held some workshops intended for junior members of the public, and verified its effect (Art Advance Mitsukoshi 2009, Workshop Collection 2010).

And for (3), we developed a system for visualizing the flow of scents interactively, utilizing a modality other than visual/auditory sensation. This system can realize a space design and imaging manipulation with scents by using gas sensors and a projector. The system was displayed at a media art exhibition (Cine Kid 2009: October 14 - 23, 2009, Amsterdam), and earned high praise. We are planning to progress with our research by repeating the development of basic technologies and the provision of places of experience, such as exhibitions/workshops, to further advance the area of interactive art.



UteriorScape (upper left), *Tablescape Animation* (upper right), *hanahanahana* (lower left)

Research into Twins Concerning Sociality and Mental Health - Connecting Genes and Brain Activity

Representative Researcher: Juko Ando (Professor, Faculty of Letters) <http://kts.keio.ac.jp/>

Mechanisms of the human mind are one of the expressions of the phenomena of life, and in this context, these are subject to genetic influence in a similar manner to every other life activity. The longitudinal study of twins is intended to identify how these genes are expressed while relating to the environment during human development. When identical twins, whose genes are identical, are compared under environmental conditions that are exactly the same as non-identical twins, who share only half their genes, we find that genetic influences are greater than environmental influences. The study applies this principle to cognitive ability, linguistic ability, personality, social interaction, mental health, etc. to identify the influences of genes and the environment on development continuity and changes during the first few years of life and for several years during adolescence.

The manner in which genetic influence occurs changes through interaction with the environment. For example, the appearance of problematic behavior in childhood is related to the parents' behavior toward childcare, but it is not necessarily true that the parents' strict or rigid discipline is liable to result in problematic behavior. In our research, the stricter the behavior toward childcare, the greater the influence of genes on problematic behavior appears to be and the greater

the apparent difference between individuals with and without the predisposition. Specifically, even individuals who have a predisposition for problematic behavior do not easily exhibit problematic behavior if they are in an appropriate childcare environment, and individuals without a causative factor do not easily exhibit problematic behavior even in a strict environment.

Our project is beginning to identify how these genetic and environmental influences on our mind and behavior are related to brain activity, and which genes are involved. Even between identical twins whose genes are identical, we sometimes find major differences in behavior, but this suggests differences in gene expression due to the environments. If the related differences in the brain structure or function and the transcription to RNA and epigenetics (epigenetic/chemical changes in DNA) become known, we may be able to find mechanisms that bridge genes, the brain, behavior and the environment.



Scene of a survey of twins conducted in a school setting

MEXT Grant-in-Aid for Young Scientists (B) FY2009

Research into the Atmospheric Gravity Wave Emitted from the Jet Stream

Representative Researcher: Norihiko Sugimoto (Assistant Professor, Faculty of Law) <http://www.sci.keio.ac.jp/member/detail.php?eid=00014&katagaki=3&status=1>

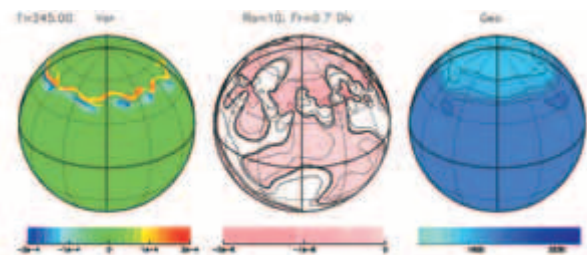
Gravity waves that exist in the atmosphere (waves whose restoring force is buoyancy) transport kinetic momentum over long distances, and play an important role in the general circulation of the mid-level atmosphere (the stratosphere and mesosphere). The general circulation of the mid-level atmosphere has a great impact on climatic changes through the transport of substances such as ozone and carbon dioxide. For this reason, the processes of excitation, propagation, and dissipation of gravity waves are important research themes in forecasting future climatic conditions by using climate models (computer-generated models of the conditions on earth). Research based on observation in recent years has revealed the emission of gravity waves from strong vortex-like flows, such as jet streams and typhoons, but the process by which they are emitted is still poorly understood. In this research, we are using an approach that consists of both numerical experiment using a simplified model of the earth's atmosphere and theoretical research based on the theory of vortex sound (the theory of how sound waves are emitted from a vortex) with the aim of elucidating the process by which it is emitted.

Previous studies have quantitatively evaluated the emitted gravity waves and examined the mechanisms by which they are emitted using the shallow water system on an f-plane (an approximation where the effects of the axial rotation of the earth are regarded as being fixed on the plane). This is the most simple system that contains the vortex-like flow and gravity waves, and recently, an expansion of the system spherically (the effects of the axial rotation of the earth involve latitude variation). As a result, it has become clear that the effects of the axial rotation of the earth have a great impact on the emission of gravity waves.

In FY2009, we conducted the following research to build upon the research that has been conducted to date. Initially, in a more basic framework, we investigated the process by which gravity waves are emitted from co-rotating vortex pair. In this framework, it is possible to derive the analytical solution for the field of a gravity wave at a remote distance by citing the theory

of vortex sound and using the Green's function. Next, in the same framework, we performed a numerical experiment, and confirmed the consistency between the obtained analytical solution and the results of numerical calculation. Currently, we are conducting parameter scanning experiments in which more complex positions of vortices that cannot be derived analytically are changed and the effects of the axial rotation of the earth or the propagation speed of gravity waves are changed. We are planning to elucidate the mechanisms by which gravity waves are emitted from vortex-like flows under more general conditions.

In the current climate models, the emission of gravity waves from vortex-like flows cannot be appropriately reproduced. For this reason, we expect that the results of this research will be actively utilized so that climate models can provide more reliable forecasts.



State of an atmosphere gravity wave (mid-level) emitted from the jet stream (left) in a simplified numerical model of the earth's atmosphere

MEXT Grant-in-Aid for Scientific Research (S) FY2009

Nanoscale Helium Physics and its Applications

Representative Researcher: Keiichi Shirahama (Professor, Faculty of Science and Technology) http://www.phys.keio.ac.jp/guidance/labs/sirahama/kiban_s/index.html

Superconductivity and superfluidity, which are fundamental phenomena occurring at very low temperatures are typical examples of "symmetric breaking." These phenomena are expected to form the basis of quantum computers and other devices based on the principle of quantum coherence. This research is aimed to search for and elucidate new quantum phenomena that appear when helium atoms, which are Bose particles, are confined in nano-space. In this way, we hope to cultivate a new concept in condensed matter physics and develop quantum devices, such as a superfluid Josephson device and a matter-wave interferometer, and to develop it to the stage of practical application. Our aim is to create a new research area that may be called, "Nanoscale Helium Physics."

This research is being promoted in line with four major programs: (1) Elucidation of quantum critical phenomena in nano-scale helium, which is realized in various nanoporous structures, and the search for new quantum phases; (2) Control of the superfluid properties in a nanopore array of porous alumina, which utilizes the property that superfluidity is strongly suppressed on nano-scales; (3) Development of a superfluid Josephson device, which uses this property; (4) Development of a matter-wave interferometer, which uses this new Josephson device, and application of the device to the high-precision measurement of the earth's rotation, etc. and to new research into quantum interference effects.

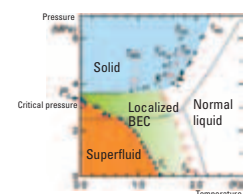
These research initiatives are based on the optimum use of experimental techniques at very low temperatures, which has been cultivated by the Shirahama laboratory at the Department of Physics, and new nanoporous materials based on porous alumina developed by Honda laboratory at Yamaguchi University.

In FY2009, the first year of the project, we discovered two types of new quantum critical

phenomena in helium in the nanostructure described in (1). We also started an experiment on the control of superfluidity by using the nanopore array described in (2). These research initiatives have got off to a promising start. Through the use of nanoscale helium, we investigated the superfluidity of solid helium, which has been a recent topic of interest and is actively studied. We have produced interesting results. We intend to continue our progress in FY2010 and release our research results, while strengthening our exchanges with researchers inside and outside Japan.

This research is expected to produce typical examples of a strongly correlated Bose particle system that exhibits diverse quantum phenomena, and to result in a new concept for condensed matter physics. In addition, the realization of Josephson device may pave the way to the full-scale advancement of nanoscience, which utilizes the phase coherence of helium, and advance a new area of physics that we may call Nanoscale Helium Physics.

Nanopore array of porous alumina used for superfluid control experiments and development of the Josephson device



Phase diagram of helium in nano-porous form

A Ubiquitous Active Knowledge Base System Which Realizes Automatic Search, Analysis, and Mechanisms for Providing Video Data

Representative Researcher: Yasushi Kiyoki (Professor, Faculty of Environment and Information Studies) <http://www.mdbl.sfc.keio.ac.jp/>

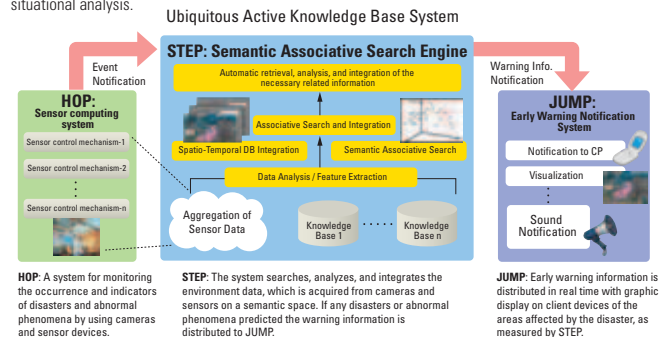
Under circumstances where diversification of and changes in social life environments have caused various disasters and abnormal phenomena, there are demands for the implementation of an automatic information distribution system for the monitoring and warning of disasters/abnormal phenomena, and for the providing of subsequent guidance concerning appropriate courses of action. We are directing our efforts toward the research and development of the Ubiquitous Active Knowledge Base System, which analyzes the possibility of disaster or abnormal phenomena occurrence, and automatically distributes the necessary action plans in response to analysis results.

Our research results from FY2009 produced the following three achievements:

1. We established a model for automatic monitoring and analysis and a warning distribution system that transmits information in collaboration with three distant locations. It consists of the automatic detection of disasters and abnormal phenomena through the use of ubiquitous sensors (HOP process), the automatic acquisition of the necessary relevant information through an analysis of the data detected, a determination based on events, and a knowledge base (STEP process). The work also consists of the automatic detection and the automatic transmission of information at target sites (subjects) that require monitoring, and warning information when a disaster or abnormal phenomenon has occurred (JUMP process). This is known as the "remote Hop-Step-Jump process."

2. Our academic results relating to the creation of this system consist of six journal papers, four invited lectures at international academic conferences, and 15 presentations at international academic conferences. One particularly noteworthy result is the winning of the Best Demo Award for system which we created and presented at DASFAA2010, a leading international academic conference in the database field.

3. We created a mechanism that analyses and automatically distributes information for the purpose of the early detection of problems. This is done by means of rapid acquisition of information from information sources, sources which relate to the prevention and detection of damage from disasters and abnormal phenomena. This mechanism was created as a semantic space and a semantic search mechanism in relation to the prevention and detection of damage from disasters and abnormal phenomena. Thus what we have been able to do, is make possible, semantic information distribution along with automatic situational analysis.



MEXT Grant-in-Aid for Scientific Research (B) FY2009

Development of Bioseparation Systems Utilizing Environmentally Responsive Nanointerface Control Technology

Representative Researcher: Hideko Kanazawa (Professor, Faculty of Pharmacy)

Our group has developed highly functional separation supports based on the idea that hydrophilic-hydrophobic changes by temperatures on the surface of separation supports using temperature-responsive high polymers. We created a system that enables separation by temperature control alone. The temperature-responsive chromatography that we developed is the world's first research as a separation technique using functional high polymers. The research is highly regarded in the area of analytical chemistry both inside and outside Japan. For instance, the research was featured on the cover of *Analytical Chemistry*, the academic journal of the American Chemical Society.

The objective of this research is to develop a bio-separation system based on a completely novel concept, namely, the molecular design of intelligent high polymers that recognize and respond to environmental changes. Based on nano-interface control technology for functional polymer-modified separation supports, the aim of the project is to advance the technology that regulates interactions with proteins by stimulation-responsive high polymers, and to construct a bio-separation system, which is an important key to the production of biological drugs. The aim of the project is also to realize on-site analysis of biological functions, in which the monitoring of drugs is performed in real time in clinical practice.

Research Achievements in FY2009

In FY2009, we published five academic papers, gave twelve presentations at academic conferences, and made one patent application.

1. Efficient peptide separation utilizing new stationary phase with the use of a high-density temperature-responsive polymer brush

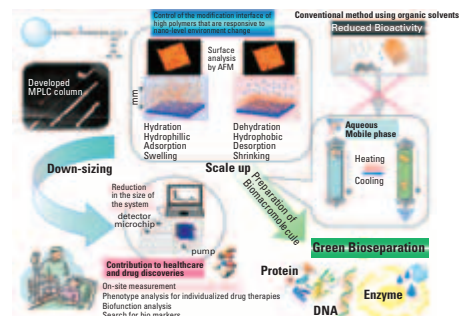
We modified various kinds of temperature-responsive high polymers (*N*-isopropylacrylamide) on porous polymer beads using the surface-initiated atom transfer radical polymerization method, and evaluated them

in the temperature-responsive chromatography solid phase. There are expectations for these molecules as a stationary phase for new bio-separation, which replaces silica gel and its associated problem of durability^[1].

2. Measurement of blood concentration in the anesthetic agent, propofol, using temperature-responsive chromatography

We applied a method for measuring changes over time in the blood concentration of propofol, an intravenous anesthetic agent, in monkeys to whom the drug was administered. Only water is used for the mobile phase, and the retention time can be controlled by the column temperature. Therefore, neither patients nor healthcare professionals will be exposed to organic solvents, ensuring safety when used in clinical practice^[2].

- [1]. *Biomacromolecules* 2009, J. Chromatogr. A (2010)
- [2]. *J. Chromatogr. A* (2009)



Health and Labour Sciences Research Grants [Project for research into the control of rare diseases] FY2009

Research for Ossification of the Spine Ligament

Representative Researcher: Yoshiaki Toyama (Professor, School of Medicine) <http://mhlw-grants.niph.go.jp/niph/search/NIDD00.do>

This research group had the designation of the specified disease in 1975, and Yoshiaki Toyama became the seventh representative researcher in 2008. The aim of the group is to establish a diagnostic and treatment system for the ossification of spine ligaments through research into the disease. The group is engaged in searching for disease-related genes/proteins, conducting multi-center clinical studies and formulating guidelines, etc. in cooperation with 37 institutions nationwide.

The main target diseases for this research group are ossification of posterior longitudinal ligament (OPLL), ossification of the ligamentum flavum (OLF), and fibrodysplasia ossificans progressive (FOP).

In FY2009, a survey on the prevalence of OPLL revealed that the incidence was 2.1%, and in the gene research, the number of sib blood samples reached the target (200 samples). In FY2010, we commenced linkage analysis using the affected sib-pair method. In addition, we identified new disease-specific proteins, and made a patent application. Our multicenter research consisted of: 1) A prospective survey on neurological symptoms; 2) Formulation of alarm points for intraoperative monitoring to prevent spinal cord disorders; 3) A survey on the occurrence of leg paralysis in laminoplasty; 4) Investigation into the outcomes of surgical treatment for thoracic spine OPLL; and 5) A survey on pain and ADL disorder from the viewpoint of patients, thereby producing results that can be provided to benefit people in a clinical setting.

On the other hand, fibrodysplasia ossificans progressive (FOP) is a very rare disease, and there are many unclear aspects concerning even its natural course. In FY2009, we analyzed signals that inhibit ALK2 activity with the aim of elucidating the pathological conditions. We investigated 1,040 types of drugs approved by the U.S. Food and Drug Administration (FDA) in our quest to find candidate therapeutic

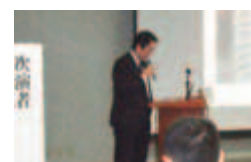
drugs. Clinical research revealed that the mobility may decrease over time from elementary school to junior high school, thereby necessitating support for ADL. Hallux valgus, which can be a clue to early diagnosis, was seen in 93% of cases as some kind of deformation, thereby suggesting that it may become a useful diagnostic tool.

The final goal of this research group is to provide the newly acquired knowledge so that it is of benefit in actual clinical practice. Currently, there are no effective therapies (drugs) to suppress the progression of ligament ossification, and consequently, there is a very great demand for a new therapy amongst patients. Members of patients' associations have participated in the meetings held to report research results, and the meetings have been an effective means of providing the latest information and exchanging opinions.

We intend to produce results that can be of benefit to clinical practice by progressing with our research in and after FY2010, based on the results obtained in FY2009.



The meeting held to report the results of research



Opening remarks by Yoshiaki Toyama

Research Funds at Keio University in FY2009

Research funds at Keio University from national and local public institutions, private businesses, and university funds totaled approximately ¥18.9 billion in FY2009. The charts below show research fund totals classified in various ways, such as by type of fund, by type of external entity making the contribution, by campus, by researcher affiliation, and by research field.

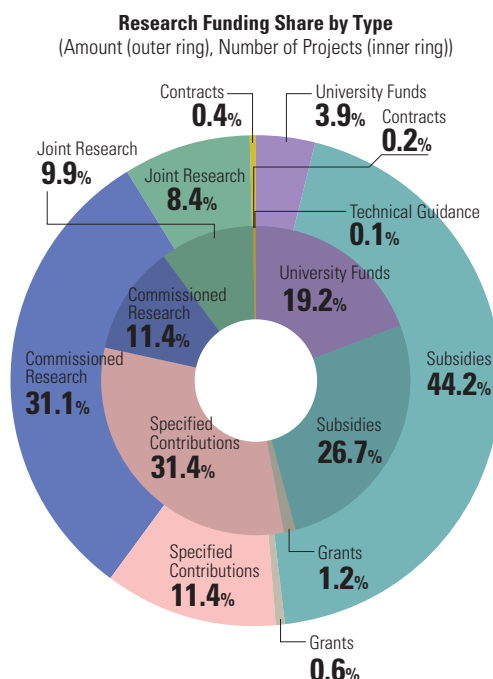
1. Research Funds by Type

When classifying by type of research funds, specified contributions account for the largest number of projects and subsidies account for the largest amount in yen. University funds represent less than 4% of the total at 700 million yen. Research funds from external entities represent nearly 96% of the total at 18.2 billion yen.

*The total for university funds includes a contribution from the Current Expense Subsidies for Private Universities.

- Improvement project for high technology research center/Science frontier program/Community collaboration program/Improvement project for open research center
- Creation and support of a base for strategic research at private universities

Type of Funds	Number of Projects	Amount
University Funds	705	739,547
Subsidies	977	8,375,120
Grants	44	118,684
Specified Contributions	1,149	2,155,464
Commissioned Research	416	5,881,953
Joint Research	361	1,587,371
Contracts	6	70,601
Technical Guidance	5	2,438
Total	3,663	18,931,178



Definition

Subsidies:

Research funds provided mainly by government and their public offices.

Grants:

Research expenses provided mainly by foundations for the purpose of improvement or accomplishment of research.

Specified Contributions:

Contributions earmarked for research activities.

Commissioned Research:

Research commissioned by government and other public offices, as well as private enterprises.

Joint Research:

Collaborative research through personnel exchanges and/or sharing technology/facilities under the joint research agreement, with or without payment of research funds.

Contracts:

Research under a contract agreement.

Technical Guidance:

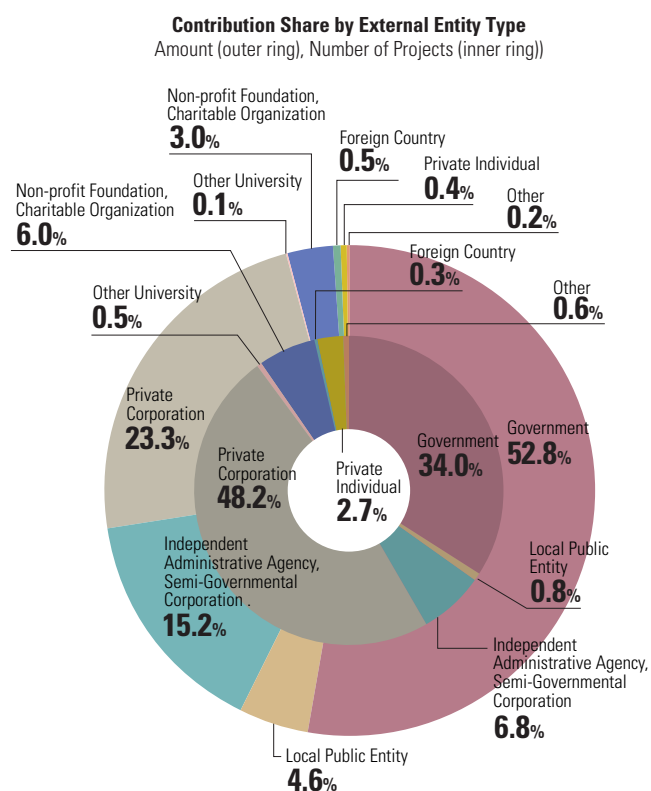
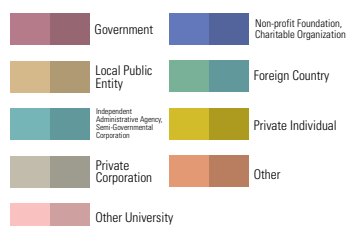
Research involving technical guidance such as development of equipment or apparatus.

2. Types of External Entities Contributing Research Funds

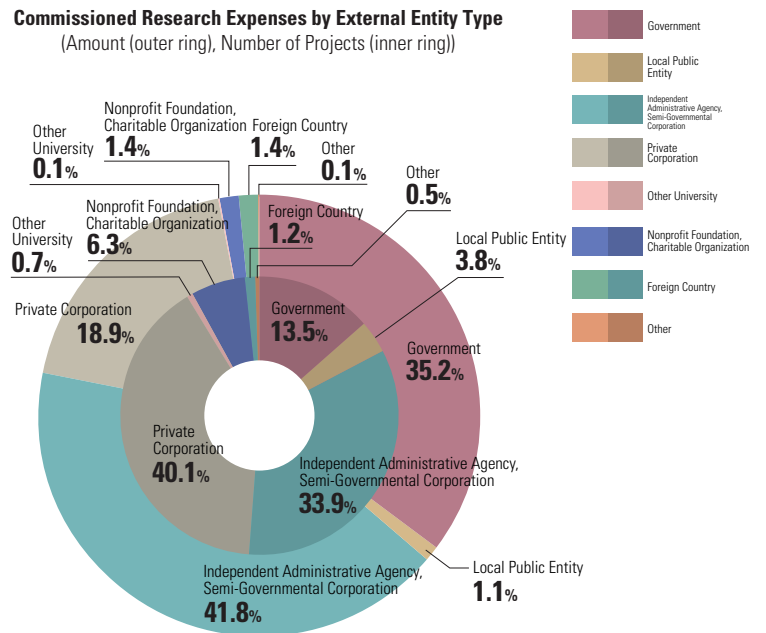
This category classifies funds by the type of external entities making contribution. Private corporation accounts for the largest number of projects while the government accounts for the largest amount in yen.

*This chart represents the total number of projects and amount in yen excluding the "University Funds" item in "1. Research Funds by Type."

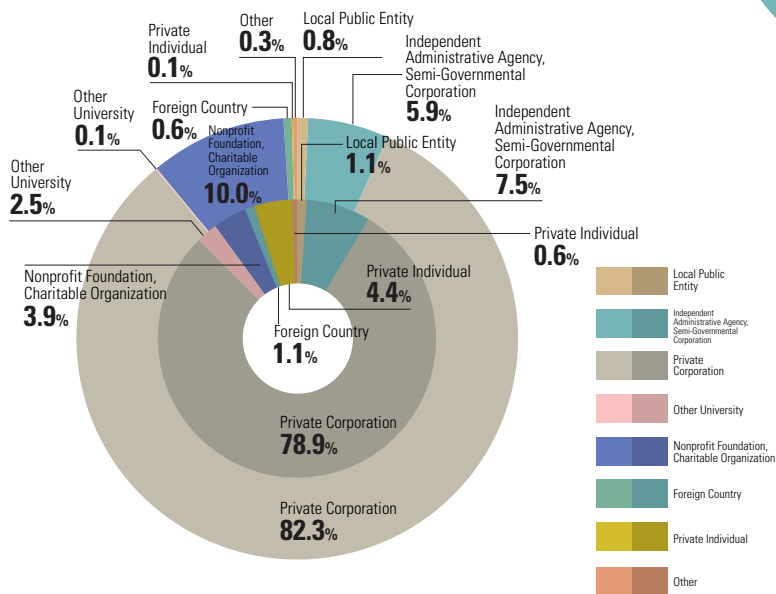
Type of External Entity	Number of Projects	Amount
Government	1,007	9,602,949
Local Public Entity	24	834,505
Independent Administrative Agency, Semi-Governmental Corporation	201	2,756,044
Private Corporation	1,426	4,246,376
Other University	15	13,621
Non-profit Foundation, Charitable Organization	177	540,278
Foreign Country	10	95,075
Private Individual	81	71,089
Other	17	31,694
Total	2,958	18,191,631



Type of External Entity	Number of Projects	Amount
Government	56	2,068,594
Local Public Entity	16	65,364
Independent Administrative Agency, Semi-Governmental Corporation	141	2,459,721
Private Corporation	167	1,110,212
Other University	3	7,640
Nonprofit Foundation, Charitable Organization	26	84,680
Foreign Country	5	81,750
Other	2	3,992
Total	416	5,881,953



Joint Research Expenses by External Entity Type
(Amount (outer ring), Number of Projects (inner ring))



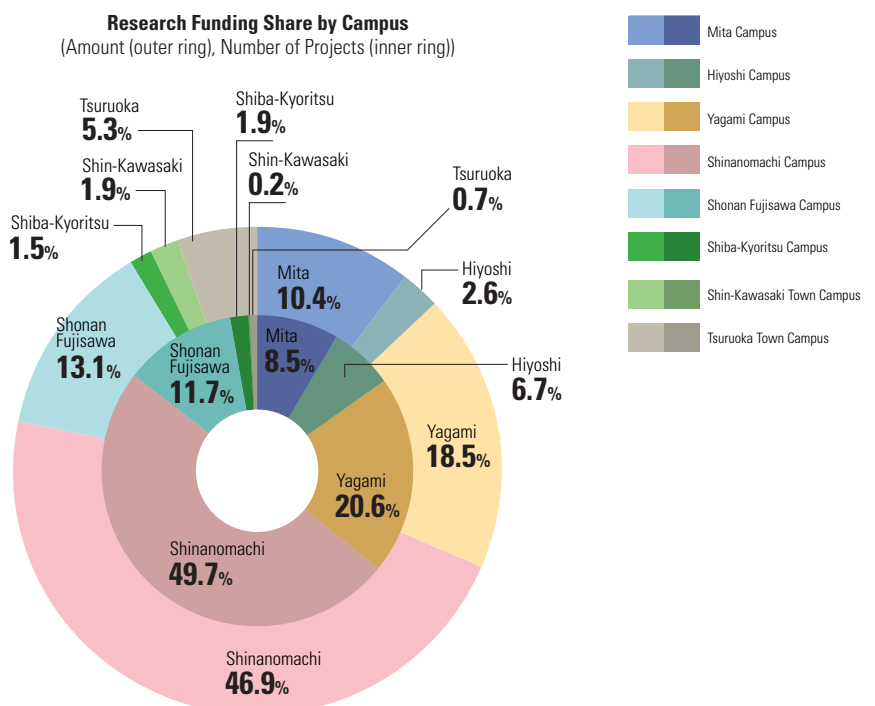
Type of External Entity	Number of Projects	Amount
Local Public Entity	4	12,000
Independent Administrative Agency, Semi-Governmental Corporation	27	93,792
Private Corporation	285	1,306,549
Other University	9	1,500
Nonprofit Foundation, Charitable Organization	14	158,423
Foreign Country	4	9,410
Private Individual	16	1,647
Other	2	4,050
Total	361	1,587,371

3. Research Funds by Campus

At Keio University, each campus has an Office of Research Administration that manages research funds. Classifying research funds by campus shows that Shinanomachi Campus (home of School/Graduate School of Medicine) accounts for the largest number of projects and the largest amount in yen, followed in both categories by the Yagami Campus (home of the Faculty/Graduate School of Science and Technology).

*The totals are compiled based on the home campus (in principle, the affiliation of the research project representative). However, the actual research may take place at a different campus.

Campus	Number of Projects	Amount
Mita Campus	313	1,966,634
Hiyoshi Campus	246	484,979
Yagami Campus	754	3,500,673
Shinanomachi Campus	1,821	8,869,618
Shonan Fujisawa Campus	428	2,472,300
Shiba-Kyoritsu Campus	70	284,303
Shin-Kawasaki Town Campus	6	350,336
Tsuruoka Town Campus	25	1,002,335
Total	3,663	18,931,178

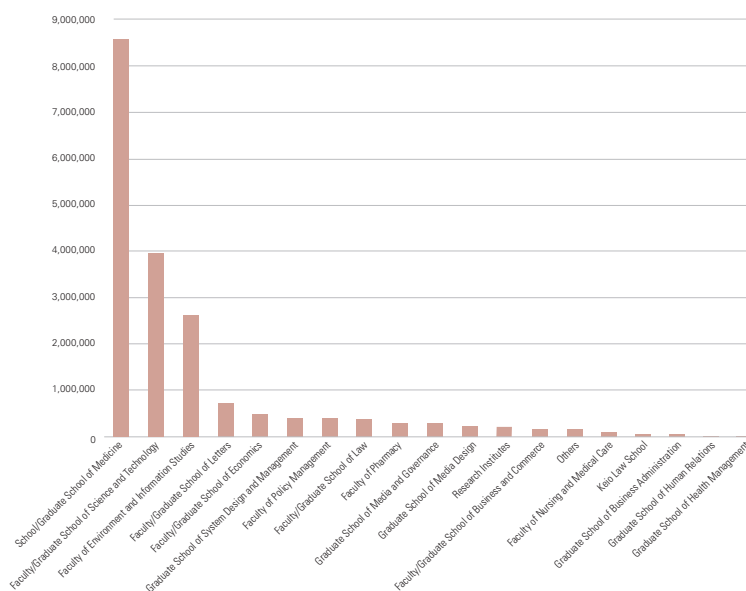


4. Research Funds by Affiliation of Researchers

Classifying funds by affiliation of researchers (in principle, the research representative) shows that the School/Graduate School of Medicine accounts for the largest number of projects and amount in yen, followed by the Faculty/Graduate School of Science and Technology.

Thousand yen		
Affiliation of Researcher	Number of Projects	Amount
Faculty/Graduate School of Letters	137	714,362
Faculty/Graduate School of Economics	103	470,613
Faculty/Graduate School of Law	62	377,256
Faculty/Graduate School of Business and Commerce	75	158,225
School/Graduate School of Medicine	1,808	8,593,578
Faculty/Graduate School of Science and Technology	772	3,947,940
Faculty of Policy Management	128	379,033
Faculty of Environment and Information Studies	229	2,615,994
Faculty of Nursing and Medical Care	36	81,129
Faculty of Pharmacy	70	284,303
Graduate School of Human Relations	2	8,060
Graduate School of Media and Governance	54	277,059
Graduate School of Health Management	5	4,600
Graduate School of Business Administration	17	19,230
Graduate School of System Design and Management	35	382,468
Graduate School of Media Design	32	225,650
Keio Law School	29	41,170
Research Institutes	64	209,481
Others	5	141,026
Total	3,663	18,931,178

Research Funds by Researcher Affiliation (in order of amount)

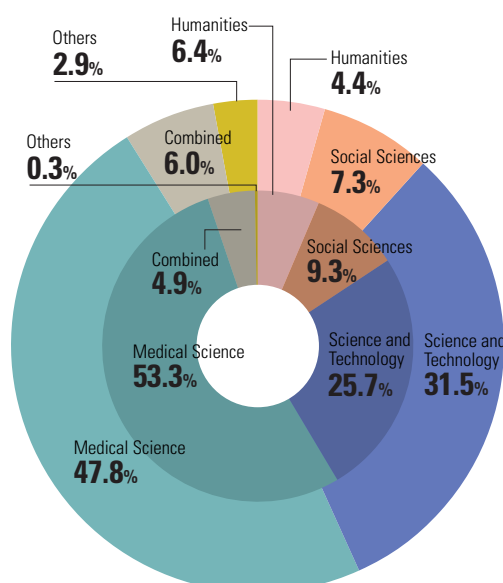


5. Research Funds by Field

Classifying research funds by field shows that medical science accounts for the largest number of projects and the largest amount in yen. The field classifications were derived from the MIC (Ministry of Internal Affairs and Communications) Survey of Research and Development and research expense surveys by the Japan Association of Private Colleges and Universities.

Thousand yen		
Research Field	Number of Projects	Amount
Humanities	235	834,291
Social Sciences	341	1,390,079
Science and Technology	942	5,972,502
Medical Science	1,953	9,050,027
Combined	181	1,129,844
Others	11	554,434
Total	3,663	18,931,178

Research Funding Share by Field
(Amount (outer ring), Number of Projects (inner ring))



Definition

Humanities:
History, Philosophy, Literature, Languages, and other humanities.

Social Sciences:
Economics, Sociology, Business and Commerce, Political Science, Law, and other social sciences.

Science and Technology:
Applied Chemistry, Chemistry, Mechanics and Shipbuilding, Engineering, Mathematics, Electrics, Communications, Physics, and other science and technology.

Medical Science:
Medicine, Nursing, Pharmaceutical Science, and other health and medical sciences.

Combined:
Interdisciplinary fields.

6. Research Fund Data Over the Past 5 Years

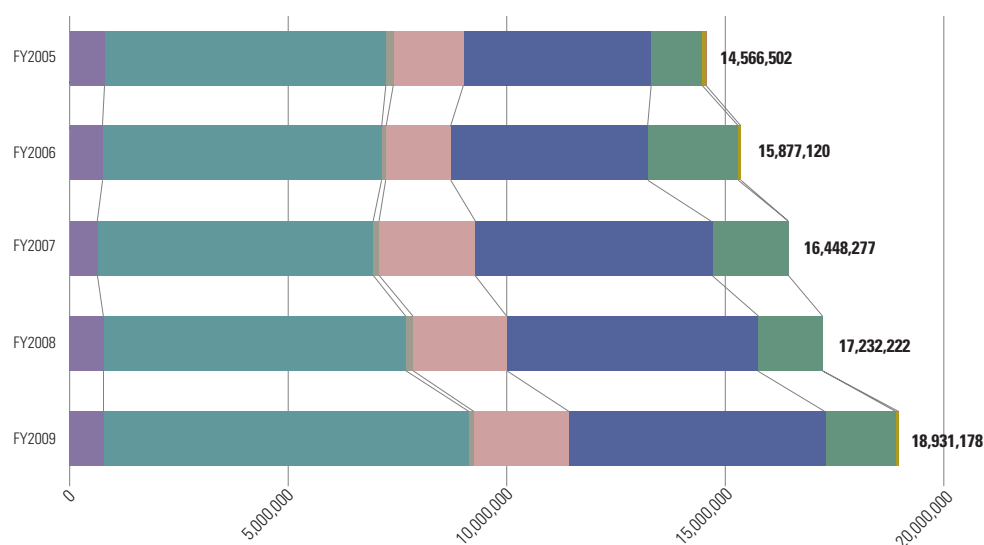
The table shows that research funding over the past five years (FY2005 to FY2009) has been increasing. Looking at research funds by type reveals a sharp increase in commissioned research projects.

Research Funds by Type Over the Past 5 Years

Thousand yen

Type of Research Funds	FY2005	FY2006	FY2007	FY2008	FY2009
University Funds	798,164	749,592	630,666	781,824	739,547
Subsidies	6,436,472	6,387,754	6,317,761	6,910,061	8,375,120
Grants	171,421	104,794	134,381	166,903	118,684
Specified Contributions	1,604,521	2,063,242	2,194,895	2,142,860	2,155,464
Commissioned Research	4,296,684	4,438,734	5,424,980	5,762,275	5,881,953
Joint Research	1,163,996	2,073,601	1,742,299	1,466,307	1,587,371
Contracts	88,499	59,403	1,995	290	70,601
Technical Guidance	6,745	0	1,300	1,702	2,438
Total	14,566,502	15,877,120	16,448,277	17,232,222	18,931,178

University Funds
Subsidies
Grants
Specified Contributions
Commissioned Research
Joint Research
Contracts
Technical Guidance

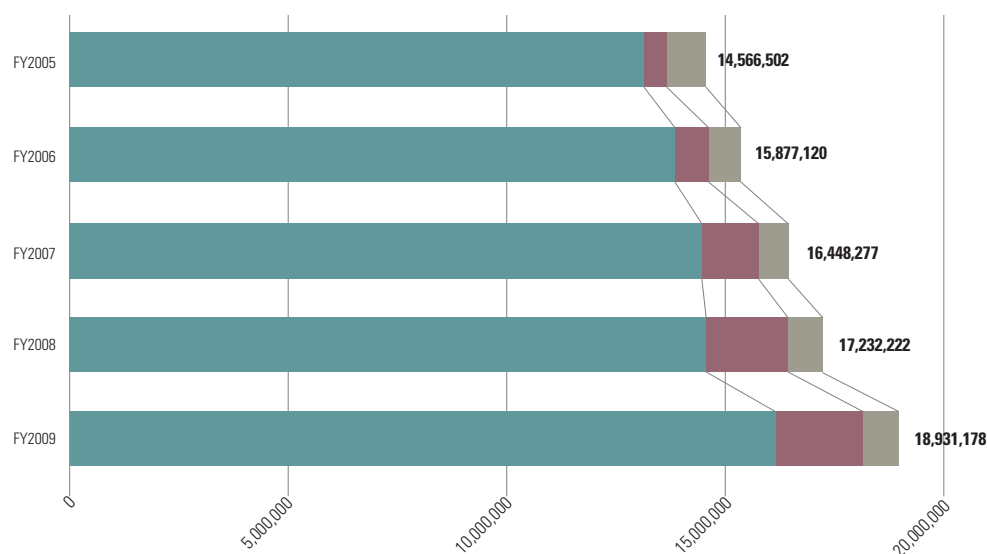


Direct Research Expenses, Indirect Research Expenses, and General Administrative Expenses Over the Past 5 Years

Thousand yen

Type of Research Funds	FY2005	FY2006	FY2007	FY2008	FY2009
Direct Expenses (Direct Costs)	13,137,388	14,142,780	14,467,728	14,563,048	16,117,929
Indirect Expenses	529,791	781,735	1,305,746	1,873,112	1,997,233
General Administrative Expenses	899,323	952,605	674,803	796,062	816,016
Total	14,566,502	15,877,120	16,448,277	17,232,222	18,931,178

Direct Expenses (Direct Costs)
Indirect Expenses
General Administrative Expenses



Researchers at Keio University in FY2009

This section presents data from FY2009 on researchers involved in research and education at Keio University (Professors, Associate Professors, Assistant Professors and Instructors), doctoral students and awardees of doctor's degrees, and researchers participating in research projects at Keio University but not affiliated under the any of the above conditions.

1. Number of Researchers

"Tenured researchers" are those employed under full-time contracts without fixed terms. "Researchers with fixed-period contracts" are either full-time or part time. "Special research professors" are researchers with fixed-period contracts who are paid from external research funds as a condition of appointment. "Researchers" in the following data only include researchers in the University (Professors, Associate Professors, Assistant Professors, and Instructors). The term excludes teachers at affiliated elementary and secondary schools of Keio University. The number of non-tenured researchers (that is, the total number of researchers with fixed-period contracts and special research professors) accounts for 27% overall, but is a striking 42% at Shonan Fujisawa Campus.

Number of people

Campus	Tenured Researchers	Researchers with Fixed Period Contract	Special Research Professors	Total Number of Researchers
Mita	379	31	46	456
Hiyoshi	316	22	9	347
Yagami	241	27	24	292
Shinanomachi	445	50	258	753
Shonan Fujisawa	136	42	58	236
Shiba-Kyoritsu	61	3	0	64
Total	1,578	175	395	2,148

As of 1 May 2009

2. Support for Future Researchers

There are two types of doctor's degrees: course and dissertation doctorates. Course doctorates are conferred upon completion of course work with all other requirements. Dissertation doctorates are conferred on those who have submitted a dissertation with consent of a committee of a graduate school, and passed the examination by a board of review. The standard period for completion of a doctoral course is three years, except for the Graduate School of Medicine, which maintains a four year standard.

Number of Doctorates Awarded

Course Doctorate	
Graduate School of Letters	9
Graduate School of Economics	6
Graduate School of Law	5
Graduate School of Human Relations	8
Graduate School of Business and Commerce	2
Graduate School of Medicine	46
Graduate School of Science and Technology	63
Graduate School of Business Administration	0
Graduate School of Media and Governance	29
Graduate School of Health Management	0
Graduate School of System Design and Management	3
Graduate School of Media Design	0
Graduate School of Pharmaceutical Sciences	5
Subtotal	176
Dissertation Doctorate	
Graduate School of Letters	5
Graduate School of Economics	1
Graduate School of Law	2
Graduate School of Human Relations	2
Graduate School of Business and Commerce	3
Graduate School of Medicine	57
Graduate School of Science and Technology	7
Graduate School of Business Administration	0
Graduate School of Media and Governance	2
Graduate School of Health Management	0
Graduate School of System Design and Management	0
Graduate School of Media Design	0
Graduate School of Pharmaceutical Sciences	0
Subtotal	79
Total	255

As of 31 March 2010

Number of Students Registered in Doctoral Courses

Graduate school	Admission Capacity	Maximum Occupancy	Number of Students Enrolled
Graduate School of Letters	45	135	123
Graduate School of Economics	15	45	53
Graduate School of Law	30	90	80
Graduate School of Human Relations	11	33	45
Graduate School of Business and Commerce	20	60	36
Graduate School of Medicine *1	68	272	249
Graduate School of Science and Technology	150	450	305
Graduate School of Business Administration	8	24	14
Graduate School of Media and Governance	50	150	152
Graduate School of Health Management	10	30	25
Graduate School of System Design and Management *2	11	22	43
Graduate School of Media Design*2	10	20	27
Graduate School of Pharmaceutical Sciences*2	6	18	31
Total	434	1,349	1,183

As of 1 May 2009

*1: For the Graduate School of Medicine, the numbers refer to the students enrolled in the doctoral program.

*2: The Graduate School of System Design and Management, the Graduate School of Media Design, and the Graduate School of Pharmaceutical Sciences were opened in April 2008.

3. Researchers from Outside Keio

Keio University has long emphasized the creation of an environment conducive for intellectual exchange and synergistic cooperation with researchers both within and outside the institution, with the goal of sharing common or related research subject. Not only undergraduate faculties/graduate schools but also research institutes of Keio University accept researchers from other research institutions and universities.

Number of Researchers Accepted—Breakdown by Job Title and Status

Job Title/Status of Researchers	Number of Researchers	Qualifications
Research Associates of Faculty of Science and Technology (Yagami)	26	Researchers participating in research without a contract of commissioned research.
Researchers of Keio Leading-edge Laboratory of Science and Technology (KLL) (Yagami)	44	Researchers participating in research under a commissioned research contract.
School of Medicine Researcher (Shinanomachi)	276	Researchers employed by research, educational, or medical institutions other than the School of Medicine of Keio University.
Senior Visiting Researchers, Keio Research Institute at SFC (Shonan Fujisawa)	302	Researchers accepted by Keio Research Institute at SFC upon application from an institution not affiliated with Keio University, or that from the applicant him/herself. Applicants must have a master's degree or qualified as equivalent having experience and achievements as an independent researcher.
Visiting Researchers, Keio Research Institute at SFC (Shonan Fujisawa)	128	Researchers accepted by Keio Research Institute at SFC upon application from an institution not affiliated with Keio University or from the applicant him/herself. Applicants must have a bachelor's degree or qualified as equivalent having experience and achievements as an independent researcher.
Research Associate, Faculty of Pharmacy (Shiba-Kyoritsu)	28	Researchers participating in research under a commissioned research contract.
Research Associate, Keio Advanced Research Centers (KARC) (Each base campus for activities)	141	Persons from outside Keio University pursuing internal projects for KARC.
Visiting Professors and Researchers *1 (See Table A)	310	
Others (See Table B)	481	
Total	1,736	

Table A: Visiting Professors and Researchers

Job Title, Status	Mita/Hiyoshi	Yagami	Shinanomachi	Shonan Fujisawa	Shiba-Kyoritsu	Total Number
Visiting Professor	36	18	5	0	1	60
Visiting Associate Professor	18	10	11	0	0	39
Visiting Assistant Professor	9	3	5	0	0	17
Visiting Instructor	0	7	1	0	0	8
Visiting Research Fellow	53	45	51	0	3	152
Visiting Junior Research Fellow	17	11	4	1	1	34
Total	133	94	77	1	5	310

Table B: Others

Research Institute	Number of Researchers at Keio University*2	Number of Researchers not Employed by Keio	Total Number
Institute of Cultural and Linguistic Studies (Mita)	26	56	82
Institute for Media and Communications Research (Mita)	8	33	41
Keio Economic Observatory (Mita)	32	48	80
Shido Bunko, Institute of Oriental Classics (Mita)	10	2	12
International Center (Mita)	54	33	87
Teacher Training Center (Mita)	43	44	87
Fukuzawa Memorial Center for Modern Japanese Studies (Mita)	27	36	63
The Keio Institute of East Asian Studies (Mita)	19	34	53
Center for Japanese Studies (Mita)	8	40	48
Research Center for the Arts and Arts Administration (Mita)	18	13	31
Global Security Research Institute (G-SEC) (Mita)	40	38	78
Research Institute for Digital Media and Content (DMC) (Mita)	19	6	25
Institute of Physical Education (Hiyoshi)	19	43	62
Health Center (Hiyoshi)	15	0	15
Keio Research Center for Foreign Language Education (Hiyoshi)	56	35	91
Sports Medicine Research Center (Hiyoshi)	8	10	18
Keio Research Center for the Liberal Arts (Hiyoshi)	228	5	233
Research and Education Center for Natural Sciences [Hiyoshi]	43	5	48
Total	673	481	1,154

Figures show the totals for FY2009.

Sites included in parentheses indicate location of the institution.

*1 Generic designation used for visiting professor, visiting associate professor, visiting assistant professor, visiting instructor, visiting research fellow and visiting junior research fellow. (Excludes researchers at Keio listed in Table B).

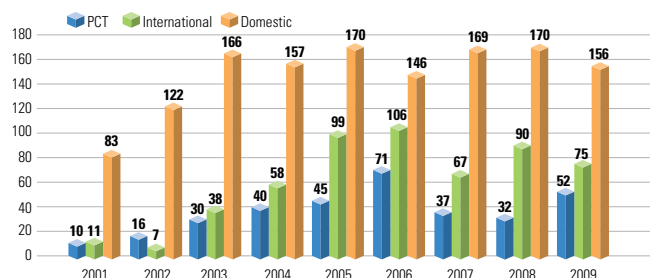
*2 Researchers at Keio University: the figure indicates total number of researchers including teachers in the affiliated elementary and secondary schools of Keio, in addition to tenured and non-tenured researchers of undergraduate faculties/graduate schools or research institutes. A researcher affiliated to more than two institutions is counted as one researcher of each.

Intellectual Property and Technology Transfer

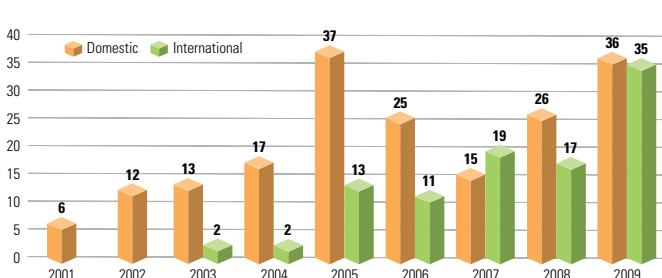
1. Intellectual Property

In FY2009, the IPC took 156 domestic patent applications, 52 PCT applications, and 75 international patent applications. The center also registered 36 domestic patents and 35 international patents.

Patent Applications



Registered Patents



2009 Domestic Patent Applications

Applications by Technology Field

Bio / Medical	45%
Information / Communication	23%
Materials / Chemicals	17%
Control / Measurement	15%

Applications by Campus

Yagami (Faculty of Science and Technology) Campus	157
Shinanomachi (School of Medicine) Campus	91
Shonan Fujisawa Campus	18
Hiyoshi Campus	9
Mita Campus	7
Shiba-Kyoritsu Campus	1

Total Patent Applications by Inventor

Professors	170
Associate Professors	40
Assistant Professors	51
Instructors and Researchers	7
Students and others	15
Employee(s)	0

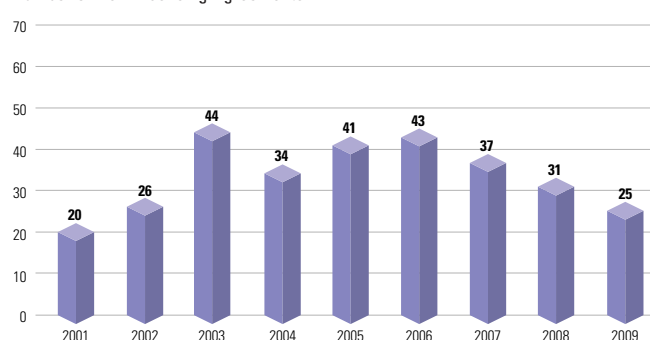
2. Technology Transfer

The IPC technology transfer officer ensures the smooth transfer of technology from university to industry. Technology transfer takes the following three forms:

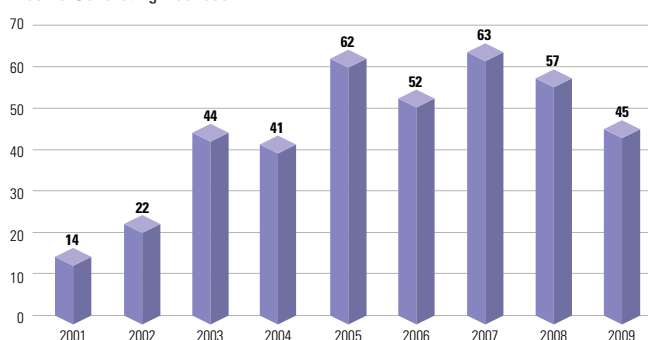
- (I) Licensing of Keio University's intellectual property to companies
- (II) Start up venture companies based on Keio University's intellectual property
- (III) Creation of joint research companies based on Keio University's intellectual property, and continuation of development activities in that company

In FY2009, the IPC made 25 new licensing agreements with companies. The total income in FY2009 was 41.75 million yen.

Number of New Licensing Agreements

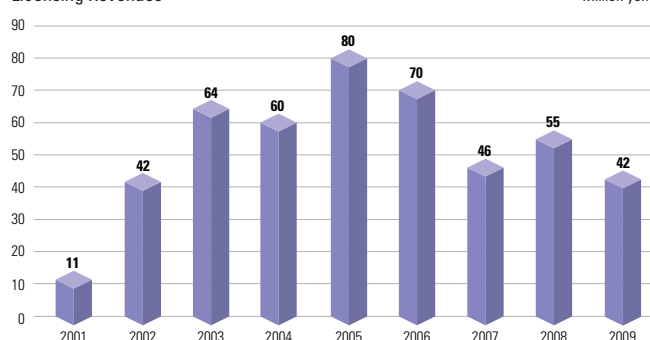


Income-Generating Licenses

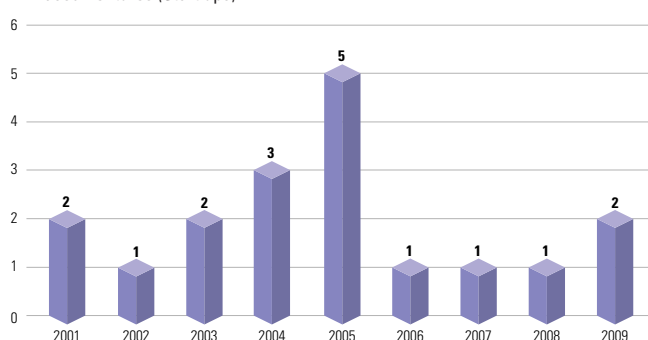


Licensing Revenues

Million yen



IP-Based Ventures (Start ups)



The IPC supports the establishment of venture businesses. In FY2009, two companies established based on Keio IP were launched: SIM-Drive, Inc. and Arai MedPhoton Research Laboratories, Corp. Thus far, a total of 19 companies have been established, with Keio University holding an equity stake in 14 of them.

Awards for Research Activities in FY2009

Source: Keio Gijyuku Ho (Keio Biweekly Newsletter) Keio University homepage. Entries arranged by date of award.

Date Awarded (YYYY/MM/DD)	Recipient (s)	Award	Reason for Award	Awarding Institution
2009/04/06	Mitsuhiro Itaya (Professor, Faculty of Environment and Information Studies) Kenji Tsuge (Assistant Professor (Non-tenured), Graduate School of Media and Governance) and others	Nikkei BP Technology Awards	Development of "Giant Genome Remodeling Technology"	Nikkei Business Publications, Inc.
2009/04/07	Shogo Miyata (Assistant Professor, Faculty of Science and Technology) and others	JSME Medal for Outstanding Paper	For the Paper Entitled "Influence of Structure and Composition on Dynamic Visco-Elastic Property of Cartilaginous Tissue: Criteria for Classification Between Hyaline Cartilage and Fibrocartilage Based on Mechanical Function"	The Japan Society of Mechanical Engineers
2009/04/07	Yasuhiro Kakinuma (Assistant Professor, Faculty of Science and Technology)	JSME Young Investigator Award (Research)(2009)	For the Study on "Development of ER Gel and Its Application to Micromachining"	The Japan Society of Mechanical Engineers
2009/04/11	Tomohiro Ichinose (Associate Professor, Faculty of Environment and Information Studies)	Encouragement Prize of Thesis	For the Research Paper "Land Use Change and Biodiversity Conservation in the Agricultural Landscape of Awaji Island, Hyogo Prefecture"	The Association of Rural Planning
2009/04/13	Daisuke Takahashi (Research Associate (Non-tenured), Faculty of Science and Technology)	CSJ Presentation Award 2009	The Oral Presentation Entitled "Target-Selective Photo-Degradation of HIV-1 Protease by a Fullerene-Sugar Hybrid".	The Chemical Society of Japan
2009/05/06	Makoto Ida (Professor, Law School)	The 2009 Eugen und Ilse Seibold Prize	Contribution to the Promotion and Mutual Exchanges in Academic Affairs as a Bridge between Japan and Germany in the Area of Legal Science.	DFG, German Research Foundation
2009/05/16	Hirokazu Kono (Professor, Graduate School of Business Administration) and others	Best Paper Award, Japan Industrial Management Association	By the Paper Entitled "Safety Analysis under Uncertainties for Investment Alternatives over Multiple Periods using the Total-Cost Unit-Cost Domain" (Journal of Japan Industrial Management Association, Vol.58, No.6, 2008)	Japan Industrial Management Association
2009/05/16	Hitoshi Abe (Research Associate, Faculty of Science and Technology)	SSSJ Young-Researcher Lecture Award	For the Presentation of "Fe/Cu (001) Surface Antiferromagnetic Coupling Induced by NO Adsorption and the Comparison CO Adsorption"	The Surface Science Society of Japan
2009/05/21	Masaaki Minakawa (Professor (Non-tenured), Graduate School of Media and Governance)	59th Society of Automotive Engineers of Japan Awards, Excellent Paper Award	Paper Title: The Model Concept for a Simple 3DOF Vehicle Model with Considerations of the Effect of Body Roll	Society of Automotive Engineers of Japan
2009/05/21	Nobutoshi Yamazaki (Professor, Faculty of Science and Technology) and others	59th JSAE Award the Outstanding Technical Paper Award	For the Paper Entitled "Development of a New Driving Posture for Fatigue Reduction Focused on Biomechanical Loads"	Society of Automotive Engineers of Japan
2009/05/23	Mikiko C. Siomi (Associate Professor (Non-tenured), School of Medicine)	The Saruhashi Prize	Contribution to Elucidating the Molecular Mechanisms of RNA Silencing, Gene Silencing Pathways Mediated by Small RNAs	The Association for the Bright Future of Woman Scientists
2009/05/27	Hisanao Yamashita (Professor, Faculty of Science and Technology)	IEEJ Outstanding Technical Report Award	"The Ultimate Techniques for Measuring Discharge Phenomena in Dielectric Liquids and their Applications"	The Institute of Electrical Engineers of Japan
2009/05/29	Akira Mita (Professor, Faculty of Science and Technology)	The Prize of AIJ 2009, Research Theses Division	For the Paper Entitled "Study on Diagnosis of Structural Health and Advance of Structural Safety Based on Dynamical Models"	Architectural Institute of Japan
2009/06/06	Yuiko Fujita (Associate Professor (Non-tenured), Institute for Media and Communication Research)	Yoshimi Uchikawa Memorial Mass Communication Sciences Award	For Work Entitled "Cultural Migrants: Young Japanese and Transnational Media" (Shin-Yo-Sha, 2008)	The Japan Society for Studies in Journalism and Mass Communication
2009/06/12	Yasushi Isobe (Associate Professor, Faculty of Law)	The 25th MASAYOSHI OHIRA Memorial Prize	For Work Entitled "Center and Province in Contemporary China : Deconcentration and Provincial Leaders in Guangdong" (Keio University Press, 2008)	The MASAYOSHI OHIRA Memorial Foundation
2009/06/13	Atsuhiko Yamada (Associate Professor, Faculty of Economics)	FY2008 Japan Society of Household Economics Encouragement Award	Research Achievement "Income Distribution of People of Retirement Age in Japan" (Journal of Income Distribution, 16 (3-4), pp. 31-54, 2007)	The Japan Society of Household Economics
2009/06/21	Takuro Yoda (Professor, Graduate School of Business Administration) and others	APDM Best Paper Award	For the Paper Entitled "International Comparison of Flow Experience in Video Games"	Association of Product Development and Management
2009/06/25	Yukiko Sakai (Associate Manager, Shinanomachi Media Center) Keiko Kurata (Professor, Faculty of Letters) and others	Honorable Mention in Posters by the Medical Library Association Research Section	Acknowledgement of the High-quality Research of the Poster presentation at MLA09. "How they "Change": Health Information Consumers in Japan"	Medical Library Association Research Section (U.S.)
2009/06/26	Ryo Sudo (Assistant Professor, Faculty of Science and Technology)	Excellent paper award	For the Presentation of "Hepatocyte-endothelial Cell 3D Co-culture Model Established in a Microfluidic System"	The Japanese Society for the Research of Hepatic Cells
2009/07/03	Toru Namerikawa (Associate Professor, Faculty of Science and Technology) and others	Kanazawa University - Komatsu Industrial Collaboration Award	He developed a control system design method and a simulator based on modern control theory for press machines and this method was implemented on the real products.	Komatsu Ltd.
2009/07/12	Miki Seko (Professor, Faculty of Economics) Michio Naoi (Assistant Professor (Non-tenured), Faculty of Economics) and others	Best Paper Award for 2009 AsRES-AREUEA Joint International Conference	For the Paper Entitled "Residential Mobility Decision in Japan: Identifying the Effects of Housing Equity Constraints and Income Shocks under the Recourse Loan System"	Asian Real Estate Society, American Real Estate and Urban Economics Association
2009/07/29	Tomoyoshi Soga (Professor, Faculty of Environment and Information Studies)	2009 The Prize of the Chairman of Hatsume Kyokai (Japan Institute of Invention and Innovation)	Invention of CE/MS Method" (patent No. 3341765)	Japan Institute of Invention and Innovation (JIJI)
2009/08/04	Ryohei Furukawa (Research Associate (Non-tenured), Faculty of Letters)	Furuta Young Investigator Award	According to the Presentation "Molecular Characterization and Expression Analyses of ApDOCK in Starfish Mesenchyme Cells."	Japanese Association for Developmental and Comparative Immunology
2009/09/02	Masaru Tomita (Professor, Faculty of Environment and Information Studies)	Award for Distinguished Service to the Metabolomics Society	International Promotion of the Area of Metabolomics, thereby Contributing to the Development of Society	Metabolomics Society
2009/09/02	Koji Suzuki (Professor, Faculty of Science and Technology) and others	Advanced Analytical Technology Award	Creation of a Formaldehyde Responsive Reagent and its Application to a Sick-building Gas Sensor	The Japan Society for Analytical Chemistry

Date Awarded (YYYY/MM/DD)	Recipient (s)	Award	Reason for Award	Awarding Institution
2009/09/17	Yuji Nagasaka (Professor, Faculty of Science and Technology) and others	Best Paper Award of Society for Chemical Engineers Japan 2008	For the Paper Entitled "Dynamic Observation of the Behavior of the Surface of Liquid Films of Polymer-Organic Solvent System by Ripplon Surface Laser-Light Method"	Society for Chemical Engineers Japan
2009/09/26	Eiji Hosoda (Professor, Faculty of Economics)	Society for Environmental Economics and Policy Studies Academic Award (1st)	Book Titled <i>"Resource-recycling Society - System Design and Prospects of Policy"</i> (Keio University Press Inc. 2008/4)	Society for Environmental Economics and Policy Studies
2009/10/22	Yoshiyasu Takefuji (Professor, Faculty of Environment and Information Studies)	Appreciation Award from Japan Food Service Association	Contribution to Activities of the Food-service Industry and Japan Food Service Association for Many Years.	Japan Food Service Association
2009/10/23	Hirokazu Kono (Professor, Graduate School of Business Administration)	Distinguished Service Award, Japan Institute of Industrial Engineering	For the Outstanding Service as Editor-In-Chief of IE Review for over 10 Years and the Service as Chief Instructor on Engineering Economy Courses.	The Japan Institute of Industrial Engineering
2009/10/30	Takehiko Mikami (Professor, Law School)	Honorary Doctor of Laws of Saarland University (Germany)	Contribution to Academic Exchanges between Japan and Germany, Particularly Contribution to Academic Exchanges between the Faculty of Law, Saarland University and the Faculty of Law and the Graduate School of Law, Keio University. Academic Achievements, etc. in the Area of Civilprocedure law and Insolvency Law.	Saarland University
2009/10/30	Makoto Ida (Professor, Law School)	Honorary Doctor of Laws of Saarland University (Germany)	Contribution to Academic Exchanges between Japan and Germany, Particularly Contribution to Academic Exchanges between the Faculty of Law, Saarland University and the Faculty of Law and the Graduate School of Law, Keio University. Academic Achievements, etc. in the Area of Criminal Law, Particularly Comparative Criminal Law.	Saarland University
2009/11/03	Ichiro Innami (Professor, Faculty of Policy Management)	The 52nd Nikkei Prize for Excellent Books in Economic Science	Based on Original Data Collection and Analyses, the Researcher Found that So-called Social (Inappropriately) Hospitalization was Attributable to the Low-density Medical and Custodial Care for the Elderly, which is Caused by the Excess Number of Hospital Beds and the Underemployment of Necessary Manpower, and Devised a Set of Policy Recommendations to Better the Care for the Elderly.	Nikkei Inc., Japan Center for Economic Research
2009/11/03	Hideyuki Okano (Professor, School of Medicine)	Medal with Purple Ribbon	For His Outstanding Achievements in the Research of Development and Regeneration of the Central Nervous System	Cabinet Office, Government of Japan
2009/11/03	Daisuke Uemura (Professor, Faculty of Science and Technology)	Medal with Purple Ribbon	Exploratory Research on Bioactive Natural Products with a Focus on Biological Phenomena	Cabinet Office, Government of Japan
2009/11/05	Toshiaki Makabe (Professor, Faculty of Science and Technology)	The Serbian Academy of Science and Arts (Foreign member)	Outstanding Contribution to Low Temperature Plasma Electronics	The Serbian Academy of Science and Arts
2009/11/12	Yasuhiro Kakinuma (Assistant Professor, Faculty of Science and Technology) and others	Best Paper Award	For the Paper Entitled "Basic Study on Nanofabrication of Biodegradable Plastics using Biochemical Machining"	International Conference of Asian Society for Precision Engineering and Nanotechnology (ASPEN2009)
2009/11/14	Nobutoshi Yamazaki (Professor, Faculty of Science and Technology) and others	Biomechanism Best Paper Award	Proposal of a Driving Posture for Fatigue Reduction Based on Many-sided Evaluations	Society of Biomechanism (SOBIM) Japan
2009/11/21	Ikuo Takahashi (Professor, Faculty of Business and Commerce)	2009 KAMS/KSMA Fall International Conference, Best Conference Paper Award	Published Paper "Satisfaction and Dissatisfaction Management in Japan"	Korean Academy of Marketing Science, Korean Strategic Marketing Association
2009/12/10	Hiroyoshi Inoue (Professor, School of Medicine)	2009 Chikuhō Bank Bioventure R&D Award	To Accomplish the Success of High Quality R&D and the Increases of Sales and the Surplus Settlement Immediately after Establishment as a University Venture	Chikuhō Bank
2009/12/11	Yoshiko Uzawa (Professor, Faculty of Letters)	25th Joseph Ruggendorf Book Award	<i>Hashimura Togo: Yellowface and the Japanese in American Popular Literature</i> (University of Tokyo Press, 2008)	Department of English Literature, Sophia University
2009/12/25	Yasuhiro Koike (Professor, Faculty of Science and Technology)	Selected as "Nice Step Scientist" for His Distinguished Contribution to the Science and Technology in 2009	Fundamental Research and Realization of High-speed Plastic Optical Fiber	National Institute of Science and Technology Policy
2010/02/19	Tohru Yamada (Professor, Faculty of Science and Technology)	SSOCJ Nissan Chemical Industries Award for Novel Reaction & Method 2009	Development of Optically Active Cobalt Complex Catalysts for Enantioselective Synthetic Reactions	The Society of Synthetic Organic Chemistry, Japan
2010/02/20	Hiromichi Kobayashi (Professor, Faculty of Law)	Award for Distinguished Young Researcher in Fluid Mechanics, the Japan Society of Fluid Mechanics	Development of the Subgrid-scale Model Based on Turbulence Structures according to the following papers: (1) "The Subgrid-scale Models Based on Coherent Structures for Rotating Homogeneous Turbulence and Turbulent Channel Flow," (2) "Application of a Local SGS Model Based on Coherent Structures to Complex Geometries," (3) "Large Eddy Simulation of Magnetohydrodynamic Turbulent Duct Flows"	The Japan Society of Fluid Mechanics
2010/03/05	Issei Fujishiro (Professor, Faculty of Science and Technology) and others	IEEE Pacific Visualization Symposium 2010 Best Poster Award	For the Poster Entitled "Interpolating 3D Diffusion Tensors through Optimizing Rotational Transformations of Anisotropic Features"	IEEE Computer Society
2010/03/12	Tojiro Aoyama (Professor, Faculty of Science and Technology) Yasuhiro Kakinuma (Assistant Professor, Faculty of Science and Technology)	Best Paper Award	For the Paper Entitled "Development of Electric Field-assisted Polishing Method using ER Gel"	The Japan Society for Abrasive Technology
2010/03/17	Toru Namerikawa (Associate Professor, Faculty of Science and Technology) and others	Award of 9th Annual Conference on Control Systems	He presented a Paper Entitled "Network-Topology Independent Cooperative Target-enclosing Behavior by Swarms of Vehicles" in the 9th Annual Conference on Control Systems and it was selected as the most outstanding paper.	Control Division of the Society of Instrument and Control Engineers
2010/03/19	Takayuki Tatsumi (Professor, Faculty of Letters)	IAFA Distinguished Scholarship Award	Contribution to Research on Contemporary Literature Centered on the Book Titled <i>"Full Metal Apache: Transactions between Cyberpunk Japan and Avant-Pop America"</i> (Durham: Duke UP, 2006)	The International Association for the Fantastic in the Arts

Date Awarded (YYYY/MM/DD)	Recipient (s)	Award	Reason for Award	Awarding Institution
2010/03/23	Seiichiro Katsura (Assistant Professor, Faculty of Science and Technology)	IEEE AM2010 Recognition Award	For Commitment to Proposing and Organizing Attractive Session	General Chair of IEEE AM2010
2010/03/23	Seiichiro Katsura (Assistant Professor, Faculty of Science and Technology)	IEEE AM2010 Recognition Award	For Contribution as International Steering Committee Member	General Chair of IEEE AM2010
2010/03/26	Issei Fujishiro (Professor, Faculty of Science and Technology) and others	2009 Best CG Paper Award	For the Paper "Applying Manifold on Learning to Plotting Approximate Contour Trees" published in IEEE Trans. VCG, 15(6), 2009	The Society for Art and Science
2010/03/26	Yoshio Ohno (Professor, Faculty of Science and Technology)	CG Japan Award	For Contribution to the Development of Computer Graphics	The Society for Art and Science

Introduction to Research-related Information Databases

Researchers Information Database K-RIS (Keio Research Information System)



You can search for the research achievements and profiles of Keio University researchers.

http://www.k-ris.keio.ac.jp/index_en.html

Keio Leading-edge Laboratory of Science and Technology (KLL) Yellow Pages



You can search for research projects being conducted in the KLL.

<http://www.kll.keio.ac.jp/db/index.html>

Keio Research Institute at SFC Yellow Pages



You can search for research projects being conducted in the Keio Research Institute at SFC.

<http://www.kri.sfc.keio.ac.jp/kris-yp/>

Research-related Facilities and Libraries

Research Space for Rent

Keio University provides research space and incubation facilities for rent as indicated below. Policies and availability differ by campus, so please inquire in advance for vacancies, rental qualifications, application procedures, application deadlines, etc.

As of June 2010



Sousoukan Building on Yagami Campus



Keio Fujisawa Innovation Village

Facility	Outline	For Inquiries
Kyoseikan Collaboration Space (See pages 13-14)	Total of 5 rooms in Kyoseikan Building on Hiyoshi Campus Size: each room: 20.82m ² ; Total floor area: 104.10m ²	• Kyousei-Kan Operations Center Tel. +81-45-564-2500 http://www.kcc.keio.ac.jp (Japanese Only) E-mail: hy-ksk@adst.keio.ac.jp
Research Space at the KLL (See pages 15-16)	Total of 31 rooms in Sousoukan Building on Yagami Campus Size: 66.12m ² - 102.49m ² ; Total floor area: 2,245m ² Type A (for chemistry and biology experiments) Type B (for applied physics experiments) Type C (for experiments for heavy materials) Type D (for experiments for light-weight equipments) Type E (for various types of experiments)	• KLL Liaison Office (c/o Office of Research Administration, Yagami Campus) Tel. +81-45-566-1794 http://www.kll.keio.ac.jp/ (Japanese Only) E-mail: staff@kll.keio.ac.jp • KLL Liaison Office http://www.kll.keio.ac.jp/liaison (Japanese Only)
Shinanomachi Research Park (See pages 17-18)	37 units in the Institute of Integrated Medical Research Building Steel frame with a reinforced concrete structure; 2 under ground floors, 9 above ground floors, and one penthouse floor Total floor area: 24,400m ²	• Shinanomachi Office of Research Administration Tel. +81-3-5363-3879 E-mail: ras-shinanomachi@adst.keio.ac.jp
Keio Fujisawa Innovation Village (SFC-IV) (See page 20)	Steel frame structure, 2 floors Site area: 1,825.3m ² Total floor area: 1,470.0m ² Rental space: 906.4m ² offices: 18; small offices: 3; shared offices: 8 R&D fabrication rooms: 3; office/R&D fabrication rooms: 2 server room: 1	• Keio Fujisawa Innovation IM Room Tel. +81-466-49-3910 http://www.sfc-iv.jp/11.html E-mail: incubation@sfc-iv.jp
Shin-Kawasaki Town Campus (See pages 23-24)	4 research buildings Steel-frame structure, 2 floors Total floor area: 5,336.11m ²	• Shin-Kawasaki Town Campus Shin-Kawasaki Frontier Research and Education Collaborative Square Tel. +81-44-580-1580 http://www.k2.keio.ac.jp (Japanese Only) E-mail: k2-to@adst.keio.ac.jp
Tsuruoka Metabolome Campus (Tsuruoka Leading-Edge Research Industrial Support Center - not a Keio facility.) (See page 26)	29 units, Size: 7m (L) x 10m (W) x 2.8m (H) Steel frame structure, 2 floors Total floor area: approximately 3,700m ²	• Municipal Policy Promotion Division, Planning Department Tsuruoka City Tel. +81-235-25-2111 (ext. 528) http://www.city.tsuruoka.lg.jp/ (Japanese Only) E-mail: seisakusuishin@city.tsuruoka.yamagata.jp

Library Collections

Keio University has six campuses: Mita, Hiyoshi, Shinanomachi, Yagami, Shonan Fujisawa, and Shiba-Kyoritsu, each one of them developing leading-edge research and education in various disciplines, and also high-level medical practice. The Media Centers, centering the library service, branch on each campus to provide intensive support for all these specific activities.

As of March 31, 2010

	Book Stocks	Collections by Material Type					Number of Seats
	Total	Domestic Books	Foreign Books	Domestic Journals	Foreign Journals	Non-book Materials (items)	
Mita Media Center	2,711,876	975,082	1,053,952	250,427	297,658	134,757	1,286
Hiyoshi Media Center	897,305	484,014	230,368	70,489	74,340	38,094	1,435
Shinanomachi Media Center	412,878	73,724	51,653	92,659	188,243	6,599	229
Information and Media Center for Science and Technology	364,853	97,396	45,290	57,215	160,701	4,251	510
Shonan Fujisawa Media Center	420,321	231,294	86,695	48,985	25,952	27,395	1,080
Information and Media Center for Pharmaceutical Sciences	72,428	39,927	5,220	7,630	18,064	1,587	147
Total	4,879,661	1,901,437	1,473,178	527,405	764,958	212,683	4,687

There are also electronic media resources (359 databases, 37,972 electronic journals, and 18,275 electronic books).



Mita Media Center (New University Library)



Hiyoshi Media Center (Hiyoshi Library)



Shinanomachi Media Center (Kitasato Memorial Medical Library)

FY2009 Financial Position

Ended on March 31, 2010

1 Balance Sheet

		Million yen	
Assets		Liabilities	
Fixed assets	325,214	Fixed liabilities	62,908
Tangible fixed assets	208,348	Long-term borrowings	11,963
Land	34,135	School bonds	3,144
Buildings	100,624	Retirement allowance reserve	27,983
Structures	4,747	Pension reserve	19,208
Equipment and supplies for education and research	24,955	Long-term accounts payable	610
Other equipment and supplies	587	Current liabilities	30,820
Books	40,325	Short-term borrowings	2,726
Vehicles	32	School bonds	1,456
Construction in progress	2,944	Accounts payable	10,812
Other fixed assets	116,865	Advances received	13,112
Telephone subscription rights	72	Deposits	2,625
Facility use rights	185	School trip deposits	89
Deposits	22	Liabilities total	93,728
Profit-making business capital	5,692		
Long-term loans	1,633	Funds	
Specified assets	62,841	Funds	
School bond assets producing interest	4,601	First fund	313,781
Reserve assets for the third fund	41,798	Second fund	15,650
Software	22	Third fund	41,798
		Fourth fund	9,076
Current assets	33,239	Funds total	380,305
Cash deposits	18,033		
Accounts receivable	13,443	Balance of income and expenditure	
Inventories	662	Carried forward to next year	115,581
Negotiable securities	0		
Assets for school trip deposits	89		
Others	1,011		
Assets total	358,452	Total of liabilities, funds, and balance of income and expenditure	358,452

Source: Activities and Financial Position of Keio Gijuku: FY2009 Business Report



Keio Corporate Administration "Jukukan-kyoku" at Mita Campus

2 Income and Expenditure Statement

		Million yen	
Income		Expenditure	
Imputed income		Personnel	64,959
Tuition and other student fees	47,363	Expenses for education and research	60,777
Other fees	2,393	Expenses for general administration	3,886
Donations	6,161	Interest on borrowings	345
Subsidies	16,516	Loss on disposition	4,314
Income from asset management	3,289	Provision for allowance for doubtful accounts	70
Asset sales differential	0	Discretionary reserve	-
Income from business	8,550	Total expenditure	134,350
Income from medical services	45,226		
Miscellaneous income	3,319		
Imputed income total	132,815		
		Current excess over expenditure	11,354
Transfer to capital fund	△ 9,819	Brought forward from last year	104,226
		Carried forward to next year	115,581
Income total	122,996	Imputed income total - Total expenditure	△ 1,535

Source: Activities and Financial Position of Keio Gijuku: FY2009 Business Report



Old library at the Mita Campus

Access Information

Mita Campus

2-15-45 Mita, Minato-ku, Tokyo 108-8345
Tel +81-3-5427-1517

- 8-minute walk from Tamachi St. (JR Yamanote Line or JR Keihin Tohoku Line);
Approximately 10 minutes by train from Tokyo to Tamachi.
Approximately 20 minutes by train from Ueno to Tamachi.
Approximately 15 minutes by train from Shibuya to Tamachi.
- 7-minute walk from Mita St. (Asakusa or Mita Line);
Approximately 15 minutes by train from Suidobashi to Mita.
- 8-minute walk from Akabanebashi St. (Oedo Line)



Shinanomachi Campus

35 Shinanomachi, Shinjuku-ku, Tokyo 160-8582
Tel +81-3-3353-1211

- 1-minute walk from Shinanomachi St. (JR Sobu Line);
Approximately 6 minutes by train from Shinjuku to Shinanomachi.
Approximately 15 minutes by train from Tokyo to Shinanomachi.
- 5-minute walk from Kokuritsu-kyogijo St. (Oedo Line)



Hiyoshi Campus

4-1-1 Hiyoshi, Kohoku-ku, Yokohama-shi,
Kanagawa 223-8521
Tel +81-45-566-1000

- 1-minute walk from Hiyoshi St. (Tokyu Toyoko Line or Yokohama Subway Line, Green Line);
Approximately 25 minutes by train from Shibuya to Hiyoshi (20 minutes by express).
Approximately 20 minutes by train from Yokohama to Hiyoshi (15 minutes by express).
Approximately 20 minutes by train from Shin-Yokohama to Hiyoshi via Kikuna.



Shonan Fujisawa Campus

5322 Endo, Fujisawa-shi, Kanagawa 252-0882
Tel +81-466-47-5111

- Approximately 15 minutes by bus from Shonandai St. (Odakyu Enoshima Line, Sagami Tetsudo Izumino Line, or Yokohama Subway Line);
Approximately 30 minutes by train from Yokohama to Shonandai.
- Approximately 25 minutes by bus from Tsujido St. (JR Tokaido Line);
Approximately 30 minutes by train from Yokohama to Tsujido.



Yagami Campus

3-14-1 Hiyoshi, Kohoku-ku, Yokohama-shi,
Kanagawa 223-8522
Tel +81-45-566-1454

- 15-minute walk from Hiyoshi St. (Tokyu Toyoko Line or Yokohama Subway Line, Green Line);
Approximately 25 minutes by train from Shibuya to Hiyoshi (20 minutes by express).
Approximately 20 minutes by train from Yokohama to Hiyoshi (15 minutes by express).
Approximately 20 minutes by train from Shin-Yokohama to Hiyoshi via Kikuna.
- Approximately 10 minutes by car from Shin-Kawasaki St. (JR Yokosuka Line);
Approximately 20 minutes by train from Tokyo to Shin-Kawasaki.
Approximately 12 minutes by train from Shinagawa to Shin-Kawasaki.
Approximately 10 minutes by train from Yokohama to Shin-Kawasaki.



Shiba-Kyoritsu Campus

1-5-30 Shibakoen, Minato-ku, Tokyo 105-8512
Tel +81-3-3434-6241

- 10-minute walk from Hamamatsu-cho St. (JR Yamanote Line or Keihin-Tohoku Line)
Approximately 7 minutes by train Tokyo to Hamamatsu-cho
Approximately 13 minutes by train from Ueno to Hamamatsu-cho
Approximately 18 minutes by train from Shibuya to Hamamatsu-cho
- 2-minute walk from Onarimon St. (Mita Line)
Approximately 5 minutes from Ote-machi to Onarimon
- 6-minute walk from Daimon St. (Asakusa Line or Oedo Line)
Approximately 16 minutes from Shinjuku to Daimon
Approximately 7 minutes from Nihonbashi to Daimon



Shin-Kawasaki Town Campus

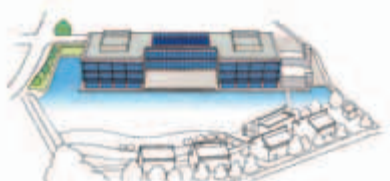
7-1 Shin-Kawasaki, Saiwai-ku, Kawasaki-shi, Kanagawa
212-0032
TEL+81-44-580-1580

- 10-minute walk from Shin-Kawasaki St. (JR Yokosuka Line); Approximately 20 minutes by train from Tokyo to Shin-Kawasaki. Approximately 12 minutes by train from Shinagawa to Shin-Kawasaki.
- Approximately 9 minutes by train from Yokohama to Shin-Kawasaki.
- 15-minute walk from Kashimada St. (JR Nambu Line); Approximately 7 minutes by train from Kawasaki to Kashimada.



Tsuruoka Town Campus

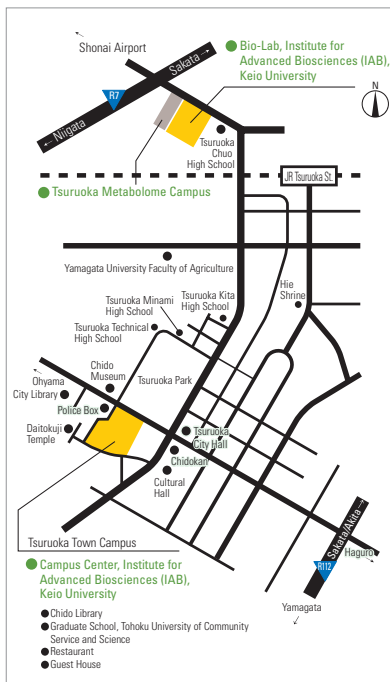
Campus Center
14-1 Baba-cho, Tsuruoka-shi, Yamagata 997-0035
TEL +81-235-29-0800



Bio-lab
403-1 Nipponkoku, Daihouji, Tsuruoka-shi,
Yamagata 997-0017
TEL +81-235-29-0534



- By air: approximately 50 minutes from Tokyo Haneda Airport to Shonai Airport, approximately 25 and 18 minutes by car from Shonai Airport to Campus Center and Bio-lab, respectively.
- By train: approximately 120 minutes by Joetsu Shinkansen (bullet train) from Tokyo St. to Niigata St., then approximately 120 minutes by Uetsu Honsen (main line) from Niigata St. to Tsuruoka St., then 10 minutes by car



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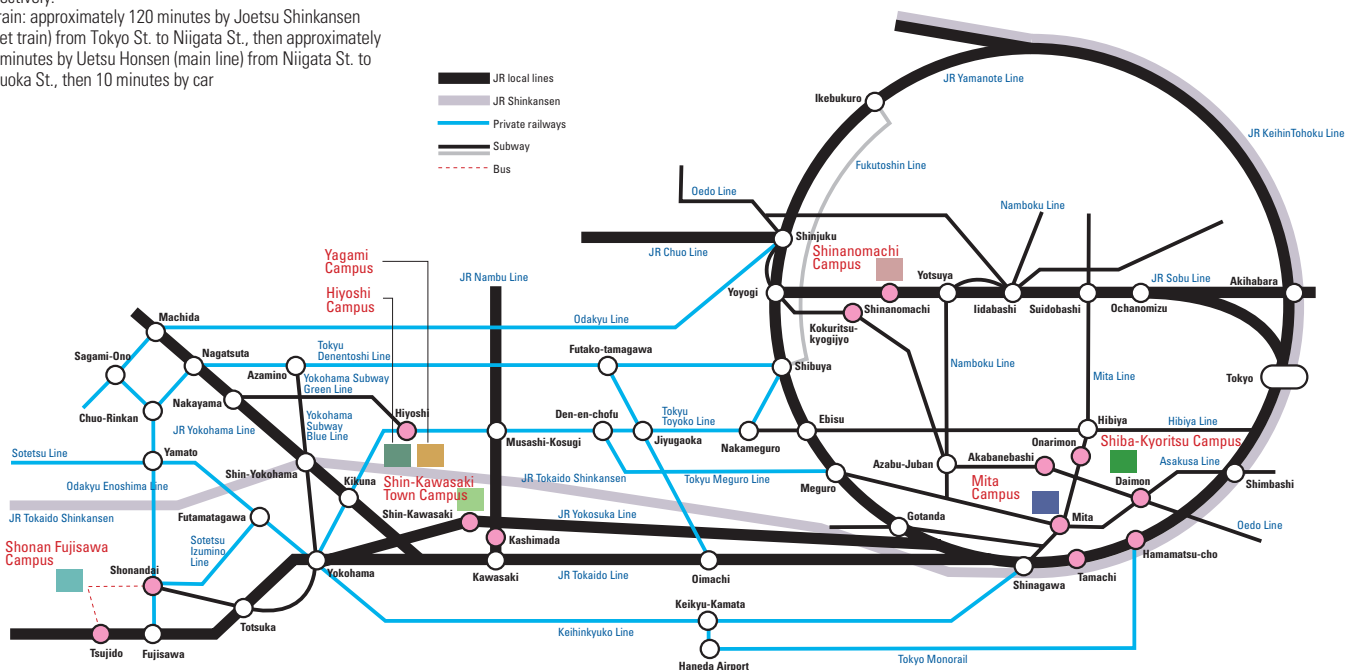
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