Keio University Annual Report on Research Activities
2003 - 2004
The Offices for Research Administration on each campus have long played an important institutional role. These Offices provide practical advice and services to support individual researchers. Keio has successfully and, proactively, sought to protect and properly utilize research results as identifiable intellectual properties since the 1998 establishment of the Intellectual Property Center (IPC). The IPC is pioneering technology licensing organization in Japan. On October 1, 2003, Keio also launched the Organization for Research Advancement and Administration (ORAA) to further facilitate a series of research activities by supporting researchers, generating new and innovative research, and promoting research returns to society.

Roles and Functions of the Organization for Research Advancement and Administration (ORAA)

The ORAA is composed of the Center for Research Promotion, the Incubation Center, the Intellectual Property Center (IPC), and the Offices of Research Administration, as illustrated in the figure. It makes overall strategy of the University, for cooperation with industry, government and academia, and for supporting a system of researchers and research projects within the University, from the start of planning to the end of returning the results to society. The major roles and functions of each organization in the ORAA are as follows:

The Center for Research Promotion is the contact point, for anyone outside Keio University in private business, research institutions, or a university, in- and outside Japan, interested in Keio-related research collaboration. The Center functions as a representative of the University, and organizes comprehensive agreements between corporations and all of Keio, including the planning for commercialization of technologies and matching coordination with the best possible combination of research and researchers.

This does not mean to totally cast off existing "one section of a company to one laboratory of university" type cooperation, but rather to derive greater benefits from cross-sectional, industry-government-academia exchange of technologies, research and development projects, by taking advantage of competencies within Keio University, due to its variety of disciplines.

In the University, the Center surveys governmental policy and industrial trends, collects and analyzes information on research grants and subsidies, provides information to researchers, and to the Advisory Board. The Board, in turn, formulates comprehensive and strategic research topics for Keio. It also cooperates with other offices in the ORAA, such as Offices of Research Administration, and the IPC.

The Incubation Center is an organization dedicated to supporting and nurturing business efforts at the initial stage, as these originate from researchers, administrative staff, and students of Keio University.

As of November 2004, the Incubation Center has not yet commenced operations. Please direct any inquiries to the Center for Research Promotion.

The Intellectual Property Center (IPC) is a technology licensing organization with a range of responsibilities. IPC is responsible for the management and operation of intellectual properties to the support of a venture started within the University. Upon request of an inventor, the IPC closely examines the patentability or potential for licensing, files an application for a patent, and manages its maintenance.

Another important role of the IPC is to support licensing and venture startups. The Center also hosts the Keio Technology Licensing Forum to introduce potential startups from Keio to local businesses. The Center also manages investment possibilities in a venture company from the Entrepreneur Assistance Organization within the ORAA.

The Offices of Research Administration located on each campus at Mita, Hiyoshi, Yagami, Shinanomachi and Shonan Fujisawa, provide official information on sources of research, facilities, opportunities for research grants to researchers, and a variety of services including support for making or negotiating for joint or commissioned researches, management of research expenses, operation of laboratories, and compilation and presentation of research results. The offices also function, standing by the researchers, as a contact point for collaboration on campus and cooperate with each organization within the ORAA.

Furthermore, the Head Office of Research Administration functions as an umbrella to integrate an Office of Research Administration on each campus, the Center for Keio Frontier Research and Education Collaborative Square (K-FRCS), and the Center for Integrated Education System. The Head Office, on one hand, shares and compiles information on researches and researchers with other offices and develops and maintains a research database. It is, on the other hand, responsible for supporting transmission of research results from Keio, for instance, as in the "Symposium for Interim Report on Keio University 21st Century COE Programs" held on April 17 and April 19, 2004.

Inventors at Keio University may lodge objections for patent applications with the Intellectual Property Mediation Committee. The Research Ethics Committee deals with and keeps every party well informed of rules and regulations concerning not only intellectual properties but also research ethics, conflicts of interest and duties, and issues on side jobs and confidentiality.

The Center for Research Promotion is an one-stop contact point for enquiries from local governments, private enterprises, universities, and research institutions, regarding anyone interested in research collaboration with Keio University. Any request or question entered in the form provided on a website at http://www.crp.keio.ac.jp/ or e-mail message to crp@keio.ac.jp will be replied to in a prompt manner, or forwarded to more suitable offices for response.

The Intellectual Property Center will provide consultation for licensing, venture startups, intellectual properties, or technology transfers, at http://www.ipc.keio.ac.jp/. If interested in research at the Graduate School of Science and Technology on Yagami Campus, the Liaison Office of Keio Leading-edge Laboratory of Science and Technology (KLL) give advice to enquirers at http://www.lli.keio.ac.jp/. Please also refer to the "Access Information" at the end of this booklet (p.p. 17-18).
The Focus of Having a Direct Commitment to Society
Infrastructure for a Knowledge Society
Exploring New Entrepreneurial Potentials

The Focus of Remaining Neutral from Society
Creating Intellectual Values
Inspiring through Education
The Intellectual Property Center (IPC) was established in November 1998 as a Technology Licensing Organization (TLO) based on a policy that research results originating from Keio University are valuable intellectual assets for which the University actively promotes implementation, protection and utilization of these rights. The IPC as a right holder would work even harder for its mission and strengthen ties and cooperation between the University and society, corresponding to the “Jitsugaku no Seishin, (spirit of practical learning)” as Yukichi Fukuzawa, as the University’s founder advocated.

**Flow of Technology Transfer**

1. Invention
2. Patenting
3. Technology Licensing Strategy
4. Negotiations: Signing a Contract
5. Following-up

**Patent Applications**

Types of intellectual assets are diverse including inventions, programs and creations, but can generally be categorized into two types, the “patent type” and the “non-patent type.” The Intellectual Property Center supports licensing of both types, but has given high priority to the intellectual property for the “patent type” for which the acquisition of rights is necessary for licensing. A total of over 627 patent applications have been filed (492 in Japan, 135 overseas) since the center’s establishment. The School of Medicine and the Faculty of Science and Technology have been particularly active in patent application in the fields of bio and medical technologies, with bio/medical making up 50 percent of the total, information/communication/electronics and control/measurement each making up 20 percent, and materials/chemicals making up 10 percent.

One of the characteristics of FY2003 was the increase in joint patent applications with foundations and private enterprises. Joint applications only made up 20 to 40 percent in the past, but this figure jumped up to 58 percent in FY2003, indicating that research at the Faculty of Science and Technology in collaboration with KLI (Keio Leading edge Laboratory of Science and Technology) and Shinanomachi Research Park in the School of Medicine have begun to bear fruit. 34 patents had been obtained as the university continues to apply for evaluation of licensed items as of FY2003.

**Inventions by Intellectual Property Center**

1. Nurturing of Venture Business
   The Intellectual Property Center (IPC) is responsible for the initiatives described below in support of starting a venture company as an effective means of commercializing technologies born from Keio University, as well as creating good environment for ventures by finding and training resource persons through these initiatives.
   1) Keio Venture Forum
      Keio Venture Forum has been organized to provide support and advice on business planning to start a venture company originating from Keio’s industrial property right. The forum offers services to venture capitalists, trading companies and incubators, which have cooperative agreements with Keio.
   2) Entrepreneur Assistance Fund
      Keio University has established an Entrepreneur Assistance Fund to invest up to one million yen but less than 30 percent of the total capital in a research and development-based venture company originating from industrial property rights of Keio University. The Operating Committee for the fund makes a final decision on each investment upon recommendation by the IPC.
   3) Licensing to Venture Companies
      Keio University accepts licensing fees through equity such as stock or stock options in lieu of cash, following a careful consideration of the financing standing of the venture company.

2. Promotion of Technology Licensing
   Learning from the last five-year experience of technology transfer, the IPC believes that small and medium-sized enterprises are the most important potential partners. From that point of view, the IPC has newly organized a Keio Technology Licensing Forum to strengthen collaboration with smaller businesses outside Tokyo. The Forum promotes nationwide networking by introducing Keio’s technologies to local businesses. It also aims to foster two-way collaboration not only by introducing the University’s potential, but also by going out to find local needs. The Forum was held in Nagoya and Kawasaki in FY2003, and plans to come to Kyushu and other areas in FY2004.

3. Promotion of Commercialization
   The IPC promotes technology transfer, by helping develop software or making a prototype to demonstrate the advantages of the patented technology which seems to be theoretically and conceptually convincing but rather difficult to evaluate commercial values otherwise.

4. Coordination of Joint Research
   The IPC actively coordinates joint research with private enterprises utilizing the intellectual property rights of Keio University. The IPC’s promotion of venture businesses born from Keio also contributed to procurement of governmental funds, including the “Project to Create Businesses Originating from Universities and Research and Development of Application of University Technology” by the Ministry of Economy, Trade and Industry, and the “Project to Support the Creation of Ventures Originating from Universities” by the MEXT. Such external funds from private enterprises and the government amounted to 502 million yen in FY2003.
   The IPC gives advice on terms and conditions of a joint research contract, which needs to be carefully phrased, especially for intellectual property rights, taking both positions of the University and the business into consideration.

**Venture Companies Assisted by Keio University**

SNT Co.
GBS Research Co., Ltd.
Vcube Inc.
Human Metabolome Technologies, Inc.
Oxygen Inc.
Lattice Technology
Eco’s Corporation
Signal Creation Co. Ltd.
Propogene Co. Ltd.
Comparison of Universities by Competitive Research Funds Distributed

The competitive research fund is defined here as "a fund for research and development to be distributed to researchers and institutions making proposals to a subject publicly announced, and passing the examination based primarily on scientific and technological perspectives, by a committee composed of more than two members including experts in the field of subject." One example should be "the 21st Century COE Program" for which Keio University won twelve projects in total in FY2002 and FY2003. As is typically so, a fund for the "Project for Creating Strategic Research Center" of Special Coordination Funds for Promoting Science and Technology by the MEXT, commonly known as "Super COE," for which Keio was adopted in May 2004 (cf. p.1).

The national budget for competitive research funds in FY2003 totaled to approximately 350 billion yen, equivalent to 10% of investment in government research and development. Out of it, approximately 135 billion yen was allocated as Grants-in-Aid for Scientific Research, known as Kakenhi designated by the MEXT (also see the website of the Japan Society for the Promotion of Science). In terms of amount, Kakenhi should be the most typical of competitive research funds of all.

The table and graph below show the top twenty research institutions Kakenhi distributed, according to the number of (new and continuing) projects adopted and changes in amount from FY2001 to FY2003. The amount of the University of Tokyo, the top institution, accounts for nearly 40% of the total. The Kakenhi amount distributed to Keio University is ranked first among the private universities, but the number of projects adopted equals only some 20% of that of the University of Tokyo, and 10% for the amount distributed.


Distribution of MEXT Grants-in-Aid for Scientific Research (Kakenhi) by Institution, FY2001-FY2003 (total amount of new and continuing projects)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Institution</th>
<th>FY2001</th>
<th>FY2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>University of Tokyo</td>
<td>¥135,000,000,000</td>
<td>¥135,000,000,000</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>¥125,000,000,000</td>
<td>¥125,000,000,000</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>¥120,000,000,000</td>
<td>¥120,000,000,000</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>¥110,000,000,000</td>
<td>¥110,000,000,000</td>
</tr>
<tr>
<td>5</td>
<td>-</td>
<td>¥100,000,000,000</td>
<td>¥100,000,000,000</td>
</tr>
<tr>
<td>6</td>
<td>-</td>
<td>¥90,000,000,000</td>
<td>¥90,000,000,000</td>
</tr>
<tr>
<td>7</td>
<td>-</td>
<td>¥80,000,000,000</td>
<td>¥80,000,000,000</td>
</tr>
<tr>
<td>8</td>
<td>-</td>
<td>¥70,000,000,000</td>
<td>¥70,000,000,000</td>
</tr>
<tr>
<td>9</td>
<td>-</td>
<td>¥60,000,000,000</td>
<td>¥60,000,000,000</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
<td>¥50,000,000,000</td>
<td>¥50,000,000,000</td>
</tr>
</tbody>
</table>

The two tables and graph below show the top twenty research institutions by overall amount of competitive research funds distributed in FY2001 and FY2002. The vast majority was distributed to national universities, particularly to seven former imperial universities (before becoming national universities in 1947), (Hokkaido University, Tohoku University, the University of Tokyo, Nagoya University, Kyoto University, Osaka University, and Kyushu University). That accounts for nearly 40% of the total and the University of Tokyo alone received more than 10% of the total.

The 19 institutions out of the 20 appeared both in FY2001 and FY2002. Keio University was ranked eleventh for both years (the first among private universities).

The graph below compares the top nine universities with Keio University according to the ratio of competitive research funds to university’s revenues in FY2003.

Three major sources of revenue (106 billion yen) of Keio University are tuition, including other student fees and entrance examination fees, income from medical activities, and subsidies from government. Tuitions and medical income (83 billion yen) together account for 78% of the total, and the subsidies (17 billion yen) for 16%, according to "Keio Gijukuho (Keio Newsletter)" No. 2009, June 10, 2002. Competitive research funds to Keio remain at the level of approximately 4% of the revenue, as seen in the graph.

At national universities, to the contrary, subsidies from government account for approximately 70% of the revenues while tuitions for only some 10% ("Shukan Toyokeizai (Weekly Toyokeizai); October 19, 2002). This is because the government fully covered deficiencies of revenues of national universities until their becoming independent university corporations in April 2004. The supplementary subsidies enabled revenues of national universities to maintain the same or higher than Keio’s, despite lower income from tuition and medical fees. It should be remarked that, in addition to the subsidies, competitive research funds equivalent to 10-25% of the revenues are still allocated to national universities.

### Ratio of Competitive Research Funds to Annual Income

![Graph showing ratio of competitive research funds to annual income](image)

- **Note 1**: Indirect expenses are included in competitive research funds.
- **Note 2**: Annual Income = Total Income - Transferred to Capital Fund
- **Note 3**: Competitive research funds are NOT included in total income.

**Source:** "Kakugakuttu Sono Nikku no tomeru Kyosoku Kenkyu-Shin ni Sekai Kakaku - Seko kenkyu-kenkyu database ni motoruku yomu bunsetu to keikaku sekkei (Reform of the Competitive Research Funding System to Establish Japan as a Nation based on Creativity of Science and Technology - an Analyse of the Situation and Reform Design based on the Government Research and Development Database); Cabinet Office, April 30, 2004, and "Shukan Toyokeizai (Weekly Toyokeizai); October 19, 2000.

Incomes of national universities are quoted from "Shukan Toyokeizai (Weekly Toyokeizai)," Statement of account of the national universities has been adjusted to its equivalent of private universities.

### Research Funds at Keio University in FY2003

Research funds at Keio University from national and local government institutions, private businesses, university funding, etc., totaled to approximately 14.9 billion yen in FY2003. 1.1 billion yen increase from 13.8 billion yen in FY2002. One of the factors appears to be a large increase in subsidies, especially a total of 985 million yen for newly adopted seven programs for the 21st Century COE Program.*

*Method of categorization used here is different from that in "Keio University Annual Report on Research Activities 2002-2003."

#### 1. Research Funds by Campus

The data in this section show total of research funds by campus. Some of funds of research projects are compiled for a campus where the projects are not actually conducted.

From the largest to smallest in number of research projects, Shinanomachi Campus is on the top, followed by Yagami, Shonan Fujisawa, Mita, Hiyoshi, Shin-Kawasaki, and Tsuruoka. Shinanomachi collects more than a half of amount of total research funds.

#### 2. Research Funds by Affiliation of Researchers

Researchers are affiliated to undergraduate faculties, graduate schools, or research institutions across the campuses. The table on the right shows number of research projects and amount of funds allocated by affiliation of researchers.

In both the number of research projects and the amount of funds, the School of Medicine/Graduate School of Medicine come on top of the list, followed by the Faculty of Science and Technology/Graduate School of Science and Technology, and the Faculty of Environmental Information accordingly.
3. Research Funds by Type

The number of projects funded by specified contributions results in the largest of all, compared with the other types of funding. In terms of amount, funds from subsidies come first, followed by commissioned research. These two types of funds account for approximately 80% of the total research funds.

<table>
<thead>
<tr>
<th>Type of Funds</th>
<th>Number of Projects</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidies</td>
<td>50%</td>
<td>80%</td>
</tr>
<tr>
<td>Commissioned</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>Others</td>
<td>20%</td>
<td>20%</td>
</tr>
</tbody>
</table>

4. Research Funds by Field

The data in this section are compiled with reference to classification of the filed of research in other official reports, such as the Survey of Research and Development by the Ministry of Internal Affairs and Communications, and various surveys on research expenses by the Japan Association of Private Colleges and Universities. In both number of research projects and amount funded, the field of medical science comes first, and science and technology second, together making approximately 90% of the total research funds.

Both fields are also ranked first and second respectively, in the allocations for general administrative and indirect expenses.

<table>
<thead>
<tr>
<th>Field of Research</th>
<th>Indirect Expenses</th>
<th>General Administrative Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Science</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Science and Technology</td>
<td>90%</td>
<td>90%</td>
</tr>
</tbody>
</table>

5. Ratio of Direct Research Expenses to Research Funds

Direct research expenses account for over 90% of the total research funds, while general administrative expenses and indirect expenses account for the rest.
Researchers from outside Keio

Keio University has long emphasized the creation of a good environment for intellectual exchange and synergistic cooperation with researchers both within and outside the institution, with the goal of sharing common or related research subject.

On Mita and Hiyoshi campuses, each research institution has its own system to accept researchers from outside. On the Shinanomachi Campus, the Integrated Medical Research Center can accept researchers, as can the Keio Leading edge Laboratory of Science and Technology (KLL) at Yagami, and the Keio Research Institute at Shonan Fujisawa.

<table>
<thead>
<tr>
<th>Number of Researchers Accepted - Breakdown by Campus</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Campus</th>
<th>Status</th>
<th>Number of Researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mita</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hiyoshi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shinanomachi</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 upon completion of a dissertation with all other requirements. Dissertation doctorates are conferred on those who have submitted a dissertation with researchers both within and outside the institution, with the goal of sharing common or related research subject.

Keio University has long emphasized the creation of a good environment for intellectual exchange and synergistic cooperation with researchers both within and outside the institution, with the goal of sharing common or related research subject.

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

Number of Students Registered in Doctoral Courses

Table A. Research Institutes on Mita Campus

Table B. Research Institutes on Hiyoshi Campus