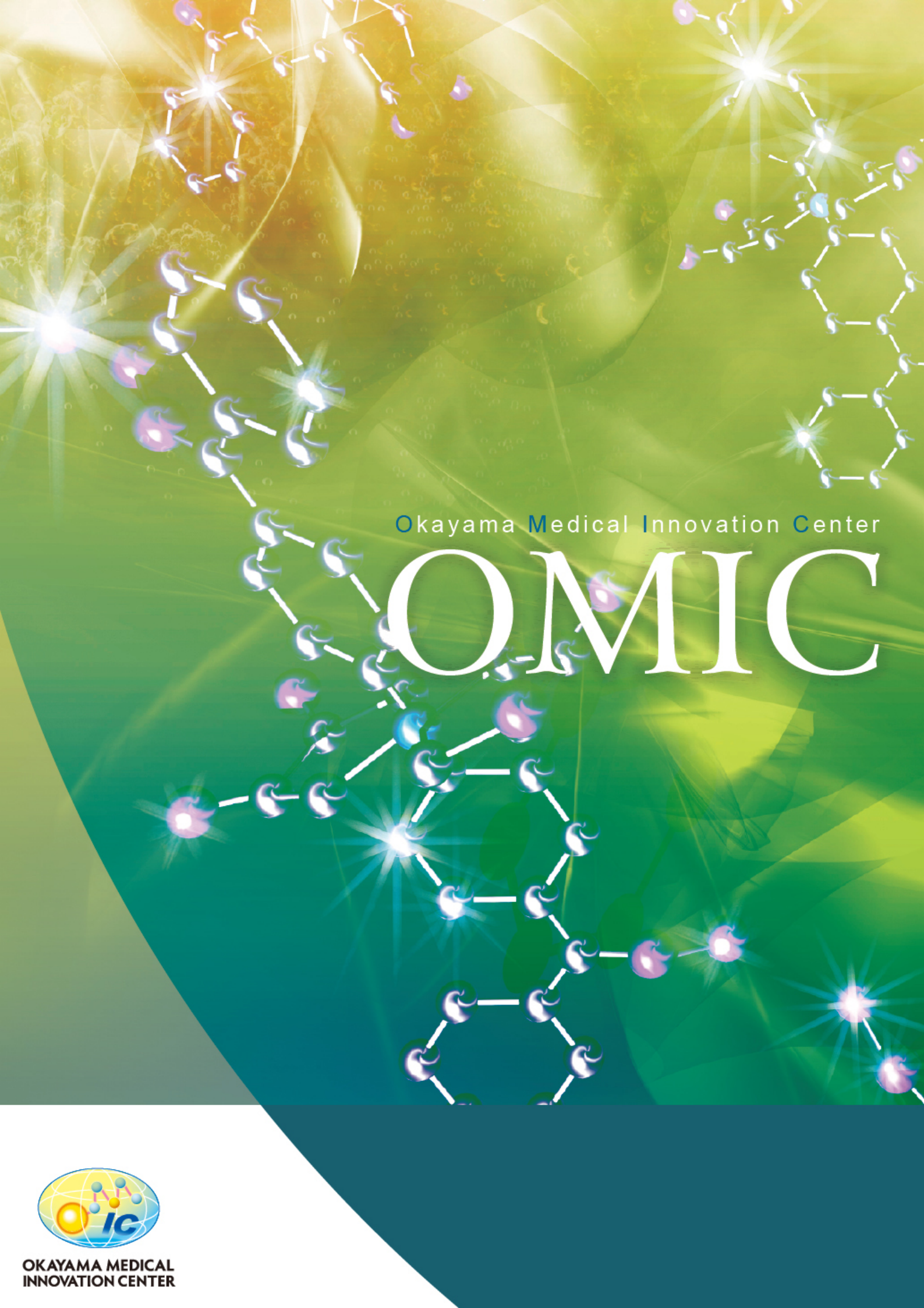


OKAYAMA MEDICAL
INNOVATION CENTER

Molecular imaging science to provide life innovation through

For promoting the “Medical-Techno-Valley” vision

Ryuta Ibaragi
(Okayama Prefectural Governor)

Kiyoshi MORITA
(President of Okayama University)

Hiroshi NAKASHIMA
(Chairman of Okayama Conference of Economic Organizations)

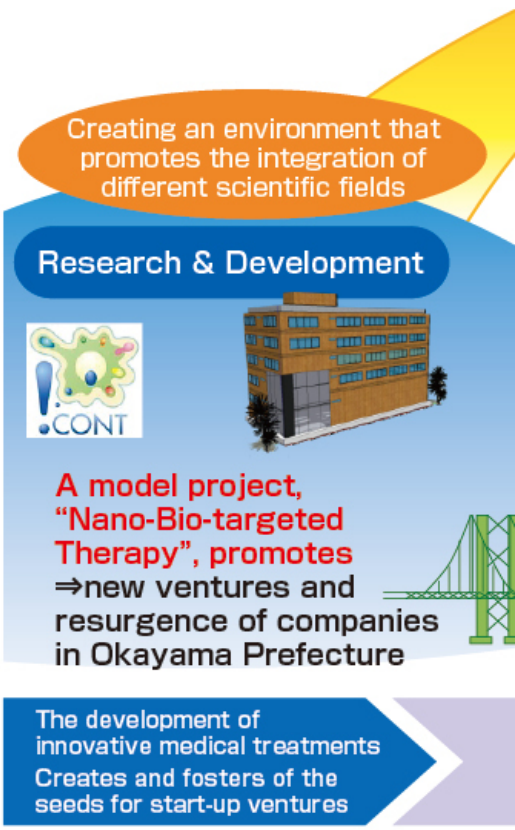
Message

The outstanding spirit of innovation in the medical and well-being fields, as well as the technologies of the manufacturing companies in Okayama are a clear sign that medicine, well-being and health are a top priority in the prefecture, as a means for industrial promotion. Furthermore, the prefecture is also advancing a “Medical-Techno-Valley” vision in order to create medical venture companies and clusters of medical companies.

Several medical, pharmaceutical, and healthcare universities have been located in Okayama Prefecture. In particular, Okayama University Medical School, that commemorated the 140th anniversary of its foundation in 2010, is proud of its long history and tradition. The school has not only produced a large number of excellent doctors, but also keeps striving to provide the most advanced medical treatments and is a leader in state-of-the-art medical fields, such as organ transplants and gene therapies.

After the Japan Science and Technology Agency decided to adopt a joint research center (FY2009) in order to revitalize regional industries through advanced medical research, Okayama Conference of Economic Organizations, Okayama University, and Okayama Prefecture created Okayama Medical Innovation Center (OMIC) in order to advance molecular imaging technology through industry-academia-government collaboration. This technology is attracting much attention from the research community as a doorway to the next-generation of medical treatments.

The OMIC, locates in the Okayama University Health Science Campus, started operating in April 2011, as a research and development center having animal molecular imaging and incubation facilities. We are committed to enhancing the appeal of the OMIC as a new local industry-academia-government center for research and development of new medicines and medical devices through the coordination of Okayama University and collaborating companies, as well as through the integration with manufacturing companies. We deeply appreciate your choosing the OMIC for your research needs.

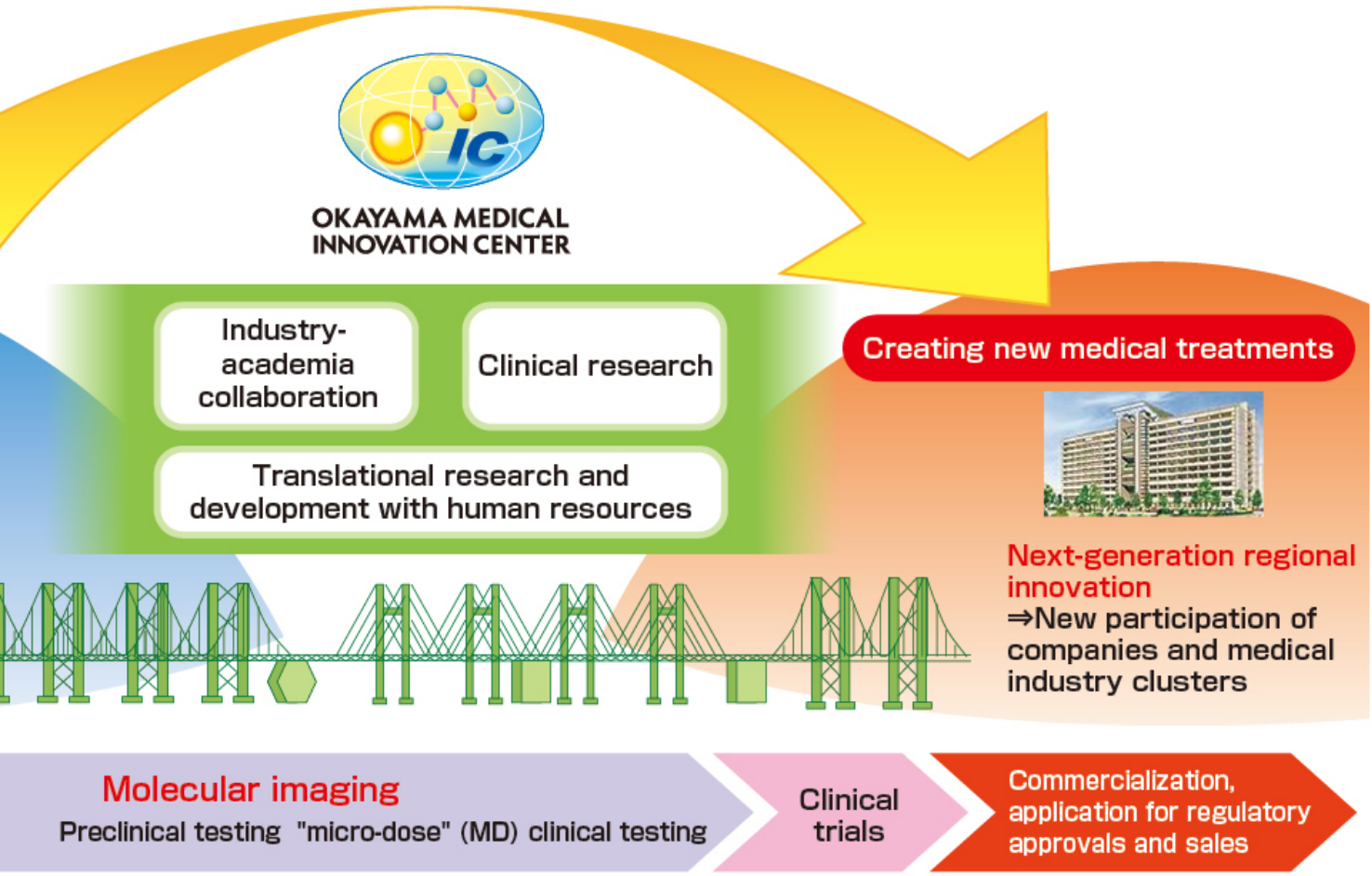


The OMIC coordination with local industry-academia-government

The Okayama Medical Innovation Center (OMIC) is ideally located at the health science campus of Okayama University, to best integrate advanced medical research programs and technologies of manufacturing companies in Okayama Prefecture with molecular imaging technologies. This collaborations will result in medical innovations in the near future, with the aim of creating medical industries and industrial clusters. The OMIC coordination with industry-academia-government in Okayama Prefecture is already eminently positioned and regarded as 'medically advanced'.

Offers innovation, with fully-fledged animal molecular imaging facilities at its core and by being located at the health science campus of Okayama University that should promote state-of-the-art medical treatments

The OMIC is creating a research and development model with that regional medical industries can develop "targeted therapy and innovative drug-discovery technologies"



Okayama Medical Innovation Center

Message from the Director

Hiromi KUMON

Director, Collaborative Research Center for OMIC,
Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences
(also, Director, The Specified Nonprofit Organization, "Medical-Techno-Okayama")

After six years following the establishment of the industry-academia-government collaborative organization, "Medical-Techno-Okayama", with the aim of creating medical industry clusters in Okayama, to realize the "Medical-Techno-Valley" vision, which has been fostered during this period, we have, at last, established the industry-academia-government joint research cooperation, OMIC.

The OMIC is the latest molecular imaging center that realizes medical innovation as a key element in the future life innovation. Its greatest advantage is its location, in such excellent health science campus, where education and research in medical sciences are unified, and where the university hospital practices state-of-the-art medical treatments.

The OMIC aims at medical innovation that disseminates information from Okayama to the world, based on pioneering achievements in innovative gene therapy and technological development of molecular target probes, created by the Innovation Center Okayama for Nano-Bio-targeted Therapy (ICONT), where leading models of the industry-academia collaboration system have been established.

The creation of new medical treatments takes place by matching the needs of medical practice with interdisciplinary coordination in the fields of medicine, dentistry, pharmacology and engineering. This requires the integration of state-of-the-art technologies from various fields of science and engineering, including industrial circles, as the essential element for its research and development. In addition, investigator-initiated translational clinical studies are crucial for medical innovation. We strongly believe that the OMIC will be a perfect place to efficiently and flexibly coordinate all of such elements.

Through close coordination with RIKEN (Kobe), that is a leading institution in the world, in the field of molecular imaging, along with several companies that represent Japan in the development of next-generation imaging probes and high profiles manufacturing companies in Okayama prefecture, we, at the OMIC, have set out to create an open innovation system for Asian countries to generate the latest medical innovations and spread them from Asia to the rest of the world. We highly anticipate your continuing support and active participation.

Organization and Role

The members of the Collaborative Research Center for the OMIC, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences and its coordinating staffs will play key roles in providing extensive research and development support, ranging from fostering the start-up research related to drug discoveries and imaging equipment to bridging to clinical research at Okayama University Hospital. As an open innovative institution dedicated to the creation of new medical industries based on molecular imaging, we will carry out extensive support projects, ranging from supporting the molecular imaging advanced human resources development project through the joint graduate school course with RIKEN (Kobe) to supporting the creation of bio-venture businesses.

(OMIC)

OKAYAMA MEDICAL INNOVATION CENTER

OMIC (Local industry-academia-government joint research cooperation)

Project Steering Committee (Okayama Prefecture, Okayama University, and industrial circles)

OMIC Project Promotion Headquarters of Okayama University

Promoting research

Bridging to clinical trials

Collaborative Research Center for OMIC, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences

Educating and developing human resources

- Molecular Imaging Department
- Animal Experiment Department
- Incubation Department

Okayama University Hospital

PET/CT diagnosis

Performing "micro-dose"(MD) clinical tests

Research and Development

- Development of simultaneous multiple molecular imaging systems
- Development of molecular probes that can be applied to diverse imaging methods
  - Infection, cancer and regenerative medicine

- Establishment and application of innovative peptide probe-making methods
  - New labeling systems using microchips
- Search for new cancer cell-binding peptides and ^{18}F-labeling-based molecular imaging

- Development of antibody probes and applications to innovative targeted therapy
  - Cancer, atherosclerosis, diabetes

Clinical Development

- Drug discovery and development of equipments through industry-academia collaboration

- Development of innovative gene therapy-medical drugs and next-generation imaging probe drugs, support for discovery and development of various drugs
- Development of PET probes by automated synthesizers, integration of development programs for drug delivery systems (DDS) and medical devices

Creation of industry-academia collaboration model and emerging business based on molecular imaging

"Medical-Techno-Valley" vision (Collaboration with "micro-manufacturing" companies in Okayama Prefecture and attraction of enterprises)

Human Resources Development and Support for Commercialization

- Fostering molecular imaging research workers by holding training workshops and lecture meetings
- Fostering medical industries in Okayama Prefecture and formation of a medical cluster

- Staffs of Collaborative Research Center for OMIC, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences
- Staffs of Medical-Techno-Okayama
- Faculty members of Center for Innovative Clinical Medicine. Okayama University Hospital
- Coordinators of Organization for Research Promotion and Collaboration

Support

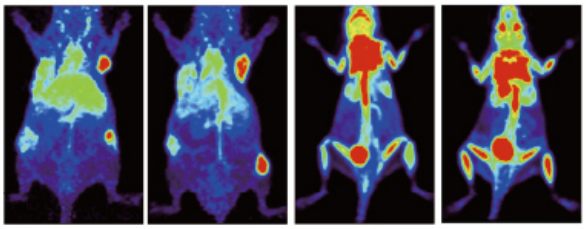
- Research and development strategic commercialization plan
- Patent strategy
- Management strategy
- Financing strategy
- General administration and operation

Molecular Imaging Department

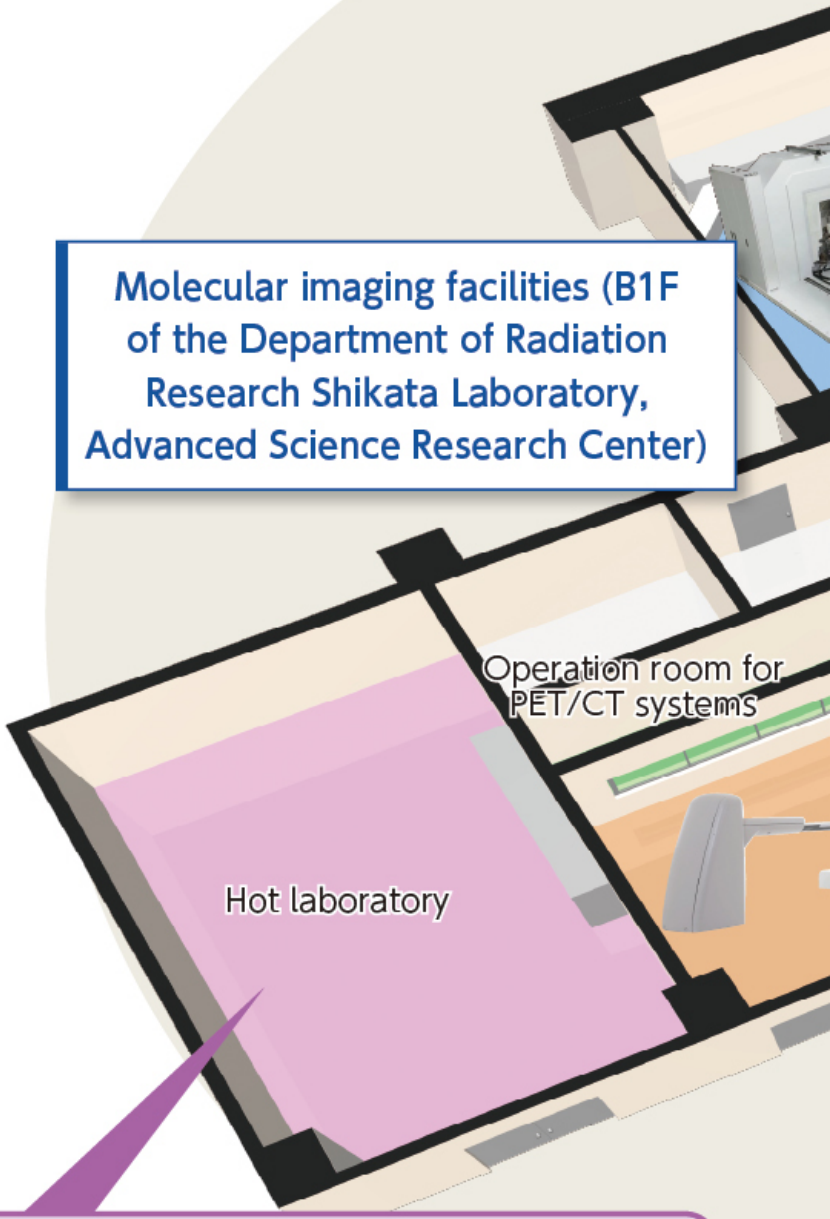
- The molecular imaging technology, which have been established, not only by basic research in medical and pharmaceutical sciences, but also through research in integrated fields such as chemistry, physics, and computer science, plays an important role in bridging from basic research to clinical trials.

- The OMIC has an environment that enables tissue-level imaging research by MALDI-TOF MS as well as non-invasive molecular imaging research with small animals (mice, rats, etc.) using the luminescent/fluorescent imaging system and the CT system.

- The OMIC also enables molecular imaging research with small and medium-sized animals (from mice to cynomolgus monkeys) by the PET/CT systems



Molecular imaging facilities (B1F of the Department of Radiation Research Shikata Laboratory, Advanced Science Research Center)



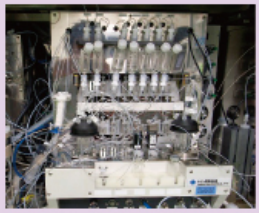
Hot cell and synthesizers for PET probes

Aiming at general clinical test and "micro-dose" (MD) clinical tests, the system corresponds to the GMP standards for investigational medicinal products.

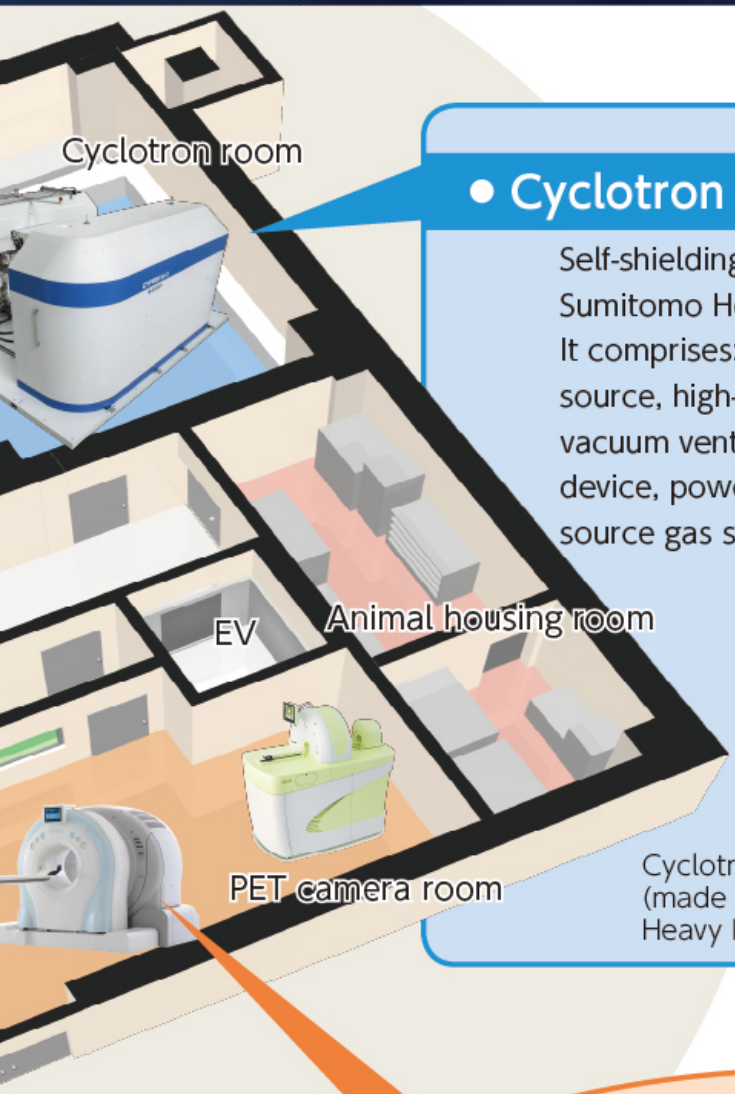
Two unit-type hot cells store synthesizers for short-half-life radionuclide labeled PET probes (made by Sumitomo Heavy Industries, Ltd).

^{18}F-FDG synthesizer (F200)

CFN multi-purpose synthesizer



^{64}Cu-metal target-purification system



• Cyclotron

Self-shielding type (made by Sumitomo Heavy Industries, Ltd). It comprises: electromagnet, ion source, high-frequency apparatus, vacuum ventilation device, cooling device, power-supply unit, ion source gas supply unit, etc.

It can take out positron-emitting radio-nuclides - ^{11}C, ^{13}N, ^{15}O, ^{18}F, ^{64}Cu.

Cyclotron; HM-12S, (made by Sumitomo Heavy Industries, Ltd)

• PET system for small and medium-sized animals

By administering the drug (PET probes) labeled by positron-emitting RI into the bodies and obtaining the distribution as a tomographic image by positron-emission tomography (PET), the system enables the analysis of pharmacokinetics and pharmacodynamics.

PET system for small animals (Clairvivo PET [made by Shimadzu Corp])

PET/CT system for medium-sized animals (Eminence STARGATE [made by Shimadzu Corp])

Molecular Imaging Department

Advanced Science Research Center, 5F

●Chemiluminescent/fluorescent in vivo imaging system (IVIS® Spectrum, made by Xenogen)

By utilizing chemiluminescence and near infrared fluorescence, the system enables in vivo non-invasive molecular imaging with small animals (mice, rats).

● In vivo CT system for small animals (eXplore Locus, made by GE Healthcare)

The system enables X-ray CT imaging for small animals (mice, rats).

General Education and Research Building, 1F

● Time-of-flight mass spectrometer (imaging MS)

This new technology can display 2-D distribution of intended biological molecules based on their positional information on tissue sections. They are obtained by their direct measurement, without extraction and labeling of samples, as well as the strength of signals of detected ions.

Chemical printer
(CHIP-1000 [made by Shimadzu Corp])

Laser desorption/ionization time-of-flight mass spectrometer
(AXIMA® Performance [made by Shimadzu Corp])

Animal Experiment Department

OKAYAMA MEDICAL INNOVATION CENTER

The molecular imaging department with the methodology of in vivo dynamics analyzes the behavior of various biological/physiological molecules such as genes/genetically regulating molecules and proteins in the 'live state'.

To perform this kind of research, researchers have to work with experimental animals; therefore, it will be essential to have animal experimental laboratories and animal housing facilities.

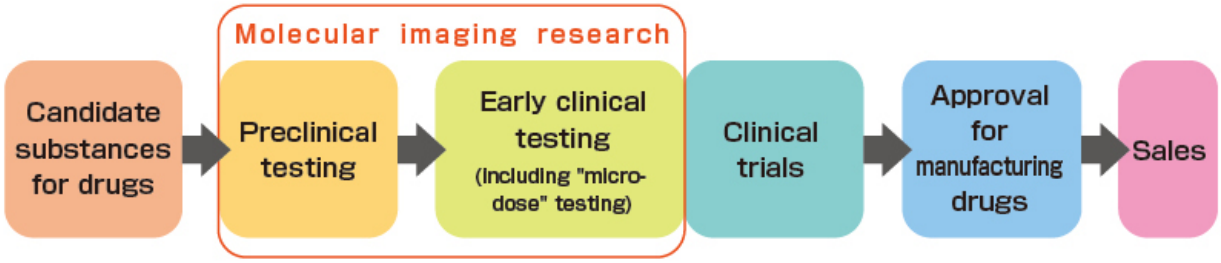
In the health science campus of Okayama University, there exists an Advanced Science Research Center (Animal Resources Department) as a shared animal experiment facility for inside and outside researchers of the university. The facility has a system of feeding and managing for experiments with rodents (mice, rats, etc.), as well as primates (mamosets, cynomolgus monkeys, etc.).

Animal housing room in the Advanced Science Research Center

Also in the Department of Radiation Research Shikata Laboratory, Advanced Science Research Center (under the RI regulation) where the OMIC collaborative research area is placed, the temporary housing facilities for mice, rats, and monkeys, together with a drying equipment (for animals after experimentation) are available.

Preclinical testing for drug discovery

The development of drugs starts with searching for candidate compounds and moves step-by-step to preclinical tests and then on to clinical trials. The most important factor for developing drugs is whether or not the results of clinical testing can be predicted from the results of preclinical testing. In recent years, with the remarkable progress of molecular imaging using PET, early clinical testing("micro-dose" testing) has been applied. Similarly, molecular imaging has been used for scientific and efficient screening at the first stage of drug discovery; absorption, distribution, excretion and evaluation of drug efficacy at the stage of preclinical tests, while the development of imaging biomarkers is also underway. The use of suitable laboratory animals and disease models, according to the drug which is subject to development, can accelerate and, therefore, reduce the costs of the drug-discovery process.



Animal models and molecular imaging

With the development of the molecular imaging instruments for small and medium-sized animals, pharmacokinetics and pharmacodynamics analyses in real time on various biologically-active substances and drug-candidate substances now can be comprehended with disease-animal models, resulting in the expansion of the research field of molecular imaging.

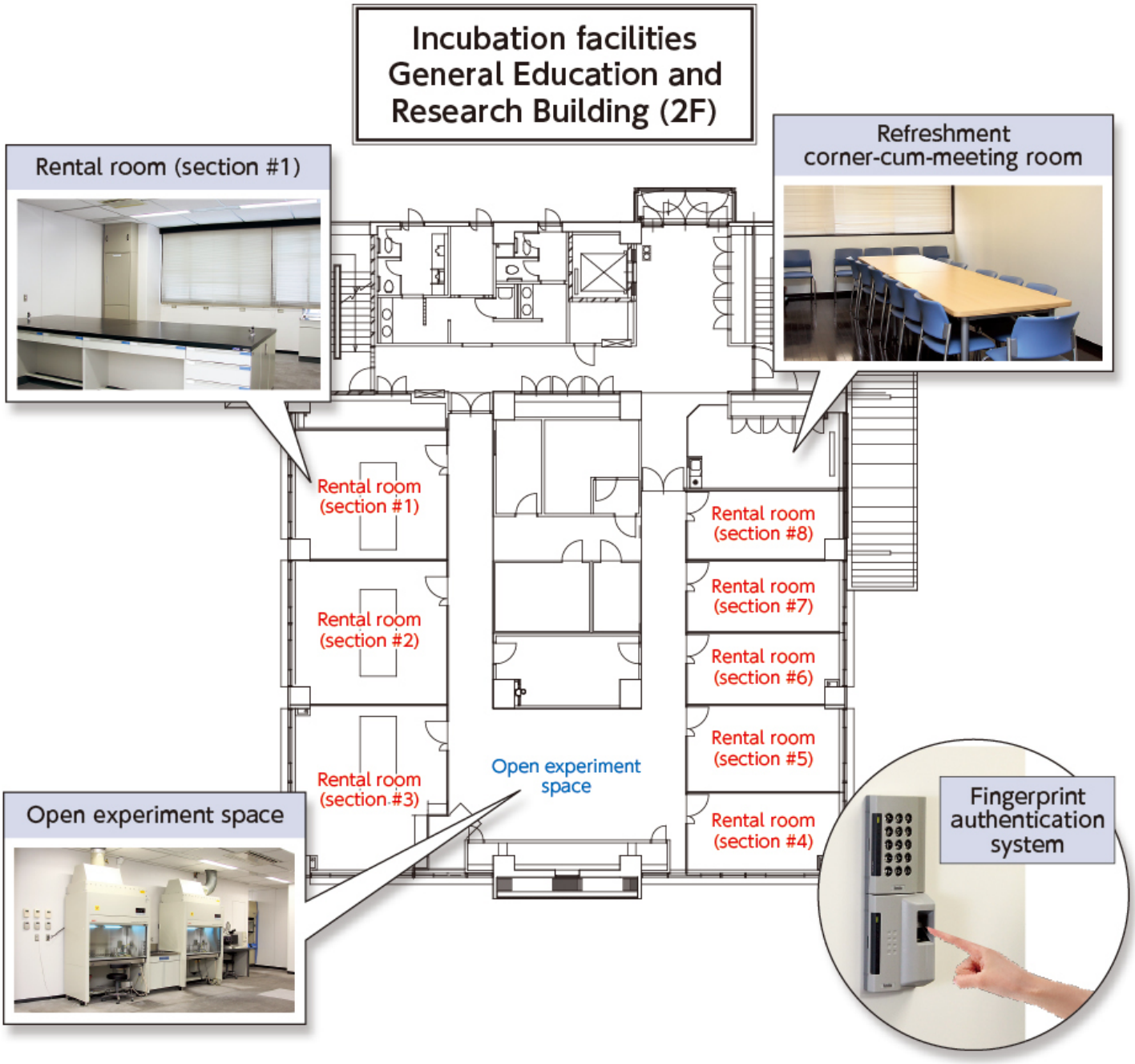
In the field of cancer research, in addition to the pharmacodynamic evaluation of anticancer drugs with ^{18}F-FDG, novel molecular target probes for diagnosis and treatment have been developed. Moreover, the antibody probes that are specific for target lesions, such as amyloid protein causing Alzheimer's disease and atherosclerotic plaque have been developed. Therefore, the approach for the development of new diagnostic procedures and therapeutic drugs is also advancing.

Incubation Department

In order to provide a confortable research environment that enables companies aiming to develop medicines and medical devices by using a cyclotron and molecular imaging equipments, incubation facilities are available at the health science campus of Okayama University (Shikata Campus).

Overview

- The first and second floors of the 8-storey General Education and Research Building
- Eight rental rooms (as experimental laboratories) (2F)
- Common space: Open experiment space, culture room, sterilization room, darkroom, cold room, homiothermal room, emergency shower room, refreshment corner-cum-meeting room, etc.



Features

- **You can use the molecular imaging instruments including a cyclotron and PET cameras installed at the campus.**
  You are provided the research environment for developing innovative molecular probes using peptides and antibodies and for molecular imaging that targets small and medium-sized animals.
  You can perform research and development of revolutionary target drug delivery systems (DDS) based on the molecular probe technologies.
- **We have strengthened security by installing a fingerprint authentication system and surveillance cameras at the major entrances.**
- **You can use the common use laboratory equipments and the medical library (Shikata Branch Library) at the campus.**
  For inquiries about the common use laboratory equipment, please see
  http://www.hsc.okayama-u.ac.jp/med/med-jikken/ryoukin.html
  For the use of Okayama University Library, please see
  http://www.lib.okayama-u.ac.jp/shikatalib/index.html
- **We coordinate sponsored research and joint research with Okayama University.**
- **We provide information on seminars, training workshops, and call for funded researches.**

Entering condition, qualification, etc.

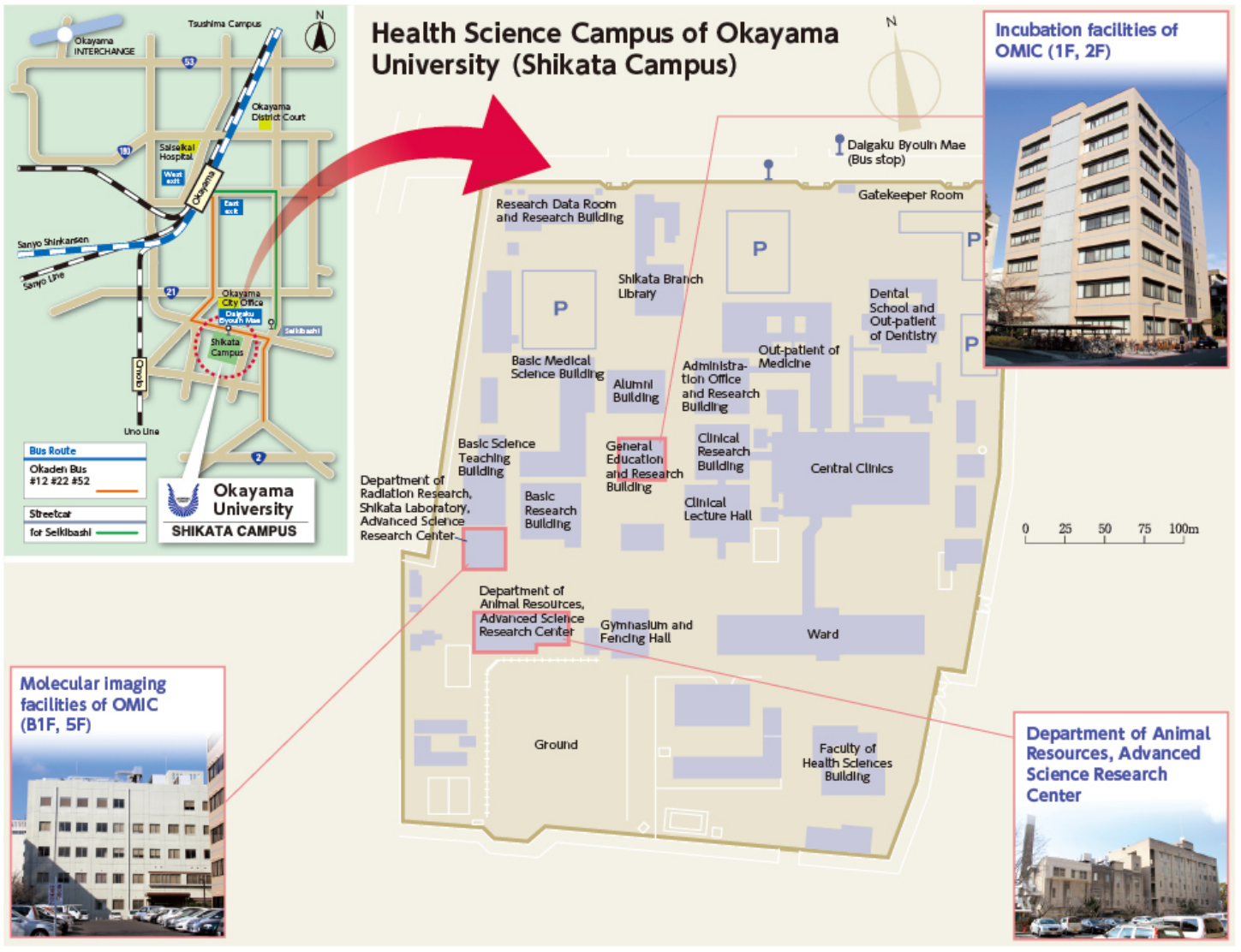
- **Candidate:** Companies that would perform molecular imaging researches at the OMIC research base, in principle
- **Period:** up to 3 years (The contract extension for the period by review is possible).
- **Review:** Candidate companies are subject to review before entering.
- **Application period:** As needed (Please apply at least one month before entering). However, receiving applications will be complete as soon as the rental rooms become fully occupied.

■Incubation facilities

Section of rental rooms (Actual room numbers may be different)		#1	#2	#3	#4	#5	#6	#7	#8
Rentable area size		35.52m²	39.21m²	44.38m²	22.58m²	23.80m²	19.70m²	19.70m²	19.27m²
Ceiling height		2.68m							
Communication environment		Communication cables are lined to the building by Okayama University.							
Security		Fingerprint authentication system, round-the-clock monitoring of the entrance by video cameras							
Electric sources	100V	8units	10units	9units	7units	7units	8units	7units	7units
	200V	N/A	N/A	1units	N/A	N/A	N/A	N/A	N/A
Gas		2units	2units	2units	N/A	N/A	N/A	N/A	N/A

* The tenants are requested to pay utility costs and the expenses for installing the Internet and telephone lines.

Access



Okayama Medical Innovation Center (OMIC)

Collaborative Research Center for OMIC, Okayama University
Graduate School of Medicine, Dentistry, and Pharmaceutical Sciences
2-5-1, Shikata-cho, Kita-ku, Okayama 700-8558, Japan
TEL: +81−86−235−6529 FAX: +81−86−235−7045
E-Mail : crc-omic@md.okayama-u.ac.jp
URL : http://www.okayama-u.ac.jp/user/crc/