

Public call for collaborative research for fiscal year 2017 (Structural Biology)

Since having been recognized as a Joint Usage/Research Center for the Multi-Stratified Host Defense System on April 1, 2010, the Medical Institute of Bioregulation, Kyushu University has been promoting collaborative research with researchers involved in host-defense studies. We have established two projects: (1) an instrument usage type project in which collaborative research is conducted using the multi-stratified levels of research facility infrastructure and the technology of this institute (a maximum budget of 500,000 yen, including travel and accommodation expenses, is distributed); and (2) a collaborative research type project (travel and accommodation expenses only) that aim at clarifying the host-defense system using the knowledge accumulated about host defense in this institute. We currently call for collaborative research to be conducted in this institute by external researchers in collaboration with our facilitator by using state-of-the-art instruments, based on the key technologies of this institute as follows:

1. Field of research: Structural biology

We plan to conduct collaborative research on the technical development of structural biology using a high performance cryoelectron microscope, and on the elucidation of the mechanism of molecular recognition of proteins using structural biology technologies (nuclear magnetic resonance, X-ray crystallography, and electron microscopy).

Structural Biology is the discipline that explains the functions of biomacromolecules, in particular proteins, based on their structures. Conventionally, functional analysis is performed first and protein structure is determined last, however currently there are an increasing number of cases where protein structure is determined first and its function is inferred from the structure. The necessity of determination of biomacromolecule structures is now widely recognized, based on the fact that "it is often possible to describe their functions in ways similar to macro machines even though they are nano-scale molecules." The following devices for structural biology are available.

1) Automatic setting-up devices for crystallization screening

- Search under 96 different crystallization conditions using a total of 25 μ l protein solution (0.2 μ l per drop).



Fig. 1 Crystal Gryphon LCP Setting-up Device (Art Robbins Instruments)

2) NMR analyses of protein structures, protein-ligand interactions using NMR titration experiment, and dynamics using NMR relaxation (^{15}N etc.)

- Bruker Avance600, Varian Inova600

A high-performance cryogenic probe is equipped with the two Bruker NMR spectrometers.

3) Single particle analysis and tomography using electron microscopes

- FEI Tecnai G3 Polara (300 kV transmission electron microscope)

Cryo measurements at liquid helium and nitrogen temperatures, Tomography including STEM tomography, STEM(HAADF), 4K x 4K CCD (UltraScan4000, GATAN), Energy filter (GIF Tridiem, GATAN with 2K x 2K CCD)

- FEI Tecnai20 (200 kV transmission electron microscope)

Tomography, 2K x 2K CCD (Eagle 2k, FEI)



Fig. 2 Cryoelectron microscope (Tecnai Polara)

4) Isothermal titration calorimeter

- VPC-ITC (Microcal)

5) Circular Dichroic Polarimeter (CD)

-JASCO J-820

2. Qualification of applicants

Researchers belonging to universities, national or public institutions, or equivalent institutions

3. Period of research

From April 1, 2017 to March 31, 2018

4. How to apply

Required Documents: Prescribed application form (1 original and 1 copy).

The application form is downloadable at <http://www.bioreg.kyushu-u.ac.jp>.

Please fill out the application form and send it to the address below by post or e-mail. Please discuss the contents with the facilitator of the institute before sending in your completed application form.

Application deadline: Friday, February 24, 2017.

Send to: Yoichiro Shibata / Mihoko Nakano (contact person)

General Affairs Section, Academic Research Cooperation Division, Administrative Office (Medical Sciences, Dental Science and Pharmaceutical Sciences), Kyushu University

Address: 3-1-1, Maidashi, Higashi-ku, Fukuoka 812-8582, JAPAN

Mail: ijksomu@jimu.kyushu-u.ac.jp

Tel: +81-92-642-6672; Fax: +81-92-642-6776

5. Acceptance or rejection

Once the review committee has made a decision to either accept or reject the application, you will be informed of the result as soon as possible.

6. Report of the results

Please submit a report describing the progress and results of the research once the study has been completed. If you have published a paper based on the results of the study, please acknowledge the facilities of our institute that you have used in the paper as follows:

“This work was partly performed in the Cooperative Research Project Program of the Medical Institute of Bioregulation, Kyushu University.”

In addition, please submit a copy of the reprint of the paper.

7. Others

(1) The *required* conditions or quantities of samples may vary substantially depending on the type of analysis or research aim. Please inquire from the facilitator of the institute beforehand whether the experiment is feasible or not.

(2) *Preliminary* studies need not have been performed on the samples (crystallization, determination of lattice constant, NMR measurement, electron microscopic observation, etc.); however, it is preferable that at least the preparation of the samples or a preliminary study for the collection of the samples has begun.

(3) Once a research theme has been chosen, the researcher responsible for the experiment must become a collaborator of the Medical Institute of Bioregulation. The researcher who wishes to receive reimbursement for travel expenses as a collaborator should answer "yes" to the "requirement of travel expense" in an application form.

(4) If you wish to conduct an urgent experiment, we may accept your application even after the application deadline. Please contact Yoichiro Shibata / Mihoko Nakano (contact person), the General Affairs Section, Academic Research Cooperation Division, Administrative Office (Medical Sciences, Dental Science and Pharmaceutical Sciences), Kyushu University.

8. Mandatory expenses

Research and travel expenses are provided, as per the budget. Travel expenses are also provided to research collaborators, as per the budget. Please contact the facilitator of the institute before beginning a collaborative research.

9. Handling of intellectual properties

Intellectual properties are handled in accordance with the Intellectual Property Handling Rules of Kyushu University.

10. Inquiries

• Regarding the application for collaborative research:
Yoichiro Shibata / Mihoko Nakano (contact person)
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(Medical Sciences, Dental Science and Pharmaceutical Sciences), Kyushu University
Mail: ijksomu@jimu.kyushu-u.ac.jp
Tel: +81-92-642-6672; Fax: +81-92-642-6776

• Inquiries about available instruments and technology:
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