

Application for Certification as a World Premier International Research Center (WPI) Academy Institution

Host institution	Osaka University
Research Center	Immunology Frontier Research Center (IFReC)
Host Institution Head	Shojiro Nishio
Center Director	Kiyoshi Takeda
Administrative Director	Nobuo Sakaguchi

1. Overall Image of Your Center

IFReC was established as a WPI center in 2007 on the basis of Japan-leading research achievements in immunology. IFReC has devoted itself to its mission of combining the fields of immunology, imaging and informatics to comprehensively understand the dynamics of the immune system. During this time, IFReC has built up research achievements of the highest standard producing over 1,300 papers that reached an average citation index of 43.5 and an h-index of 97. In addition, IFReC researchers have had several new discoveries of elements in the immune system and cell signaling pathways as well as creation of innovative new technologies and intellectual property. These advances have attracted much attention from overseas and IFReC has achieved very high visibility internationally in the fields of immunology and biology. The WPI-IFReC center attracts strong interest not only from researchers in Japan and overseas but also international pharmaceutical companies. The WPI program committee also acclaimed IFReC for achieving World Premier Status. In the next 10 years, IFReC will further raise the standard of its world top-level basic research as a WPI Academy center and will apply the basic research results achieved in order to contribute back to society. For the future long-standing sustainability of activities, IFReC is now strengthening the top-down leadership by the nomination of a new director who has the motivation and eagerness to promote the four WPI missions, Science, Globalization, Fusion research and System reform. In April 2017, IFReC entered 10-year comprehensive collaboration agreements with Chugai Pharmaceutical Co., Ltd. and Otsuka Pharmaceutical Co., Ltd., respectively. These collaboration agreements secure IFReC researchers the ability to freely advance scientific basic research and by reporting the results gained from the research, create a seamless path to joint research. The collaborations also ensure an operating base for IFReC that replaces that of the WPI grant. IFReC has raised the flag of Open Innovation and hopes to form collaborations with other corporations. This comprehensive collaboration agreement is a new form of university-industry cooperation and has received high acclaim from many quarters. Effective implementation and operation of the Open Innovation strategy is a new mission for IFReC.

2. Mid- to long-term research projects and strategies

IFReC has created a unique and energetic research environment with world top-class researchers, a fully-equipped facility and an effective research support system. As a member of the WPI Academy, IFReC will continue to raise its visibility overseas and international confidence in scientific standards in Japan.

(1) Collaboration with QBiC, CiNet and Institute for Datability Science: Researchers at IFReC and these other institutes, also located on Suita Campus, are creating new interdisciplinary research fields

to model the immune system as a whole by observing the collective behavior of immune molecules and cells using cutting-edge imaging methods and analyzing the experimentally obtained big data.

(2) Generation of innovative immunotherapies: At IFReC, the application of research outcomes to medical/clinical immunology has been accelerated through cooperation with Osaka University Hospital. In addition, collaboration with companies is advancing the application of basic research results into drug discovery and development of diagnostic technologies. Listed below are major projects at IFReC;

- Development of innovative immune-regulating techniques using innate immune mechanisms
- Development of innovative cancer immunotherapy to target regulatory T cells
- Development of novel diagnostic and therapeutic strategies for autoimmune diseases
- Promotion of new drug development with innovative PET/MR and PET/CT imaging
- Forefront vaccine development

3. System for Managing the Research Organization

Research organization and management will be conducted as follows to carry out the research strategy and plan described above.

(1) Maintenance of the WPI research system and operating structure: The current research organization and operation structure will be maintained to the extent possible to fully utilize the advantages. Namely, 1, Top-down decision making by the Director; 2, Use of generous discretionary expenses; 3, The function of the administrative director; 4, Research Planning and Management Office (RPMO) with research administrators (URA) familiar with the needs of researchers; and 5, Administrative staff capable in English.

(2) PI organization with strong potential: New concurrent PIs (Okada, Yamashita, Nagasawa and Yamasaki in FY2017, Okada, Takakura and Hara in FY2018 and Fujimoto in FY2019) have been appointed to encourage the seamless development of basic research to medical/clinical immunology and to promote interdisciplinary research further. In addition, it is also vital to maintain a high research standard across generations. At IFReC, if researchers are able to continue to achieve outstanding research outcomes and publish papers in top international journals as well as acquiring external funding of 100 million yen per year, they will be provided with a research environment. IFReC actively promotes young researchers to PI's in order to steadily inherit research assets from the senior researchers. IFReC established a grant program for young PIs to challenge research to create a new field of immunology in FY2018.

(3) Promotion of Open-Innovation strategy toward medical and clinical immunology development IFReC has formed comprehensive collaboration agreements with multiple companies. Since basic research achievements at IFReC are reviewed by the companies at an early stage, the agreements are expected to promote joint research for applied research. The Open Innovation Strategy that encourages collaborations with the other companies will advance medical/clinical immunology as well as promotion of basic research to human immunology and stabilization of the operations base for IFReC.

(4) Enhanced function as a hub for international brain circulation

(See 4. International Circulation of Best Brains)

(5) Enrichment of the research support system IFReC has significantly extended the experience of URAs in the WPI program period. Under the comprehensive collaboration agreements, URAs will gain experience in a different realm. Responsibilities will include; support for collaboration with companies such as intellectual property and support for advancing translational research; requiring the training and appointment of professionals with a wider range of capabilities to enrich the research support system.

4. International Circulation of Best Brains

Function as an international brain circulation hub will be enhanced by establishing a virtuous cycle, in which career development of IFReC's young researchers attracts outside researchers to IFReC and assists the employment of excellent researchers. To establish this virtuous cycle, the following will be implemented.

(1) International brain circulation program for young researchers Under the WPI program IFRcC has already supported nearly 100 young researchers on dispatch overseas as well as supporting visits by international researchers to visit IFRcC using the Kishimoto Foundation Fellowship. As a WPI Academy Center, IFRcC will launch the International Brain Circulation Program for Young Researchers to encourage a continuous flow of international brains by sharing acquired experiences through international exchange among young researchers in IFRcC. It is expected to give strong stimulation to research activities through overseas experience by Japanese researchers and overseas researchers visiting Japan.

(2) Super-postdoc system The acquisition of excellent young researchers is a competition on a global scale. The low level of remuneration in Japan is a significant barrier to hiring international young researchers from overseas. For this reason, the Super-Postdoc system will offer remuneration that is 1.3 times that of standard pay.

(3) Establishment and use of Winter School Alumni The Winter School has been hosted by IFRcC and the Singapore Immunology Network since 2012. The young researchers gathered at this school are without doubt the future global leaders of immunology. As a host, IFRcC will establish an Alumni to follow the participants' careers, invite them to IFRcC events, and maintain and develop the relationships.

(4) Use and fostering of staff to support the international brain circulation The development of the international brain circulation depends on sufficient publicity of research results of young IFRcC researchers, and wide publicity of IFRcC's research activities to attract excellent young researchers. Effective measures include outreach activities and continuous holding of opportunities to form personnel networks such as international symposia and the Winter School as well as hiring and training URAs capable of supporting such activities.

5. Support by Host institution

(1) Establishment of International Advanced Research Institute Osaka University has set up the International Advanced Research Institute with the university president at its head. IFRcC became a permanent core center within the institute.

(2) Assignment of permanent positions for researchers and staff Osaka University has provided IFRcC with seven administrative staff, and in FY2015, provided tenure positions for overseas researchers (one professor and two associate professors). Further, the university offers five further tenure positions (including two professors) for three laboratories.

(3) Support for University-Industry Collaboration This fiscal year sees the launch of the comprehensive collaboration agreements and IFRcC will promote collaboration with further companies according to the Open Innovation strategy. The support of the Office for Industry-University Co-Creation of Osaka University is vital to handling intellectual property and managing these agreements and other collaborations with companies.

6. Financial Measures

Ensuring IFRcC operating costs through collaboration with industry IFRcC has concluded two 10-year comprehensive collaboration agreements beginning with Chugai and Otsuka. These agreements mean that operating expenses equivalent to the WPI grant have been secured. Naturally, the accounting management of these external funds must be done with great care. Expenses for university education and training, wider contribution to society and promotion of globalization of the university must be meticulously managed. In particular, support other than salary to researchers is also vital in order to complete the mission of a Hub for International Brain Circulation. Expenses and personnel related to support for publicity of research achievements such as conducting outreach activities and hosting symposia etc. are necessary. Therefore, financial support from Osaka University and MEXT is vital for IFRcC to carry out the WPI missions and contribute to the development of medical/clinical immunology as a world leading WPI Academy Center.

WPI Academy Center

Form 2 FY2019 List of Principal Investigators

NOTE:

- Underline names of principal investigators who belong to an overseas research institution. Place an asterisk (*) by names of investigators considered to be ranked among world's top researchers.
- In case of researchers who newly participated in the center in FY 2017, state it in the "Notes" column.

		<Results at July 1st, 2019>				Principal Investigators Total: 31	
Name	Age	Affiliation (Position title, department, organization)	Academic degree specialty	Effort (%)*	Starting date of participation (joined IFReC)	Status of participation(contribution) (Describe in concrete terms)	Notes
Center director Kiyoshi Takeda*	52	Director and Professor, WPI Immunology Frontier Research Center, and, Graduate School of Medicine, Osaka University	MD, PhD (Immunology)	100	01/11/2007	usually stays at the center	
Shizuo Akira*	66	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	100	01/10/2007	usually stays at the center	
Tomohiro Kurosaki*	63	Deputy Director and Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology and molecular biology)	80	03/12/2007	usually stays at the center	
Hisashi Arase*	53	Deputy Director and Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	70	01/10/2007	usually stays at the center	
Atsushi Kumanogoh*	53	Professor, Graduate School of Medicine, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	10	01/10/2007	usually stays at guraduate school of medicine	
Ken J. Ishii*	50	Professor The Institute of Medical Science, The University of Tokyo Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology, Vaccine Science)	5	01/11/2007	join to meetings every two months, workshops several times a year, and symposiums occasionally.	
Cevayir Coban	46	Professor, The Institute of Medical Science, The University of Tokyo, WPI Immunology Frontier Research Center, Osaka University	MD (Clinical Microbiology specialty)	20	01/04/2008	stays at the center once (1 week) a month, joint IFReC Management meetings, at skype meeting three times a week.	
Kazuhiro Suzuki	43	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immune cell dynamics)	90	01/04/2011	usually stays at the center	
Masahiro Yamamoto	40	Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center,Osaka University	PhD (Immunology)	45	01/04/2012	usually stays at the center	
<u>Seymour Benjamin John</u>	46	NICT Invited Executive Researcher and Wellcome Trust Intermediate Clinical Fellow (Cambridge University)	PhD (Neurological Science)	10	01/04/2014	He visits IFReC several times/year to attend symposia, etc. to contribute to research at IFReC. He regularly communicates with us by emails.	
Jun Hatazawa*	65	Professor, Research Center for Nuclear Physics, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Nuclear Medicine)	5	16/01/2009	stays at the center once a month, usually stays at Research Center for Nuclear Physics Osaka University, RCNP	research for new radionuclide development for medical use
Kazuya Kikuchi	53	Professor, Graduate School of Engineering, WPI Immunology Frontier Research Center, Osaka University	PhD (Chemical Biology)	10	01/08/2009	usually stays at the center	
Masaru Ishii	46	Professor, Graduate School of Frontier Biosciences, WPI Immunology Frontier Research Center,Osaka University	MD, PhD (Bioimaging)	5	01/12/2008	usually stays at the center	

Nicholas Isaac Smith	44	Associate Professor, WPI Immunology Frontier Research Center, Osaka University	PhD Engineering / Applied Physics)	90	01/06/2009	usually stays at the center, except when teaching or during conference travel	
Daron M.Standley	51	Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center, Osaka University	PhD (Bioinformatics)	30	01/10/2008	usually stays at the center	
Shigekazu Nagata*	69	Professor, WPI Immunology Frontier Research Center, Osaka University	PhD (Molecular/Cell Biology)	95	01/04/2015	usually stays at the center	
Taroh Kinoshita*	67	Endowed Chair Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center, Osaka University	PhD (Immunology, Biochemistry)	70	01/10/2007	usually stays at the center	
Shimon Sakaguchi*	68	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	80	01/04/2011	usually stays at the center	
Takashi Saito*	68	Team leader, RIKEN, Research Center for Integrative Medical Sciences, Professor, WPI Immunology Frontier Research Center, Osaka University	PhD (Immunology)	10	01/04/2008	join to meetings every two months, workshops several times a year, and symposiums occasionally.	
Hitoshi Kikutani*	68	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	100	01/10/2007	usually stays at the center	
Tadamitsu Kishimoto*	80	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	70	01/10/2007	usually stays at the center	
<u>Fritz Melchers*</u>	83	Max Planck Fellow	PhD (Immunology)	10	01/10/2007	He visits IFRc several times/year to attend symposia, etc. to contribute to research at IFRc. He regularly communicates with us by emails	
Toshio Yanagida*	72	Professor, Graduate School of Frontier Biosciences, WPI Immunology Frontier Research Center, Osaka University	PhD (Molecular Imaging)	5	01/10/2007	join seminars, symposium, and meetings (several times a year at IFRc)/ interdisciplinary research promotion at NICT CiNet and Riken	
Yukinori Okada	38	Professor, Graduate School of Medicine, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Bioinformatics)	5	01/04/2017	conducts research 2 or 3 times a week at the center	
Toshihide Yamashita	54	Professor, Graduate School of Medicine, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Neurological Science)	15	01/04/2017	conducts research 2 or 3 times a week at the center	
Takashi Nagasawa	57	Professor, Graduate School of Frontier Biosciences, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	20	01/04/2017	conducts research 2 or 3 times a week at the center	
Sho Yamasaki	50	Deputy Director and Professor, WPI Immunology Frontier Research Center, and Research Institute for Microbial Diseases, Osaka University	PhD (Immunology)	80	01/04/2017	usually stays at the center	
Masato Okada	61	Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center, Osaka University	PhD(Science)	50	01/08/2018	stays at the center once a week	New
Eiji Hara	54	Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center, Osaka University	PhD (Molecular Biology)	50	01/08/2018	usually stays at the center	New
Nobuyuki Takakura	56	Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center, Osaka University	MD,PhD(Vascular and Stem Cell Biology)	5	01/08/2018	usually stays beside the center	New
Manabu Fujimoto	52	Professor, Graduate School of Medicine, WPI Immunology Frontier Research Center, Osaka University	MD.PhD. (Dermatology)	15	01/04/2019	usually stays at guraduate school of medicine	New

*Percentage of time that the principal Investigator will devote to his/her work for the center vis-à-vis his/her total working hours (total time for whole working activities including education, medical services, and others as well as research).

Researchers unable to participate in the center in FY 2017

Name	Affiliation (Position title, department, organization)	Starting date of participation

World Premier International Research Center Initiative (WPI) Diagram of management system

