

World Premier International Research Center Initiative (WPI)

FY2011 WPI Project Progress Report (Post-Interim Evaluation)

Host Institution	Osaka University	Host Institution Head	Toshio Hirano President
Research Center	Immunology Frontier Research Center	Center Director	Shizuo Akira Professor

Common instructions:

- * Unless otherwise specified, prepare this report from the timeline of 31 March 2012.
- * So as to base this fiscal year's follow-up review on the document "Post-interim evaluation revised center project," please prepare this report from the perspective of the revised project.
- * Use yen (¥) when writing monetary amounts in the report. If an exchange rate is used to calculate the yen amount, give the rate.

Summary of State of WPI Center Project Progress (write within the space of this page)

FY2011 was a very fruitful year for IFReC in two aspects: Firstly, yearly publication of research papers exceeded 200, of which as many as 20 papers appeared in journals of impact factors higher than 14. In addition to this high quality science, more medically oriented papers were published than in preceding years, reflecting researcher's awareness of the need for academic research to be translated into that which would benefit human health. Secondly, the year witnessed IFReC establish the research environment required for both an internationally competitive immunology research center and for advancing interdisciplinary research. Construction of the new IFReC Research Building (completed in March, 2011), that adjoins the Integrated Life Science Building, made it possible for two-thirds of IFReC's research groups to work "under one roof". In this research complex, several advanced imaging instruments such as a new 11.7 T MRI and new computer servers and network system were installed. Furthermore, the radio-isotope experimental station and part of the Core Instrumentation Facility of the Research Institute for Microbial Diseases (RIMD) were set up in the new building for common use with IFReC.

As for interdisciplinary research at IFReC, the challenge is gradually being met. Several works, with joint authorship, were published by researchers from different disciplines. Noteworthy examples are the study of the RNase regnase-1 that serves a critical role in preventing autoimmunity by controlling the stability of mRNA encoding cytokines (collaboration of immunology, bioinformatics and structural biology) and the study on bone-resorbing dynamics of osteoclasts (collaboration of immune-imaging and probe chemistry).

The percentage of overseas researchers at all levels was kept above the WPI target level of 30%. Despite a marked decrease in overseas visitors to Japan as a whole, due to the Great East Japan Earthquake and its aftermath, IFReC also received many visitors from abroad, including foreign government officials as well as scientists. Although an international symposium scheduled for last May was cancelled due to the same reason, the first "Winter School on Advanced Immunology", was successfully held on Awaji Island in January, 2012. The school was jointly organized by IFReC and the Singapore Immunology Network (SIgN) and saw 51 young participants selected from 209 applicants from 48 countries. In addition, the research environment for overseas researchers was further improved by holding orientations in English to explain how to use the Core Instrumentation Facilities and Animal Resource Centers jointly operated with RIMD, and a KAKENHI seminar, also in English, showing how to apply for the KAKENHI grant as well as offering advice for successful applications.

Throughout the year, IFReC engaged in various outreach activities, more than previous years. Of note are a series of science cafés, several visits by high schools, participation in the "Science and Technology Festa in Kyoto" and the AAAS 2012 Annual Meeting's exhibition in Vancouver, Canada. IFReC also made more effort to reinforce the organization (promoting staff awareness of elements central to its mission and objectives among all members, importance of compliance with the laws and regulations, administration skills, etc.) as well as for better collaboration with RIMD.

• Please concisely describe the progress being made by the WPI center project from the viewpoints described below.

• In addressing the below-listed 1-6 criteria, please place emphasis on the following:

- 1) Whether research is being carried out at a top world-level (including whether research advances are being made by fusing fields).
- 2) Whether a proactive effort continues to be made to establish itself as a “truly” world premier international research center.
- 3) Whether a steadfast effort is being made to secure the center’s future development over the mid- to long term.

• Please prepare this report within 10-20 pages (excluding the attached forms).

1. Conducting research of the highest world level

In FY2011, IFReC continued the high level of productivity. Even when those in press excluded, the number of research papers published exceeded 200 (Appendix 1A), about 10% of which appeared in journals of impact factors higher than 14, demonstrating IFReC’s commitment to quality science. In addition, imaging and informatics groups showed good progress in various aspects of their technologies; some have already been applied to immunological research whereas others are near to being implemented, as judged by many of their published papers.

1-1 Fundamental Immunological Research

Below is a brief description of research papers selected from the list of those published in FY2011 (Appendix 1A). These works reflect the efforts made in basic research, as well as those of an etiological or clinical nature.

a) Control of cytokine encoding mRNA (Akira, Host Defense; Standley, Systems Immunology). This study expanded on earlier work (Matsushita *et al. Nature* 458: 1185-90, 2009) which had revealed the function of regnase-1 (also known as zc3h12a) as an essential modulator of inflammatory cytokine mRNA levels. Here, it was shown that regnase-1 functions within a complicated regulatory network involving the IKK complex, and that regnase-1 targets not only cytokines such as IL6 but also the mRNA of regnase-1 itself. Upon TLR stimulation, the regnase-1 protein is degraded, while expression of multiple genes, including inflammatory cytokines as well as regnase-1, is induced. The induction of regnase-1 gene expression is a negative feedback loop that prevents over-production of cytokines. (*Nat. Immunol.* 12: 1167-1177, 2011).

b) Developments in neuroimmunology (Murakami, Developmental Immunology). An entry site that allows blood cells including pathogenic CD4+ T cells across the blood brain barrier into the CNS was identified at the dorsal blood vessels of the fifth lumbar cord. CCL20 was identified to play a role in this accumulation, and that its expression risks the development of autoimmune diseases when pathogenic CD4+ T cells are present in the blood stream, and that neural activation can be transformed into an inflammatory signal (*Cell* 148: 447-457, 2012). The identification of such locations may prove valuable therapeutic targets for a variety of neuroimmunological diseases, including autoimmune and inflammatory diseases.

c) Aryl hydrocarbon deficiency and arthritis (Kishimoto, Immune Regulation). Developments in the etiology of collagen-induced arthritis showed that in Aryl hydrocarbon receptor KO mice a deficiency of Aryl hydrocarbon in T cells, but not macrophages, suppressed the development of collagen-induced arthritis. A decrease in the percentage of Th17 cells, but not T_{reg} cells suggested that a

balance between the Th1/Th17 populations may be involved in the pathology (*Proc. Natl. Acad. Sci.* 108: 14222-14227, 2011).

d) B Cell regulatory function control (Kurosaki, Lymphocyte Differentiation). The calcium sensors STIM1 and STIM2-induced SOC influx is critical for B regulatory function, but not for antibody production. Defects in B cell Receptor-induced SOC influx were seen in STIM1 and STIM2 KO mice, which lead to a failure in IL10 production. B cell SOC-influx is therefore required to limit autoimmunity (*Immunity* 34: 703-714, 2011).

e) Immunotherapy targets for adult T-cell leukemia/lymphoma (Sakaguchi, Experimental Immunology). Cancer/testis (CT) antigens were identified as being expressed in T cells from Immunotherapy targets for Adult T-cell leukemia/lymphoma (ATLL) patients. Clinical trials are currently underway for vaccines against CT antigens for other types of human cancers, offering potential for similar therapy for ATLL patients to be developed (*Blood* 119: 3097-3104, 2012).

f) *Toxoplasma gondii* virulence factor ROP18 (Takeda, Mucosal Immunology). Elucidating the molecular mechanism of ROP18, a key virulence factor in *T.gondii*, this study demonstrated that ROP18 targets the host endoplasmic reticulum-bound transcription factor ATF6 β , destabilizing the protein. This in turn interfered with ATF6 β -dependent immune responses and is seen as a novel pathogenic mechanism induced by ROP18 (*J. Exp. Med.* 208: 1533-1546, 2011).

Aside from those listed above, many more papers of high scientific quality with a clear prospect toward medical immunology were published in FY2011. Those include:

- Toyofuku *et al.* Endosomal sorting by Semaphorin 4A in retinal pigment epithelium supports photoreceptor survival. *Genes Dev.* 26:816-29, 2012. (Kumanogoh, Immunopathology).
- Kayama *et al.* Intestinal CX₃C chemokine receptor 1^{high} (CX₃CR1^{high}) myeloid cells prevent T-cell-dependent colitis. *Proc. Natl. Acad. Sci.* 109: 5010-5015, 2012. (Takeda, Mucosal Immunology).
- Marichal *et al.* DNA released from dying host cells mediates aluminum adjuvant activity. *Nature Medicine* 17: 996–1002, 2011 (K. Ishii, Vaccine Science).
- Garcia *et al.* SIRP α /CD172a Regulates Eosinophil Homeostasis. *J. Immunol.* 187: 2268-77, 2011 (Miyasaka, Immunodynamics).

1-2 Innovating Technology for Immunological Research

The papers listed below demonstrate some of the published works (Appendix 1A) at IFRc that have focused on developing new techniques or tools to aid in immunological, imaging or informatics research.

a) Integrated PET/MRI imaging (Hatazawa, Nuclear Medicine). A further development of integrated PET/MRI for metabolic/morphological dual modal imaging had been made to improve spatial resolution and sensitivity for mice imaging. Although further innovation is necessary for clinical imaging of immune systems and immunological disorders, the system proved useful for the whole body imaging of rats and mice (*Phys. Med. Biol.* 56: 7555-67, 2011; *ibid.* 57 :N1-13, 2012) .

b) Development of protein labeling techniques (Kikuchi, Chemical Imaging Techniques). Two lactamase mutant–tag-based probes were developed. One is a new no-wash fluorogenic probe, which is

characterized by fast quencher elimination, hydrophilicity, and high resistance against auto-degradation. The probe was successfully used to analyze the trafficking of epidermal growth factor receptors (EGFR) between cell surface and intracellular region (*J. Am. Chem. Soc.* 134, 1623–29, 2012). The other is a novel ^{19}F MRI probe containing Gd^{3+} ion that can be used for the imaging of gene expression in cells (*Chem. Sci.* 2: 1151–55, 2011). For *in vivo* imaging of bone-resorbing osteoclasts pH-activatable fluorescent probes were also developed (*J. Am. Chem. Soc.* 133: 17772–76, 2011). These probes will be fully exploited for selective visualization of specific cells or molecules and to discriminate them from an ensemble of similar targets, the methodology of critical importance in studying immune dynamics.

c) Simultaneous three-dimensional (3D) tracking of biomolecules in living cells (Yanagida, Single Molecule Imaging). New quantum rods (QRs), rod-shaped semiconductor nanocrystals acting as highly fluorescent orientation sensors were synthesized, which can be observed with a new optical microscope using a unique lens pairs and a polarized beam splitter (BS) for 3D and rotational movements, respectively. Molecules labeled with the QRs can now be tracked in 3D with nanometer accuracy and their relative orientations. The system proved useful to observe internalization of a membrane receptor CD36 from the membrane to the cytoplasm (*World Automation Congress*, in press). The group have also developed implantable observation window systems for long-term observation of the mouse inguinal lymph node and spleen by multi-photon microscopy. Using this system with collaboration with a immunology group, migration of T cells during homeostatic proliferation was observed for a period of two weeks (manuscript in preparation).

d) Advanced technologies in MRI (Yoshioka, Biofunctional Imaging). New high sensitive coils for an 11.7 T ultra-high field MRI scanner (Patent; 2011-122326) were developed. Using together with iron oxide nanoparticles, the device proved feasible for visualization of dynamic gathering and distribution of immune cells in lymph nodes or other tissues with high spatial resolution up to a single cell level as indicated by a preliminary study (*Magn. Reson. Med. Sci.* 10: 219-27, 2011).

e) Raman label-free imaging (Smith, Biophotonics). The method was refined as to be capable of observing time-resolved changes in molecular distributions in living cells to study differences in cellular structure and function with typical time resolution of 1 minute per image (*Proc. Natl. Acad. Sci.* 109: 28-32, 2012). This method was used for time-resolved observation of malarial pigment hemozoin in living cells in collaboration with Coban, Malaria Immunology, of which a paper is now being prepared.

f) Development of software tools (Standley, Systems Immunology). On the basis of stochasticity and heterogeneity, a coarse-grained formulation for modeling the dynamic behavior of cells was developed to build a model of a cell population without requiring very precise biochemical parameters, but still provides continuous time-course predictions of each molecular state as biochemical reaction equations do. The formulation proved useful to simulate the TNF-NF- κ B system (*Phys. Rev. E.* 84:062903, 2011).

1-3 Quantitative Evaluation of Science Level

a) Publication. FY2011 was again a very productive year for IFReC in terms of publishing more than 200 research papers, as shown in Appendix 1A. Among them, more than 20 papers were published in journals of impact factors higher than 14, indicating that the research at IFReC is of an internationally high quality.

b) Evaluation by International Scientific Advisory Board (ISAB). The first in-depth evaluation of scientific activities at IFReC was performed in a peer-review style by the ISAB, a body of internationally leading figures (Appendix5). PIs belonging to the immunology, imaging and informatics groups submitted reports of their progress made from FY2007 to FY2010, which were read by three board members of respective specialties (document evaluation). PIs working in IFReC for more than two years were separately interviewed by the board members on the 19th and 20th of May, 2011. In the interview evaluation, PIs gave a presentation to the board members, followed by a Q&A session after which confidential comments were made to PIs. Both document and interview evaluations examined the scientific/technical merits, research outcomes, promotion of interdisciplinary research and future prospects of the PIs, with scores pertaining to four categories (excellent, 4; good, 3; fair, 2; poor, 1; with a total score range of between 5 and 20). The results are summarized in Table 1 and indicate that immunology groups continued to maintain a standard of high quality research; however, further efforts should be made to reinforce the activities of imaging groups.

Table 1. ISAB Evaluation Results

Principal Investigators Evaluated*	Overall average		Document		Interview	
	Document	Interview	Highest	Lowest	Highest	Lowest
Immunology (18)	16.6	16.6	20	9	20	9
Imaging (6)	12.9	13.4	19	5	19	7
Informatics (3)	15.1	15.7	19	9	19	12

* Figures in parentheses represent the number of PIs evaluated.

c) Invitation to international symposia and major awards. Like the preceding years, and limiting international symposia and workshops to those held abroad, researchers were invited on as many as 70 occasions; those of note are listed in Appendix 1B. Among many awards given to IFReC researchers (Appendix 1C), those of prestige were the Japan Academy Prize and the Asahi Prize awarded to Sakaguchi, and Japanese Society for Immunology Prize to Arase.

1-4 Research Facilities and Instrumental Installation

Construction of the IFReC Research Building (new building: nine-storey, 6,592m²) was completed at the end of March, and became operational from the beginning of April. Here, nine research groups have opened their laboratories (immunology, 5; Bio-imaging, 3; Bio-informatics, 1) and occupies a total of 5.5 floors of equivalent space. The new building has been connected by a multi-storey bridge to the Integrated Life Science Building (ILSB: ten-storey, 9,258m²), of which 6 floors of equivalent space is occupied by nine research groups (immunology, 7; Bio-imaging, 1; Bio-informatics, 1). As a result, two-thirds of IFReC research groups have now gathered together "under one roof", which is of critical importance for researchers in different discipline to collaborate with each other.

In these two buildings, the radio-isotope experimental station and a part of the Core Instrumentation Facility (radioactive material experimental station, laboratories for cell-sorters and an electron microscopy, a storage room of biomaterial) of the Research Institute for Microbial Diseases (RIMD) were set up and started operation in conjunction with IFReC as with the case of three buildings of animal resource center (two belong to RIMD and one to IFReC). Furthermore, several advanced imaging instruments were installed, including a Raman microscope, two two-photon microscopes, a new MRI device (11.7 T MRI), a high-performance cell sorter in the new building and a SR-SIM (super resolution structured illumination

Microscope) in ILSB. All of these instruments were purchased with funds allocated by the FIRST Akira Project budget (see 1-5 a). New servers and network system were also installed in the new building to facilitate the flow and availability of data from the imaging, informatics and immunology groups. The cost was covered in part by an internal research support program of Osaka University.

1-5 Securing Research Funds

As detailed in Appendix 3-2, IFReC obtained budgets other than the WPI budget (1.35 billion JPY in FY2011). The total sum of competitive research grants obtained by researchers was 1.82 billion JPY. The following are notable ones:

a) Major grants continued from preceding years

- Funding Program for World-Leading Innovative R&D on Science and Technology (The FIRST Akira Project, 744 million JPY, Akira from 2009).
- Grants-in-Aid for Scientific Research (KAKENHI), Specially Promoted Research (159 million JPY, Akira from 2008; 78 million JPY, Sakaguchi from 2008).
- KAKENHI, Scientific Research (S) (32 million JPY, Kurosaki from 2009).
- KAKENHI on Innovative Areas (22 million JPY, Kaisho from 2009; 14 million JPY, M. Ishii from 2010).
- JST CREST programs (26 million JPY, Arase from 2009; 81 million JPY, Kurosaki from 2009; 45 million JPY, Takeda from 2010; 105 million JPY, M. Ishii from 2010).
- JST PRESTO program (20 million JPY, Smith from 2009).
- Strategic Funds for the Promotion of Science and Technology (62 million JPY, Kishimoto from 2010).
- Regional Innovation Strategy Support Program (20 million JPY, Sakaguchi from 2011).

b) Major grants newly acquired in FY2011

- JST PRESTO program (11 million JPY, Suzuki).
- HFSP Career Development Award (19 million JPY, Hanayama).

In addition to these large scale grants, KAKENHI for Young Scientist were awarded to three overseas researchers.

c) Donation by the Kishimoto Foundation

- The total cost of an endowed laboratory (Immune Regulation, 100 million JPY per year).
- The Fellowship/Scholarship program for young researchers (50 million JPY per year).

1-6 Changes in Research Organization in FY2011

The list of principal investigators is shown in Appendix 2.

Immunology: Two new PIs joined IFReC, one professor (Tsuneyasu Kaisho from RIKEN RCAI in April) and one associate professor (Rikinari Hanayama from Kyoto University in October). Toshio Hirano left IFReC to take office as the President of the Osaka University in August. The total number of PIs stood at 17 as of the end of FY2011.

Bioimaging: Two PIs left IFReC at the end of March, 2011. Takashi Jin took the chair of the Laboratory for Nano-Bio Probes at QBiC (see 2-2 b), but he continues to collaborate with IFReC researchers. Junji Seki resigned as PI of IFReC to be a full-time laboratory chief at the National Cerebral and Cardiovascular Center Research Institute. Since Kazuhiro Suzuki joined in April (2-2 a), the total number of PIs was seven as of the

end of FY2011.

Bioinformatics: No change in number of PIs.

2. Advancing fusion of various research fields

2-1 Selected Articles of Fusion Research

The paper cited foremost in 1-1 (*Nature Immunology* 12: 1165-75, 2011) is one of the most successful examples of the IFRc's fusion research in FY2011, as it was jointly authored by Host Defense (Akira) and Systems Immunology (Standley) laboratories. The contribution of the latter group was to construct a mathematical model of the basic signaling network including the negative feedback loops observed experimentally. In addition, structural bioinformatics was used to show that regnase-1 and IL6 mRNA regions targeted by regnase-1 share a stem-loop motif (structural confirmation of this is under way by an NMR study of regnase-1). Thus *in vivo* measurements, systems-level calculations and molecular level modeling were used together to construct a consistent and dynamic model of regnase-1, a key regulator of Toll-like Receptor signaling.

Among those described in 1-1 and 1-2, other achievements of high quality jointly attained by different research groups are Kowada *et al.* (*J. Am. Chem. Soc.* 133: 17772-6, 2011) and Teraguchi *et al.* (*Phys. Rev. E* 84:062903, 2011). The former is an outcome of immunology/imaging fusion and the latter is a cell modeling construct developed by a collaboration of immunologists, physicists and informatics scientists. Furthermore, several projects have reached the stage of their papers "in press", "submitted" or "to be submitted".

2-2 Strategies of IFRc to Advance Interdisciplinary Research and their Outcomes in FY2011

In addition to the improvement and installation of research facilities and instruments as described in 1-4, IFRc has taken measures to facilitate "fusion research" whilst maintaining the notion that it is of great importance to foster young researchers in an environment where "collision and fusion" is norm to scientific advancement.

a) Personnel reinforcement. Two associate professors, having strong motivation to study immunology through an interdisciplinary approach, were recruited as new PIs. Kazuhiro Suzuki with a strong background of immunology joined IFRc in April from UCSF where he had been a post-doctoral fellow and gained knowledge and experience in the techniques of advanced multi-photon microscopy at Jason Cyster's laboratory. Exploiting his cutting-edge technologies, he started to pursue novel mechanisms that could explain the behavior of immune cells in the complex chemokine milieu. Rikinari Hanayama came in October from Kyoto University where he had studied the molecular mechanism how exosomes are incorporated into target cells and phagocytes with Professor S. Nagata. By using molecular biology, mouse genetics and live imaging techniques, he began to clarify the dynamics and physiological functions of exosome in the intercellular communication networks of immune system.

Two informatics experts joined the bioinformatics groups. One, an associate professor, is a specialist in genome informatics, the other, an assistant professor, is a specialist of bioinformatics with a background in biochemistry and molecular biology. Their recruitment is expected to facilitate the integration of

experimental data with systems biology methods (network analysis) to obtain a better understanding on the pathways of complex immune response. An assistant professor with experience of animal experimentation as well as NMR research was also recruited to set up a system of non-invasive imaging of whole animal using the new MRI device.

b) Collaboration with other institutions. Osaka University concluded research agreements with the National Institute of Information and Communications Technology (NICT) and the Rikagaku Kenkyūsho institute (RIKEN) in 2009 and 2010, respectively. On the basis of these agreements, the Center for Information and Neural Networks (CiNet) of NICT and Quantitative Biology Center (QBiC) of RIKEN were opened in the University campus in April, 2011. Both centers are headed by an IFReC's Deputy Director, Toshio Yanagida. The main focus of CiNet is technological innovation to allow for the direct imaging of cellular activity, metabolism and systems analysis of cellular networks in the brain; QBiC focuses on quantitative and comprehensive studies to predict and control biological activities. Although the missions and goals of these centers are different from those of IFReC, the methodologies and technologies are common to the three institutions; their opening within walking distance from IFReC can be regarded as an establishment of a powerful foundation for institutional collaboration to advance interdisciplinary research necessary for making breakthroughs in classical immunology. In fact, IFReC and QBiC have exchanged a few imaging researchers and an imaging PI and MRI specialist, Yoshioka (Biofunctional Imaging) was concurrently appointed as a Vice Director General of Instrumental Technology Section of CiNet.

c) Platforms for interdisciplinary research. The Research Support Program for Combined Research Field (Fusion Program) was established in FY2009 to financially support research projects, whose members consists of researchers from different IFReC groups/backgrounds. Nine research projects were started in FY2009 and another six in FY2010. All projects are internally evaluated once a year. In FY2011, document evaluation was conducted in a peer-review style by senior researchers ranked above associate professor.

To further facilitate interdisciplinary research to which IFReC researchers actively commit, the "**IFReC Colloquium**" and "**Dual Mentor (DM) Program**" were set up as two new platforms in FY2011. The former is a new series of discussion meetings for IFReC-members only, held once every three months. At each colloquium, speakers from IFReC laboratories give talks about their latest research progress which is followed by a discussion. Afterwards, participants are able to gather to further the discussions in an informal setting. Three colloquia were held in FY2011 with the average number of attendees of about 100.

The Dual Mentor Program will be scheduled in the latter half of FY2012 with the aim to support graduate students or young post-doctoral fellows engaging in interdisciplinary projects under the supervision of two PIs from different disciplines. It offers extra financial incentives to attract a higher caliber of applicant; financial support will be given to DM researchers and their primary mentor for three years. Financial support and/or other types of incentives will be also given to the secondary mentor if necessary.

In addition, **Advanced Seminar Series on Microbiology and Immunology (ASSMI)** has been regularly organized by the Office of Combined Program on Microbiology and Immunology of RIMD for students of the Graduate Schools of Medicine and Frontier Biosciences. This program is to promote the combined program on microbiology and immunology and put them into practice. Since this is in agreement with IFReC's stance to increase the chance for IFReC researchers to conduct research in different disciplines, IFReC supports the ASSMI by providing IFReC PI's as lecturers and encourages young IFReC researchers to

participate in it.

3. Globalization of the institution

Describe what's been accomplished or recognized in the efforts to raise the center's international recognition as a genuine top world-level research institute, along with innovative efforts proactively being taken in accordance with the development stage of the center, including the following points, for example:

- Efforts being developed based on the analysis of number and state of world-leading, frontline researchers; number and state of visiting researchers; exchanges with overseas entities
- Proactive efforts to raise the level of the center's international recognition
- Efforts to make the center into one that attracts excellent young researchers from around the world (such as efforts fostering young researchers and contributing to advancing their career paths).

3-1 **Approach to Global Visualization**

a) Number of overseas researchers. Although we had been concerned with a possible decrease of overseas researchers due to the Great East Japan Earthquake and its aftermath, the percentage of overseas researchers at all levels was kept above the WPI target level of 30% throughout the year (Appendix 3-1). For keeping this level, generous support by donations from the Kishimoto Foundation was of great help (see 3-3 b).

b) Number of visitors from abroad. Including top class scientists listed in Appendix 5, the total number of visitors from abroad to IFReC exceeded a hundred, consisting of 47% from Asia/Oceania, 28% from North America and 25% from Europe. Their purpose was mostly scientific, such as giving seminars and making arrangements for research collaborations.

c) Collaborations with government agencies of foreign countries. IFReC was also approached by the Science and Innovation Section of Embassies and Consulates of Foreign countries in Japan aiming to seek collaboration between IFReC and their private companies, universities and government agencies. These include the New Zealand Embassy in Tokyo, the UK Embassy and Consulate General in Osaka, the Embassy of Sweden and the EU-Japan Centre for Industrial Cooperation.

d) New research agreements with overseas institutions. In FY2011, IFReC concluded two academic research exchange agreements with institutions abroad to conduct joint research, lectures, symposia and seminars. One is with the Seoul St. Mary's Hospital Convergent Research Consortium for Immunologic Disease (CRCID) and the other with Maurice Wilkins Centre, Auckland University, New Zealand. Thus, as of the end of FY2011, the number of partner institutions was eight, three domestic and five international.

3-2 **International Symposia, Workshops and Other Meetings**

We had scheduled an international symposium on "Dynamism of Immune Reactions & Regulation" in May, 2011 and invited about 20 world renowned immunologists, but this was cancelled and rescheduled to May, 2012, owing to the 2011 Great East Japan Earthquake and its aftermath. However, as described in 3-3 a, we successfully organized the first "Winter School on Advanced Immunology", which was planned by IFReC and the Singapore Immunology Network (SIgN). In addition to this large event, IFReC jointly organized the following scientific meetings with other institutions:

- IFReC & CRCID Joint International Workshop specialized in immunotherapies was held on July the 4th and 5th at IFReC.

- The joint workshop entitled "IFReC / Institute for protein Research Joint Seminar Multilevel Systems Biology: Genomes, Structures, and Networks" was held on November the 16th and 17th. Standley was the responsible person of IFReC. Front-line systems biology researchers from around the world presented their recent research progress. The number of participants was about 70.
- A joint international symposium by IFReC and CRCID was held on December the 19th and 20th, 2011 at St. Mary's Hospital in Seoul, Korea with 250 participants from POSTECH and the Catholic University of Korea (see above, 3-1 d).
- The 5th Immunoparasitology Meeting (March the 1st and 2nd, 2012) was organized by Coban and financially backed up by IFReC. The number of participants was about 60.

3-3 Strategies to Attract and Foster Talented Young Researchers from All over the World

a) The First Winter School on Advanced Immunology was held at Awaji Island from January the 16th to the 20th, 2012. The school was jointly organized by IFReC and Singapore Immunology Network (SIgN) to foster young immunologists. From 209 applications from 48 countries, 51 young researchers (graduate students and post-doctoral fellows with PhD thesis obtained within three years) were selected by a competitive screening and selection process. The school provided 17 lectures given by prominent immunologists, and an opportunity for participants and lecturers to interact. The winter school is absolutely an excellent opportunity to let young promising researchers know that IFReC has a very high level of research and an excellent environment for overseas researchers to work in. It can be expected that the personnel interaction further promoted the development of immunology, and that Japan maintains a leading position in immunological research for the next generations by forming personnel networks with IFReC as a hub.

b) Kishimoto Foundation Fellowship/Scholarship Program. Throughout FY2011, enquiries about this program were made every month; six post-doctoral fellows were employed and four overseas researchers were invited as visiting scientists. As a result, since this program was established in 2009, the total number of researchers supported by this program has reached 24.

c) IFReC Young Scientist Support Program for Research Abroad was established to encourage and financially support young researchers to attend conferences or to collaborate with other laboratories abroad. The program supported six young researchers of IFReC (graduate students, 2; post-doctoral fellow, 2; assistant professor, 2) to attend the international congresses held abroad.

3-4 Improvement of Research Environment for Overseas Researchers

a) Support for overseas researchers to engage in experiments using common facilities of IFReC and RIMD. In order to give an overview of facilities commonly available to IFReC and RIMD researchers, the orientation was held in English for overseas researchers on June the 2nd, 2011. The program consists of lectures that are required by law, and regulations and guidelines for those who wish to engage in specific experiments using living modified organisms, animals, etc. The orientation raised the awareness of safety and hygiene needed when conducting these types of experiments. Forty overseas researchers participated in the orientation.

IFReC also supports overseas researchers to prepare application forms and other documents required by law, or stipulated in regulations and guidelines, to engage in experiments with animals, living modified

organisms, biologically hazardous materials, etc.

b) Support for overseas researchers to obtain research funds. On September the 5th, 2011, a seminar for overseas researchers at Osaka University was held to promote applications to the KAKENHI grant. Two IFReC professors explained the outline of Grant-in-Aid for Scientific Research (KAKENHI) and demonstrated how to make an attractive application.

For overseas researchers, there are still many barriers to obtaining competitive funds. Most documents used for the procurement of funds, such as application guidelines and forms, and the completion of reports are required to be prepared in Japanese. IFReC provides several kinds of support; a monthly updated list of funds applicable to the research fields of IFReC researchers in English and Japanese is made available on the IFReC webpage. The application forms and guidelines are translated into English if needed. PhD holders in the Research Planning and Management Office (RPMO) of IFReC can advise on the content and/or expression of research plans in the application forms, and help with the translation into Japanese if required.

3-5 Other Support to Overseas Researchers

As in preceding years, IFReC continued to subsidize part of the rent from the WPI budget for overseas researchers staying in Kasugaoka House which was constructed in Osaka University in 2010 to provide accommodation of high quality for international researchers/students.

4. Implementing organizational reforms

* If innovated system reforms generated by the center have had a ripple effect on other departments of the host institutions or on other research institutions, clearly describe in what ways.

4-1 The Support Office for Large-Scale Education and Research Projects (LSERP)

The LSERP office of Osaka University was established in 2009 for the purpose of supporting the acquisition of large-scale education and research project grants, and then the running of those successfully acquired. The office recruited bilingual staff and several personnel with research experience making IFReC a model organization with effective and efficient research support and administration. Out of the 21 projects of "Leading Program in Doctoral Education" selected by JSPS in FY2011, two were successfully submitted by Osaka University graduate schools, for which the office was successfully engaged in various aspects of application logistics.

4-2 Provision of Support System for Overseas Scholars

The Support Office for International Students and Scholars originated from within the framework of the International Student Affairs Division at the Department of International Affairs in 2007. It offers various types of assistance for international students, scholars and their families before and after their arrival in Japan, such as assistance on visa procedures, accommodation and other necessary procedures. Its effectiveness was further improved in FY2011 by creating better links with international students, scholars and the faculty staff that are always needed at IFReC for developing its international visibility. The office also provides international students with a variety of information about career opportunities in Japan and various handbooks useful for living in Japan.

4-3 Other Ripple Effects of Activities of IFReC

a) Support of overseas researchers for application to external competitive research funds.

One of the various tasks of RPMO of IFRcC is assisting researchers in making successful applications to external competitive research funds. In mid-September, 2011, RPMO organized an orientation in English for overseas researchers to understand the MEXT Grants-in-Aid for Scientific Research system and how to apply for the grant. Senior researchers who had a career in scientific research as well as experience of applying and reviewing grants were invited to talk about their experience; nearly a hundred attendees gathered from different faculties and institutions. The benefits recognized from this meeting prompted the Department of Research Promotion to organize a similar meeting as a university-wide event in June, 2012.

b) New comer orientations. In June, 2011, RPMO also organized a new comer orientation of the core facilities of RIMD in English. After this event, the office was often asked to give suggestions to other faculties and institutions having interest in holding similar orientations of using their facilities in English.

c) Outreach activities. RPMO edited "A manual for organizing Science Cafe" and provided it to other departments of Osaka University and also to other universities for help with their own outreach activities.

5. Efforts to secure the center's future development over the mid- to long term

* Please address the following items, which are essential to mid- to long-term center development:

- Future Prospects with regard to the research plan, research organization and PI composition; prospects for the fostering and securing of next-generation researchers
- Prospects for securing resources such as permanent positions and revenues; plan and/or implementation for defining the center's role and/or positioning the center within the host institution's institutional structure
- Measures to sustain the center as a world premier international research center after program funding ends (including measures of support by the host institution)

5-1 Future Plans for Center's Organization

Throughout the year, discussions were made about various aspects of the future prospect of IFRcC, including:

a) Promotion of researchers' awareness of elements central to IFRcC's mission and objectives, and importance of "fusion research" and medical/clinical immunology. This is reflected in the research outputs described in Section 1. In addition, the success of the Winter School on Advanced Immunology (see Section 3-3) seems to have encouraged researchers and administrative staff in continuing the IFRcC's mission of the fostering and securing of next-generation researchers.

b) Reinforcement of bioinformatics groups. Currently three bioinformatics groups are collaborating with immunology and imaging groups, covering topics such as structure/function prediction of proteins involved in immune responses, simulation of signal transduction cascades and transcriptional regulatory network in immune cells and advanced data processing for imaging. To effectively advance IFRcC's ultimate goal of "comprehensive understanding immune dynamism", information processing and systems-oriented studies should be strengthened.

c) Reinforcement of collaboration with QBiC and CiNet. In addition to the collaboration for promoting interdisciplinary research as described in 2-2 b, IFRcC started discussions with QBiC and CiNet to establish concrete plans for a long-term collaboration toward advancement of interdisciplinary research.

d) Budgeting and allotment of personnel expenses. These have been performed so far under the Center Director's discretion. However, keeping the period following the completion of the WPI Program in forethought, active discussion was made in advance regarding accountability measures for the clear delineation of the reasons for director's discretion and the decisions made concerning the

advancement/promotion of laboratory personnel.

e) **Joint operation of animal resource center and core instrumentation facilities with RIMD.** IFRcC began to operate these facilities with RIMD in FY2011 under the following terms, bearing in mind a possible combination/reorganization in the future:

- "Orientation to use facilities of IFRcC and RIMD" in English for overseas researchers.
- Preparation of English user manuals for animal resource centers
- Setting up of an English on-line reservation system on the web-site for the Core Instrumentation Facilities of IFRcC and RIMD.
- Employment of an administrator holding PhD in charge of those common facilities (to be scheduled in FY2012).

5-2 Faculty & Staff Development

In order to be recognized as a true "world premier research center", IFRcC should not only reform the research system framework and the support and administrative systems, but also give appropriate consideration to staff members working therein to develop their abilities. Thus, in FY2011, IFRcC started to take the following measures:

- Promotion of staff awareness of elements central to IFRcC's mission and objectives in the interest of promoting the smooth flow of their operations by such means as orientation meetings for new comers.
- In order to ensure that all necessary information is fully provided to all international researchers, English translations from the original Japanese text will be provided as needed for important matters, such as guidelines and notices pertaining to the prevention of unjust disbursement or conflict of interest that are distributed by the university bureau or related ministry.
- Office group meetings are held once a month to exchange information and opinions.
- In the latter half of FY2011, all meetings of RPMO were conducted in English.
- Various types of information such as seminars and events have been offered to the staff by means of digital signage system since the beginning of FY2011.

5-3 Negotiation with Host Institution Regarding Future Prospects

In the first half of FY2011, while preparing the WPI interim evaluation, IFRcC discussed, several times with the then the President of Osaka University Kiyokazu Washida and his Board of Trustees, about the host institution's commitment to the future prospect of IFRcC as well as its development as a WPI center. In fact, it is stated in the Mid-Term Goals for the 2nd period (FY2010 - FY2015) of the University that "the research objective (of Osaka University) is 'to promote the world's top class research, advance knowledge in various research fields by fully utilizing the capacities of different research organizations of the university, and promote interdisciplinary research by establishing an innovation hub that supports both basic and applied research'". This statement is a clear indication of the University's strong awareness of the reasons under which IFRcC was selected, and its objective as a WPI center, which is hence reflected as a general description in the Self-Evaluation Report for Interim Evaluation (see pp. 53-54 of the report) that IFRcC and

RIMD would make every effort to restart as a single organization; this new organization is expected to be capable of systematically conducting a wide range of research from basic to applied, such as molecular details in immune responses to vaccine development. This view has been transferred without much modification to the corresponding part in the "Post-Interim Evaluation Revised Project" (pp. 10-11), which was prepared after discussion with the new president Toshio Hirano and executives in the second half of FY2011. IFRc also asked them to take due consideration of its appeal regarding its future prospect made by the Director at the president-organized university-wide hearing of deans of graduate schools and directors of institutions in January, 2012, stated below. IFRc will now start discussions with the university executives concerning this matter.

The Director's Appeal to the President

In the four years since its establishment, IFRc has gathered excellent young researchers as well as leading world-class researchers who will fulfill the expectations of the coming generation. IFRc has also aimed to perfect in research facilities, equipment and support staff. Through these efforts, we have thus come to hold the position of a world-leading immunology center.

Nevertheless, the WPI program is limited to a 10 year period (15 years in the case of a granted extension). So long as we do not have a precise policy concerning the continuation of this center, the effective use of facilities and equipment and the maintenance of our current researchers and research support staff in the duration after program expiration, we will undoubtedly experience an erosion in existing personnel coupled with an increasingly hindered ability to recruit extremely talented new members as the remaining days under the WPI program are exhausted. This will lead to a vicious cycle of deterioration which will ultimately result in the inevitable decline in our research activities. Despite the valuable investments being poured in from the national budget to match our current annual operating expenses of some billion yen, and the cost of approximately 10 billion yen to establish the institute and our current building, the center that has become a proud name will gradually lose its global presence and vanish in all essence. Such regrettable circumstances would amount to nothing more than the squandering of taxpayer's money.

All WPI center host institutes made a public commitment to support the crafting of each respective center. In accordance with this, we have thus far received a tremendous amount of support for our infrastructure from Osaka University, both tangible and intangible. We strongly feel, however, that the most important issue here on after for Osaka University as our host institute is to create mid-term plans for IFRc to maintain its growth as a world renowned research center throughout the post-WPI period.

Moreover, the support staff at IFRc (not limited to only technical assistance and on-site administrative staff for research, but also ranging to include event planning and management, intellectual property administration, safety and hygiene administration, common use facility management and administration, etc.) fulfilled the expectations of a prospering international environment. Through the efforts of these extremely talented individuals, it is presumable that the university itself or possibly even other departments absorb such personnel in further should need require it; therefore we ask that measures should be taken on our behalf to device such additional policy.

6. Others

* In addition to the above 1-5 evaluation items, only if there is anything else that deserves mention regarding the center project's progress, please note it.

6-1 Outreach Activities

In FY2011, IFRc was actively engaged in various types of outreach activities in collaboration with the

LSERP office of the University (pp. 11) or with other WPI centers.

a) Activities of IFReC

- IFReC held science café series "Café on the Edge" four times in FY2011. The number of participants was 200 in total.
- Director Akira gave a keynote lecture to about 2000 "Super Science High Schools (SSH)" students at "the Congress of SSH" in Kobe on August the 11th. His lecture explained his brilliant achievements in an easy-to-understand manner.
- The Administrative Department of IFReC received visitors from the three high schools as part of the campus tour designed for prospective students. The number of students who visited was about 100 in total.
- IFReC and RIMD co-organized a meeting and site visit to explain to local residents about the Center on January the 30th, 2012; the number of participants was 30.

b) Collaboration with other WPI centers

- The six WPI institutes co-organized a joint symposium for the younger generations called "The latest scientific study and your future" in Fukuoka, Kyushu on November the 12th, 2011. The number of participants (high school students, teachers and parents, etc.) was about 700.
- IFReC set up a booth at the "Science and Technology Festa in Kyoto" on December 17th to the 18th, 2011. At the event, IFReC and other WPI institutes provided a place where the public and scientists are encouraged to communicate directly with other. The total number of visitors to the event was about 5000.
- IFReC and other WPI centers participated in the AAAS 2012 Annual Meeting's exhibition as the part of the "Japan Pavilion Booth", on February the 17th to the 19th, 2012, Vancouver, Canada. Our exhibit advertised the WPI program, which aims to build "globally visible research centers". About 2,700 people, including Canadian citizen, visited the Japan booth over the three days.

6-2 Other Activities

- A Senri Life Science Technology Seminar called "Hardware and Software of the Frontier in Vivo Imaging: — Hardware: Microscopy and Software: Fluorescent Probes—" was held on November the 9th at IFReC. Professor Kikuchi and Smith gave lectures on the cutting edge technologies of bioimaging, which were followed by a tour of the institution.

7. Center's response to interim evaluation

Transcribe each item from the "Actions Required and Recommendations" section and note how the center has responded to them. However, if you have already provided this information, please indicate where in the report.

➤ The Center Director's responses to all items of the "Actions Required and Recommendations" by the Program Committee are attached to the "Post-interim evaluation revised center project".

1) Imaging and informatics communities are making rapid progress worldwide, and strong imaging and informatics efforts at IFReC could add greatly to the center's overall goals. The center should consider strong measures to attract the very best candidates in bio-imaging and bio-informatics.

➤ As described in Section 1 of this report, both IFReC's research facilities and instruments are simply at the internationally highest level. This concurs with comments made by ISAB members in their scientific

evaluation of IFReC in May, 2011 (see pp. 5). In our view, this is partly reflected by our successful recruitment of the young researchers in the imaging and bioinformatics groups (see pp. 7). We also expect that the Winter School (see pp. 10) will be of great help in our endeavor to attract young talented researchers. In addition, as given in Section 3, collaboration with CiNet and QBiC will lead to a reinforcement of research activities in bio-imaging and bioinformatics, which would facilitate and advance interdisciplinary research at IFReC and attract an ever increasing caliber of scientist from all over the world.

2) It is critical for imaging and bioinformatics scientists to ask immunological questions, which would foster the development of new tools and approaches for basic immunology as well as clinical immunology.

➤ Recognition of the importance to challenge unsolved immunological problems has steadily spread among imaging and bioinformatics researchers at IFReC since “the fusion” program (see pp. 8) was established in FY2009. In fact, as listed in Appendix 1, more than 50 papers were published from imaging and informatics groups, more or less strongly reflecting the authors’ expectation of their outcomes to be applied to immunological research (some have already done so). The tendency should be furthered by construction of the new research building, which enables core IFReC researchers to work “under the one roof”, and with the introduction of the new programs from FY2012, “IFReC Colloquium” (2011) and “Dual Mentor Program” (detailed in Section 2-2 c).

3) Although the center’s self-evaluation report emphasized medical immunology as a future plan, no detailed strategy on targeted areas was provided. A clear strategy, roadmap and millstones for innovative medical immunology over the next five years should be presented.

➤ Measures planned by IFReC in response to this comment are described in the “Post-interim evaluation revised center project” (3 . Research Center Project (2) Research objectives <Medical Immunology through Translational research>). The following headings are (see also Section 8-5):

a) Supporting of on-going collaborative projects of IFReC and clinical researchers at the University medical school (see also pp. 20. “The Road Map of IFReC” (4): Toward Medical Immunology (2)).

b) Supporting of collaborations with other institutions;

c) Establishment of a consortium for clinical medicine-oriented immunology (see also pp. 20. “The Road Map of IFReC (3): Toward Medical Immunology (1)).

d) Proposal of a joint project search for therapeutic molecular targets for immunological disorders and cancers for the Health Labor Sciences Research Grants.

4) The gender issue has not been sufficiently pursued. IFReC needs to intensify its efforts to hire more female PIs and junior researchers. Only one female PI, Dr. Coban, has been listed throughout these years. The strategies of IFReC to increase the number of female PIs as well as young female researchers are:

a) to invite as many female speakers to IFReC-organized scientific meetings as possible;

b) to make and use a reservoir of talented young female researchers of international level, utilizing the fact that a number of young female students participated in the Winter School held in January, 2012 (see pp. 10);

c) to more aggressively publicize the University’s support systems such as the Day Care Centers within the premises of Osaka University for child welfare.

8. Center's response to the site-visit report used in the interim evaluation

Transcribe each item from the "7. Actions Required and Recommendations" section and note how the center has responded to them. However, if you have already provided this information, please indicate where in the report.

※7. Actions required and recommendations

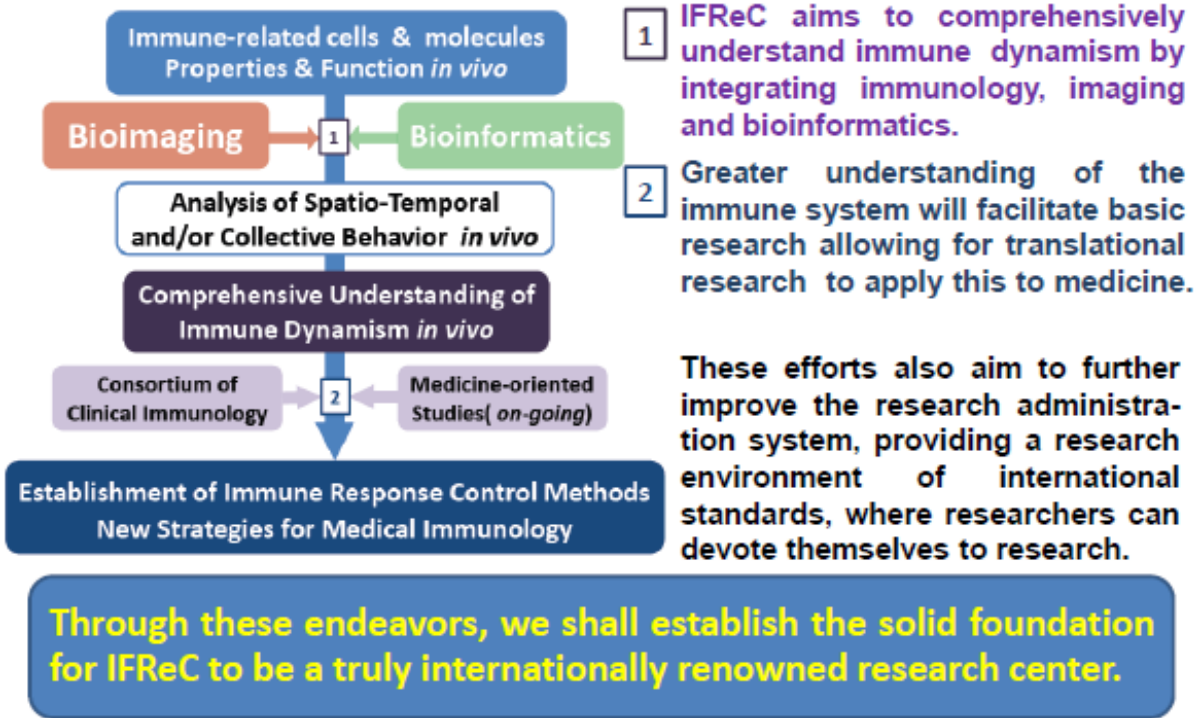
- 1) - IFRcC needs to project a clear mission statement, roadmap and millstones which contain goals for science, advancement and strategies for fusion, globalization and organization reform. This will be most critical in achieving a scientific goal that includes deeper understanding of the regulation of immune response to pathogens, allergens and self-antigens and translational research to conquer immunological disorders.
 - IFRcC's responses are:
 - IFRcC's mission statement, roadmap and millstones for science are described in the "Post-interim evaluation revised center project" (3. Research Center Project (2) Research objectives). See pp. 19-20, for the road map of IFRcC.
 - "Advancement and strategies of fusion of research" are described in this report (section2).
 - "Globalization" is described in this report (section 3).
 - "Organization reform" is described in the "Post-interim evaluation revised center project" (3. Research Center Project (3) Management and (5) Research Environment) and related matters are described in section 5 of this report.
 - "Medical immunology" is described in this report (7-3) and the "Post-interim evaluation revised center project" (3. Research Center Project (2) Research objectives < Medical Immunology through Translational research >. See also pp. 20, for "The Road Map of IFRcC" (3) and (4).
- 2) - A clear scientific mission of the entire imaging group in IFRcC needs to be established rather than providing less-focused assistance for the immunology group. The imaging group might demonstrate their importance through the development of new technologies. Outside collaboration with commercial companies or academic institutes should be also considered for facilitating the development of new imaging technologies.
 - In addition to that described above (7-1 and 7-2), IFRcC concluded a collaborative research agreement to develop new technologies of advanced microscopy with Leica Microsystems in the end of FY2011 in which a Leica Laboratory in the IFRcC building is scheduled to open in June, 2012. Also, in an informal setting, imaging scientists often discuss technological problems with the manufacturer's R&D engineers of the instruments they are using in order to improve their performance.
- 3) - Collaboration and interaction with public organizations as well as universities inside/outside Japan that lead genome-research, structural biology, systems biology, developmental biology etc. should be promoted more.
 - Aside from QBiC and CiNet (2-2 b) and the partner institutions of IFRcC (Appendix 3), IFRcC researchers collaborated with those of other institutions (FY2011 results) including:
 - a) Genome-research: Institute of Medical Science, The University of Tokyo; Computational Biology Research Center, AIST;
 - b) Structural biology: Institute of Protein Research and Graduate School of Frontier Biosciences, Osaka University; and Graduate School of Pharmacology, Hokkaido University;
 - c) Systems biology: School of Bioscience, University of Nebraska, developmental biology
- 4) - Although the self-evaluation report emphasized medical immunology as a future plan, no detailed strategy on targeted areas were provided. A overall strategy for medical immunology in research areas,

collection of clinical samples, and possible collaboration with basic immunology should be presented at the next site visit.

- Described in the preceding section 7. See also below.
- 5) -It is recommended that the center initiate actions to facilitate interactions with medical researchers and even to consider the recruitment of fine researchers specialized in human immunology and immune diseases.
- Of the three PIs with concurrent appointments with the Medical School, Osaka University, two are engaged in clinical practice at the University Hospital, Hatazawa (Nuclear Medicine), a specialist of multimodal (CT/PET/MRI) morphological and functional imaging for diagnosis of various diseases, is attempting to apply his imaging system to evaluation of therapeutic effects of various drugs for immune diseases (see pp. 20, for "The Road Map of IFRcC" (3) and (4)). Kumanogoh (Professor of Respiratory Medicine, Allergy and Rheumatic Diseases of the Department of Internal Medicine, appointed in April, 2011) started to establish a consortium for clinical medicine-oriented immunology composed of PIs belonging to the medical school of the University as its core members. This will invite clinicians who are interested in further investigations of clinical samples routinely collected from patients suffering from immune-related diseases. In addition, an increasing number of laboratories started medically/clinically oriented research (see pp. 20, for "The Road Map of IFRcC" (3) and (4)). A new PI, Kaisho, joined IFRcC from RIKEN RCAI in April, 2011. By coordinating gene targeting techniques with imaging approaches, his laboratory started to study dendritic cells, aiming for a more comprehensive understanding of novel immune-regulatory mechanisms of various immune disorders and inflammatory diseases.
- 6) - IFRcC should make more effort to recruit female researchers and to prepare the supporting systems for them.
- Described in this report (7-4).

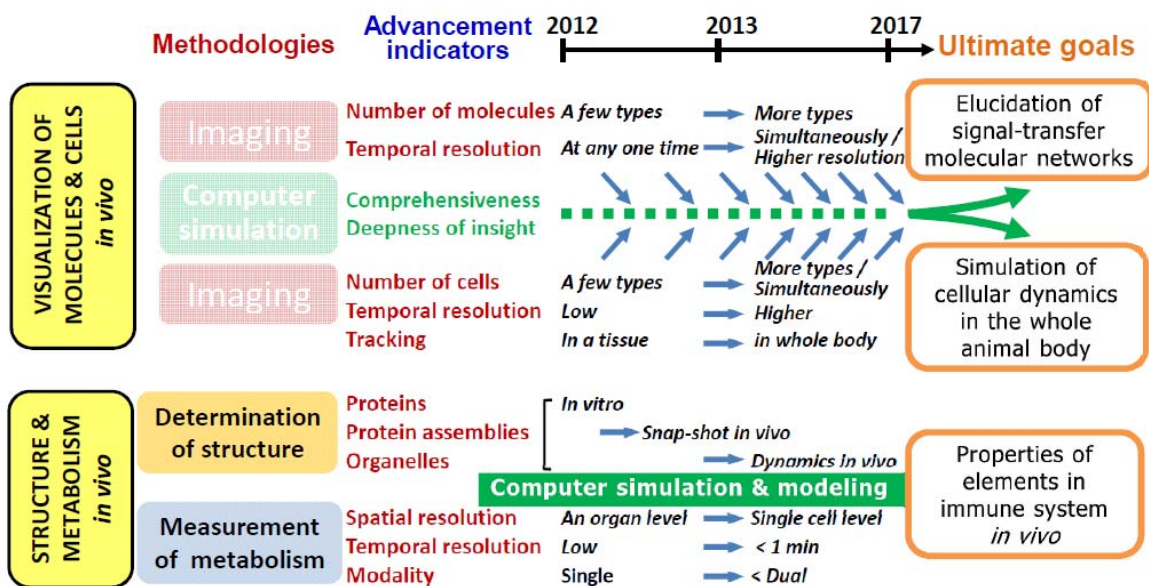
The Road Map of IFReC (1)

Mission statement



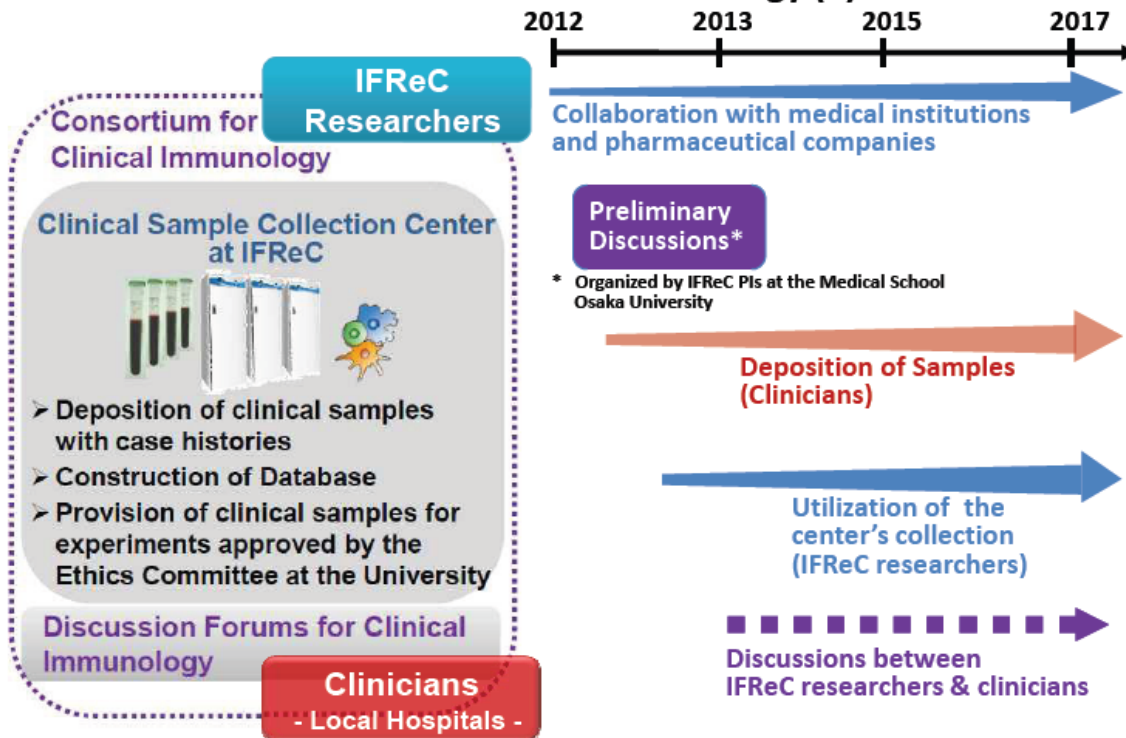
The Road Map of IFReC (2)

Milestones and Indicators of Comprehensive Understanding of Immune Dynamism



The Road Map of IFRcC (3)

Toward Medical Immunology (1)



The Road Map of IFRcC (4)

Toward Medical Immunology (2)

Cutting-edge fundamental research

Comprehensive Understanding of Immune dynamism



- Establishment of Methods to control Immune response
- New strategies for Medical Immunology

On-going studies of prevention, diagnostics, and/or treatments at IFRcC



Kumanogoh : Immunopathology at IFRcC; Department of Internal Medicine, Respiratory Medicine, Allergy and Rheumatic Diseases, Osaka University Hospital.

- Searching of diagnostic marker of autoimmune diseases such as Behcet's disease
- Clinical Trial to test treatment effect of antibodies against cytokine receptor on incurable immune diseases such as scleroderma (with Keio University & Tokyo Women's Medical University)
- Clinical test of vaccination effects on Pancreatic and lung cancers
- Development of auxiliary diagnostic kit for immune disorder using semaphorins



Sakaguchi : Experimental immunology

- Adult T-cell leukemia: Prophylactic vaccine development (BIKEN) and treatment (Nagoya City University Hospital & Imamura Hospital)



Hatazawa : Nuclear Medicine & **M Ishii** : Cellular dynamics

- Multimodal imaging for diagnosis of immune disease and evaluation of treatment effect



K Ishii : Vaccine science & **C Coban** : Malaria immunology

- Development of vaccines for immune control, adjuvants, and nucleic acid-based drugs

List of Center's Research Results and Main Awards

A. Published Papers

- List in order of most recent the Center's papers published in refereed journals during FY2011.
- For each, write the paper title; author name(s); journal name, volume, page(s); and publication year. If there are a few authors, underline those affiliated with the Center. (Any order may be used as long as format is the same.)
- If there are many authors, show and underline those affiliated with the Center, cutting out the names of other authors as deemed appropriate.
- For the most important papers, shade in the number block. For papers giving the results of fusion research, underline the number in the block.
- If the list exceeds this form, please add extra pages.

No.	Author names and details
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5	Haenuki, Y., Matsushita, K., Futatsugi-Yumikura, S., <u>Ishii, K.J.</u> , Kawagoe, T., Imoto, Y., Fujieda, S., Yasuda, M., Hisa, Y., <u>Akira, S.</u> , Nakanishi, K., Yoshimoto, T. A critical role of IL-33 in experimental allergic rhinitis. <i>J. Allergy and Clin. Immunol.</i> (Epub 2012 Mar27).
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<u>176</u>	Yamamoto, S., Watabe, H., Kanai, Y., Aoki, M., Sugiyama, E., <u>Watabe, T.</u> , <u>Imaizumi, M.</u> , Shimosegawa, E., <u>Hatazawa, J.</u> Interference between PET and MRI sub-systems in a silicon-photomultiplier-based PET/MRI system. Phys. Med. Biol. 56(13), 4147-59 (2011).
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<u>180</u>	Kobayashi, S., Nagano, H., Hoshino, H., Wada, H., Marubashi, S., Eguchi, H., Takeda, Y., Tanemura, M., Kim, T., Shimosegawa, E., <u>Hatazawa, J.</u> , Doki, Y., Mori, M. Diagnostic value of FDG-PET for lymph node metastasis and outcome of surgery for biliary cancer. J. Surg. Oncol. 103(3), 223-9 (2011).
<u>181</u>	<u>Mizukami, S.</u> , Matsushita, H., Takikawa, R., Sugihara, F., Shirakawa, M., <u>Kikuchi, K.</u> 19F MRI detection of β -galactosidase activity for imaging of gene expression. Chem. Sci. 2, 1151-1155 (2011).
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185	Watanabe, S., <u>Mizukami, S.</u> , Akimoto, Y., Hori, Y., <u>Kikuchi, K.</u> Intracellular Protein Labeling with Prodrug-Like Probes Using a Mutant β -Lactamase Tag. Chem. Eur. J. 17, 8342-8349 (2011).
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<u>200</u>	Kitamura, A., Maekawa, Y., Uehara, H., Izumi, K., Kawachi, I., Nishizawa, M., Toyoshima, Y. Takahashi H, <u>Standley, D.M.</u> , Tanaka, K., Hamazaki, J., Murata, S., Obara, K., Toyoshima, I., Yasutomo, K. A mutation in the immunoproteasome subunit PSMB8 causes autoinflammation and lipodystrophy in humans. <i>J. Clin. Invest.</i> 121, 4150-4160 (2011).
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209	Fleishman, SJ., Whitehead, TA., Strauch, EM., Corn, JE., Qin, S., Zhou, HX., Mitchell, JC., Demerdash, ON., Takeda-Shitaka, M., Terashi, G., (+50 authors), <u>Standley, DM.</u> , (+35 authors) Community-wide assessment of protein-interface modeling suggests improvements to design methodology. J. Mol. Biol. 414, 289-302 (2011).
<u>210</u>	Fernandez, M., <u>Kumagai, Y.</u> , <u>Standley, DM.</u> , Sarai, A., Mizuguchi, K., <u>Ahmad, S.</u> Prediction of dinucleotide-specific RNA-binding sites in proteins. BMC. Bioinformatics 12 Suppl 13, S5 (2011).
<u>211</u>	Reininger, L., Wilkes, J. M., Bourgade, H., <u>Miranda-Saavedra, D.</u> , Doerig, C. An essential Aurora-related kinase transiently associates with spindle pole bodies during Plasmodium falciparum erythrocytic schizogony. Mol. Microbiol. 79, 205-221, doi:10.1111/j.1365-2958.2010.07442.x (2011).
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B. Invited Lectures, Plenary Addresses (etc.) at International Conferences and International Research Meetings

- List up to 10 main presentations during FY2011 in order from most recent.

- For each, write the lecturer/presenter's name, presentation title, conference name and date(s)

No.	Lecturer/presenter names and details
1	Masaru Ishii , "Roles of S1P in osteoclast regulation and bone physiology", Gordon Research Conference, Mar. 23, 2012.
2	Tomohiro Kurosaki , "Contribution of Transcription Factors to Rapid Responsiveness of IgG Type Memory B Cells", Mar.14, 2012.
3	Kiyoshi Takeda , "Regulatory Mechanisms of Immune Responses to Intestinal Bacteria", Keystone Symposium, Mar. 7, 2012.
4	Daron M. Standley , "Functional Annotation of Intrinsically Disordered Domains by Their Amino Acid Content Using IDD Navigator", Pacific Symposium on Biocomputing, Jan 6, 2012.
5	Shimon Sakaguchi , "Regulatory T cells for immune tolerance and homeostasis", Institut Pasteur, Immunology Department Seminar, Nov. 21, 2011.
6	Tadamitsu Kishimoto , "IL-6: All the way to treatment of autoimmune inflammatory diseases", 2011 Gairdner Symposium, Oct. 28, 2011.
7	Shizuo Akira , "Microbe recognition by Toll-like receptors in mammals", The Gairdner 2011 Awardees Lectures, Oct. 27, 2011.
8	Ken Ishii , "New mechanisms of vaccine adjuvants: innate immunity and beyond", WHO –FDA workshop on the nonclinical and preclinical evaluation of adjuvanted vaccines, Sep. 7, 2011.
9	Nicholas Isaac Smith , "Time-resolved Raman imaging of malarial hemozoin", 8th European Biophysics Congress, Aug. 25, 2011.
10	Taroh Kinoshita , "Remodeling of GPI anchors in the ER before and after attachment to proteins: mechanisms and functions", 21th International Symposium on Glyconjugates, Aug. 23, 2011.

C. Major Awards

- List up to 10 main awards received during FY2011 in order from the most recent.
- For each, write the recipient's name, name of award, and year issued.
- In case of multiple recipients, underline those affiliated with the center.

No.	Recipient names and details
1	Shimon Sakaguchi , The Japan Academy Prize 2012.
2	Toshio Yanagida , Fellow of the US Biophysical Society 2012.
3	Kazuya Kikuchi , The Chemical Society of Japan Award for Creative Work 2012.
4	Shimon Sakaguchi , Asahi Prize 2011.
5	Shizuo Akira , Suita City Mayor's Prize 2011.
6	<u>Shizuo Akira</u> , Jules Hoffmann, and three scientists, The Canada Gairdner International Award 2011.
7	Hisashi Arase , Japanese Society for Immunology Award 2011.
8	Yoshihiro Baba , Incentive Award by Japanese Society for Immunology 2011.
9	<u>Tadamitsu Kishimoto</u> , <u>Toshio Hirano</u> , The Japan prize 2011.
10	Atsushi Kumanogoh , Commendation for Science and Technology by MEXT 2011.

FY 2011 List of Principal Investigators

NOTE:
 • Underline names of 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 not listed in initial plan or the latest report, attach "Biographical Sketch of a New Principal Investigator".

<Results at the end of FY2011>									
Principal Investigators Total:27									
Name (Age)	Affiliation (Position title, department, organization)	Academic degree, specialty	Working hours (Total working hours: 100%)				Starting date of project participation	Status of project participation (Describe in concrete terms)	Contributions by PIs from overseas research institutions
			Work on center project		Others				
			Research activities	Other activities	Research activities	Other activities			
Center director Shizuo Akira* (59)	Director and Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	90%	10%	0%	0%	01/10/2007	Usually stays at IFReC	
Tadamitsu Kishimoto* (72)	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	70%	0%	30%	0%	01/11/2007	Usually stays at IFReC	
Masayuki Miyasaka* (64)	Professor, Graduate School of Medicine, Osaka University	MD, PhD (Immunology)	60%	0%	20%	20%	01/11/2007	Usually stays at IFReC	
Hitoshi Kikutani* (61)	Professor, Research Institute for Microbial Diseases, Osaka University	MD, PhD (Immunology)	70%	10%	20%	0%	01/10/2007	Usually stays at IFReC	

Taroh Kinoshita* (60)	Professor and Deputy Director, WPI Immunology Frontier Research Center, Osaka University	PhD (Immunology , Biochemistry)	66%	4%	0%	30%	01/10/2007	Usually stays at IFReC
Atsushi Kumanogoh* (45)	Professor, Graduate School of Medicine, Osaka University	MD, PhD (Immunology)	50%	0%	0%	50%	01/10/2007	Usually stays at IFReC
Kiyoshi Takeda* (45)	Professor, Graduate School of Medicine, Osaka University	MD, PhD (Immunology)	70%	0%	0%	30%	01/11/2007	Usually stays at IFReC
Hisashi Arase* (46)	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	95%	0%	0%	5%	01/10/2007	Usually stays at IFReC
Shimon Sakaguchi* (61)	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	50%	10%	17%	23%	01/12/2007	Usually stays at IFReC
Takashi Saito* (61)	Group Director, RIKEN, Research Center for Allergy and Immunology	PhD (Immunology)	20%	0%	70%	10%	03/12/2007	usually stays at RIKEN RCAI satellite
Tomohiro Kurosaki* (56)	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology and molecular biology)	80%	10%	10%	0%	03/12/2007	Usually stays at IFReC

Fritz Melchers* (75)	Max Planck Fellow	PhD (Immunology)	10%	0%	10%	80%	01/10/2007	He visits IFReC several times/year to attend symposia, etc. to contribute to research at IFReC. He regularly communicates with us by emails.
Toshio Yanagida* (65)	Professor and Deputy Director, Graduate School of Frontier Biosciences, Osaka University	PhD (Molecular imaging)	25%	0%	65%	10%	01/11/2007	Usually stays at IFReC
Yoshichika Yoshioka* (58)	Professor, WPI Immunology Frontier Research Center, Osaka University	DSc (Biophysics)	100%	0%	0%	0%	01/02/2008	Usually stays at IFReC
Yutaka Hata* (50)	Professor, Graduate School of Engineering, University of Hyogo	PhD (Computer Engineering)	20%	0%	30%	50%	10/12/2007	He visits IFReC several times/year to attend symposia, etc. to contribute to research at IFReC. He regularly communicates with us by emails.
Daron M. Standley (44)	Associate Professor, WPI Immunology Frontier Research Center, Osaka University	PhD (Chemistry)	100%	0%	0%	0%	01/10/2008	Usually stays at IFReC
Jun Hatazawa* (58)	Professor, Graduate School of Medicine, Osaka University	MD, PhD (Nuclear Medicine)	5%	5%	45%	45%	16/01/2009	Usually stays at IFReC
Jang Myoung Ho (43)	Associate Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Mucosal Immunology)	100%	0%	0%	0%	01/11/2007	Usually stays at IFReC

Masaru Ishii (38)	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Bioimaging)	100%	0%	0%	0%	01/12/2008	Usually stays at IFReC
Kazuya Kikuchi (46)	Professor, Graduate School of Engineering, Osaka University	PhD (Chemical Biology)	28%	2%	50%	20%	01/08/2009	Usually stays at IFReC
Diego Miranda-Saavedra (36)	Associate Professor, WPI Immunology Frontier Research Center, Osaka University	PhD (Molecular and Cellular Biology)	100%	0%	0%	0%	16/01/2010	Usually stays at IFReC
Cevayir Coban (39)	Associate Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Clinical Microbiology)	100%	0%	0%	0%	01/04/2008	Usually stays at IFReC
Nicholas Isaac Smith (37)	Associate Professor, WPI Immunology Frontier Research Center, Osaka University	PhD (Engineering / Applied Physics)	100%	0%	0%	0%	01/06/2009	Usually stays at IFReC
Ken Ishii* (43)	Project Leader, National Institute of Biomedical Innovation (NIBIO)	MD, PhD (Immunology, Vaccine Science)	15%	5%	75%	5%	01/11/2007	He visits his laboratory at IFReC once a week.
Tsuneyasu Kaisho* (52)	Professor, WPI Immunology Frontier Research Center	MD, PhD (Immunology)	100%	0%	0%	0%	01/03/2011	Usually stays at IFReC

Kazuhiro Suzuki (36)	Associate Professor, WPI Immunology Frontier Research Center	MD, PhD (Immune cell dynamics)	100%	0%	0%	0%	01/04/2011	Usually stays at IFRcC	
Rikinari Hanayama (37)	Associate Professor, WPI Immunology Frontier Research Center	MD, PhD (Cell Biology)	100%	0%	0%	0%	01/10/2011	Usually stays at IFRcC	

Researchers unable to participate in project in FY 2011

Name	Affiliation (Position title, department, organization)	Starting date of project participation	Reasons	Measures taken
Toshio Hirano	Professor, Graduate School of Frontier Biosciences, Osaka University	01/11/2007	He was elected as the President of the Osaka University	
Junji Seki	Head, National Cardiovascular Center Research Institute, Department of Biomedical Engineering	19/12/2007	He transferred his position to the full-time laboratory chief of the National Cerebral and Cardiovascular Center Research Institute	
Takashi Jin	Professor, WPI Immunology Frontier Research Center, Osaka University	16/12/2007	He transferred his position to the chair of the Laboratory for Nano-bio Probes at QBIC	

Biographical Sketch of Principal Investigators World Premier International Research Center Initiative (WPI)

Name (Age)	
<i>NOTE: Place an asterisk (*) by the name of investigators considered to be ranked among the world's top researchers.</i>	Tsuneyasu Kaisho* (52)
Current affiliation (Position title, department, organization)	Endowed Chair Professor, WPI Immunology Frontier Research Center, Osaka University
Academic degree, specialty	M.D., Ph.D., Immunology
<p>Research and education history</p> <p>1984 M.D., School of Medicine, Osaka University</p> <p>1990 Ph.D., Graduate School of Medicine, Osaka University</p> <p>1990-1997 Research Associate, School of Medicine, Osaka University</p> <p>1994-1997 Postdoctoral fellow, Genetic Institute, University of Cologne, Germany</p> <p>1997-1999 Research Associate, Hyogo College of Medicine</p> <p>1999-2004 Associate Professor, Research Institute for Microbial Diseases, Osaka University</p> <p>2004-Present Team Leader of Laboratory for Host Defense, RIKEN Research Center for Allergy and Immunology</p> <p>2011-Present Professor, WPI Immunology Frontier Research Center, Osaka University</p>	
<p>Achievements and highlights of past research activities <i>(Describe qualifications as a top-caliber researcher if he/she is considered to be ranked among the world's top researchers.)</i></p> <p>In Dr. Akira's lab, I found that dendritic cells from the mutant mice lacking a TLR adaptor, MyD88, can mature in response to LPS, but not to CpG DNA (Kaisho et al. J Immunol 2001). At that time, only MyD88 was known as a TLR adaptor and this is a pioneering study on dendritic cell responses against pathogen sensors (Kaisho et al. Trends Immunol 2001). After moving to RCAI Yokohama Institute, I found that a serine threonine kinase, IκB kinase-α (IKKα), is required for the ability of signaling through nucleic acid sensors, TLR7 and TLR9, to induce type I interferon (IFN) production from plasmacytoid dendritic cells (Hoshino et al. Nature 2006, Kaisho et al. Trends Immunol 2008, Hoshino et al. J Immunol 2010). IKKα is a founder member of the IKK family, which a number of labs are studying extensively and competitively. My work is significant also in that the roles of IKKα in innate immunity have been clarified. I was honored with Japan Society for Immunology award 2009 for "Molecular mechanisms for regulating dendritic cell functions".</p>	
<p>Achievements</p> <p>(1) International influence <i>a) Guest speaker, chair, director, or honorary member of a major international academic society in the subject field, b) Holder of a prestigious lectureship, c) Member of a scholarly academy in a major country, d) Recipient of an international award(s), e) Editor of an influential journal etc.</i></p> <p>Guest speaker (2011): Korean Society for Biochemistry and Molecular Biology</p> <p>Guest speaker (2010): International Veterinary Immunology Symposium</p> <p>Guest speaker (2008): International Symposium on Dendritic Cells</p> <p>Lectureship (2010): RCAI International Summer Program</p>	
<p>(2) Receipt of large-scale competitive fundings <i>(over past 5 years)</i></p> <p>Grant-in-Aid for Scientific Research (B) (2008-2011, total 13.7M yen)</p> <p>Grant-in-Aid for Scientific Research on Innovative Areas (2009-2014, total 109.4M yen)</p> <p>Grant-in-Aid for Scientific Research (B) (2011-2014, total 15.3M yen)</p>	

(3) Article citations (*Titles of major publications, and number of citations.*)

"I kappa B kinase alpha is essential for mature B cell development and function"

Kaisho T et al **J Exp Med** 2001 cited **115** times

"Dendritic-cell function in Toll-like receptor- and MyD88 knockout mice"

Kaisho T et al **J Immunol** 2001 cited **343** times

"Dendritic-cell function in Toll-like receptor- and MyD88 knockout mice"

Kaisho T et al **Trends Immunol** 2001 cited **229** times

"Toll-like receptor function and signaling"

Kaisho T et al **J. Allergy Clin. Immunol** 2006 cited **262** times

"I kappa B kinase-alpha is critical for interferon-alpha production induced by Toll-like receptors 7 and 9"

Hoshino K et al **Nature** 2006 cited **138** times

"Cutting Edge: Critical Role of I kappa B Kinase alpha in TLR7/9-Induced Type I IFN Production by Conventional Dendritic Cells"

Hoshino K et al **J Immunol** 2010 cited **7** times

"PDLIM2 Inhibits T Helper 17 Cell Development and Granulomatous Inflammation Through Degradation of STAT3"

Tanaka T et al **Sci Signal** 2011 cited **0** times

Total publications=104 Total citation=19772 h-index=50

(4) Others (*Other achievements that indicate qualification as a top-caliber researcher, if any.*)

Biographical Sketch of Principal Investigators

World Premier International Research Center Initiative (WPI)

Name (Age)	Kazuhiro Suzuki (36)
<i>NOTE: Place an asterisk (*) by the name of investigators considered to be ranked among the world's top researchers.</i>	
Current affiliation (Position title, department, organization)	Specially Appointed Associate Professor, WPI Immunology Frontier Research Center, Osaka University
Academic degree, specialty	M.D., Ph.D., Immune cell dynamics
<p>Research and education history</p> <p>1994-1998 Department of Chemistry, School of Science, The University of Tokyo Awarded the degree of B.S.</p> <p>1998-1999 Department of Chemistry, Graduate School of Science, The University of Tokyo</p> <p>1999-2003 Medical School of Osaka University Awarded the degree of M.D.</p> <p>2003-2004 Resident in internal medicine, Osaka University Hospital</p> <p>2004-2007 Graduate School of Medicine, Osaka University Awarded the degree of Ph.D.</p> <p>2006-2007 Research Fellowship for Young Scientists (DC2), JSPS</p> <p>2007-2011 Postdoctoral fellow, University of California, San Francisco, USA</p> <p>2008-2011 Human Frontier Science Program Long-term Fellowship</p> <p>2011-Present PRESTO researcher, JST</p> <p>2011-Present Associate Professor, WPI Immunology Frontier Research Center, Osaka University</p>	
<p>Achievements and highlights of past research activities <i>(Describe qualifications as a top-caliber researcher if he/she is considered to be ranked among the world's top researchers.)</i></p> <p>1. Immune regulation by semaphorin molecules</p> <p>In my study for PhD, I demonstrated that semaphorin 7A (Sema7A) expressed on activated T cells stimulates macrophages to produce proinflammatory cytokines through $\alpha 1\beta 1$ integrin, which had been known as a collagen receptor. Moreover, this activity of Sema7A turned out to be crucial to initiate inflammation at peripheral tissues in the effector phase of T cell-mediated allergic and autoimmune diseases. These results raised a possibility that Sema7A could be a potential therapeutic target for immune disorders (<i>Nature</i> 446: 680; 2007, <i>Nat. Immunol.</i> 9:17; 2008).</p> <p>2. In vivo imaging of B cell responses</p> <p>After receiving my PhD, I joined the laboratory of Prof. Jason Cyster who is a leading B cell biologist and one of the pioneers bringing an in vivo imaging technique of two-photon microscopy into the field of immunology. Using two-photon microscopy, I visualized B cell antigen capture from follicular dendritic cells (FDCs) in primary lymphoid follicles in real time. Interestingly, B cells were found to acquire antigen together with FDC surface proteins. These observations established that FDCs serve as sites of B cell antigen capture (<i>J. Exp. Med.</i> 206: 1485; 2009). I also took advantage of two-photon microscopy to reveal the role of sphingosine-1-phosphate receptor-2 (S1P₂) in germinal center organization (<i>Nat. Immunol.</i> 12: 672; 2011).</p>	

Achievements
(1) International influence <i>a) Guest speaker, chair, director, or honorary member of a major international academic society in the subject field, b) Holder of a prestigious lectureship, c) Member of a scholarly academy in a major country, d) Recipient of an international award(s) , e) Editor of an influential journal etc.</i>
(2) Receipt of large-scale competitive fundings <i>(over past 5 years)</i> PRESTO/JST (2011-2014, total 40M JPY)
(3) Article citations <i>(Titles of major publications, and number of citations.)</i> 1. "Visualizing B cell capture of cognate antigen from follicular dendritic cells." <i>J. Exp. Med.</i> 206: 1485-1493; 2009. Cited 18 times 2. "Semaphorins and their receptors in immune cell interactions." <i>Nat. Immunol.</i> 9: 17-23; 2008. Cited 33 times 3. "Semaphorin 7A initiates T-cell-mediated inflammatory responses through $\alpha 1\beta 1$ integrin." <i>Nature</i> 446: 680-684; 2007. Cited 24 times
(4) Others <i>(Other achievements that indicate qualification as a top-caliber researcher, if any.)</i>

Biographical Sketch of Principal Investigators

World Premier International Research Center Initiative (WPI)

Name (Age)	Rikinari Hanayama (37)
<i>NOTE: Place an asterisk (*) by the name of investigators considered to be ranked among the world's top researchers.</i>	
Current affiliation (Position title, department, organization)	Specially Appointed Associate Professor, WPI Immunology Frontier Research Center, Osaka University
Academic degree, specialty	M.D., Ph.D., Cell Biology
<p>Research and education history</p> <p>1999 M.D., Osaka University</p> <p>2004 Ph.D., Osaka University</p> <p>1999-2000 Intern in Medicine, Osaka University Hospital</p> <p>2004-2005 Instructor in Genetics, Osaka University Graduate School of Medicine</p> <p>2005-2008 HFSP Fellow, Department of Neurobiology, Harvard Medical School</p> <p>2008-2011 Assistant Professor, Department of Medical Chemistry, Kyoto University Graduate School of Medicine</p> <p>2011-Present Associate Professor, WPI Immunology Frontier Research Center, Osaka University</p>	
<p>Achievements and highlights of past research activities <i>(Describe qualifications as a top-caliber researcher if he/she is considered to be ranked among the world's top researchers.)</i></p> <p>I have been working on the molecular mechanisms of phagocytosis of apoptotic cells. I identified a molecule that is critical for the uptake of apoptotic cells by macrophages (Nature. 2002), and showed that impaired uptake of the apoptotic cells can lead to the development of autoimmune diseases (Science. 2004). These papers are now regarded as one of the most important papers in the field of apoptosis. For these findings, I was awarded a Young Scientist Award from Science/AAAS and from the minister of MEXT, Japan.</p> <p>I also worked on the mechanisms of neuronal synapse elimination, and identified a molecule important for the development of mental retardation diseases (Cell. 2010). This finding was picked up as a scientific topic in several top journals such as Nature, Cell and Nature Neuroscience, and selected as one of the most important papers in neuroscience by Faculty of 1000.</p>	
<p>Achievements</p> <p>(1) International influence <i>a) Guest speaker, chair, director, or honorary member of a major international academic society in the subject field, b) Holder of a prestigious lectureship, c) Member of a scholarly academy in a major country, d) Recipient of an international award(s), e) Editor of an influential journal etc.</i></p> <p>HFSP Career Development Award (2011)</p> <p>The Commendation for Science and Technology by the Minister of MEXT, Japan (2009)</p> <p>AAAS Young Scientist Award (2006)</p>	
<p>(2) Receipt of large-scale competitive fundings <i>(over past 5 years)</i></p> <p>MHLW grant (2012-2015, total est. 30M yen)</p> <p>HFSP grant (2011-2014 total est. 30M yen)</p> <p>Grant-in-Aid for Scientific Research on Innovative Areas (2012-2014, total est. 10M yen)</p> <p>Grant-in-Aid for Young Scientists (B) (2010-2013, total est. 4M yen)</p>	

(3) Article citations *(Titles of major publications, and number of citations.)*

"Identification of a factor that links apoptotic cells to phagocytes"

Hanayama R et al. **NATURE 2002** cited **417** times

"Autoimmune disease and impaired uptake of apoptotic cells in MFG-E8-deficient mice"

Hanayama R et al. **SCIENCE 2004** cited **337** times

"Impaired involution of mammary glands in the absence of milk fat globule EGF factor 8"

Hanayama R et al. **Proc Natl Acad Sci USA. 2005** cited **49** times

"Autoimmunity and the Clearance of Dead Cells"

Nagata S, Hanayama R, Kawane K. **CELL 2010** cited **72** times

"The Angelman Syndrome Protein Ube3A Regulates Synapse Development by Ubiquitinating Arc"

Greer P#, Hanayama R# (#co-1st authors) et al. **CELL 2010** cited **55** times

(4) Others *(Other achievements that indicate qualification as a top-caliber researcher, if any.)*

Records of FY2011 Center Activities

1. Researchers and center staffs, satellites, partner institutions

1-1. Number of researchers in the "core" established within the host institution

- Enter the total number of people in the columns below. In the "Researchers" column, put the number and percentage of overseas researchers in the < > brackets and the number and percentage of female researchers in the [] brackets.
- In the "Administrative staffs" column, put the number and percentage of bilingual staffs in the () brackets.
- In the "Final Goal" column, enter the currently projected goal and the estimated date for achieving it [OO month, OO year].

	Goal set in the "Post-interim evaluation revised center project"	Results at end of FY 2011	Final goal (Date: March, 2017)
Researchers	180 < 61, 34%> [38, 21%]	173 < 54, 31%> [35, 20%]	180 < 61, 34%> [38, 21%]
Principal investigators	30 < 8, 27%> [3, 10%]	27 < 6, 22%> [1, 4%]	30 < 8, 27%> [3, 10%]
Other researchers	150 < 53, 35%> [35, 23%]	146 < 48, 33%> [34, 23%]	150 < 53, 35%> [35, 23%]
Research support staffs	50	63	50
Administrative staffs	30	29 (19, 66%)	30 (20, 67%)
Total	260	265	260

Other matters of special mention

- Enter matters warranting special mention, such as concrete plans for achieving the Center's goals, established schedules for employing main researchers, particularly principal investigators.
- As background to how the Center is working to mobilize/circulate the world's best brains, give good examples, if any, of how career paths are being established for the Center's researchers; that is, from which top-world research institutions do researchers come to the Center and to which research institutions do the Center's researchers go, and how long are their stays at those institutions.

<Employment of researchers>

Associate professor Hideaki Fujita, imaging specialist, joining in Yanagida group from QBiC (Aug. 1, 2012)

<Major examples of position transfer from IFReC to world-renowned research institutions>

- Osamu Takeuchi, Associate Professor, concurrent position (2007.11-2012.3) -> Professor, Institute for Virus Research, Kyoto University
- Katsuaki Hoshino, Associate Professor, Endowed Department (2011.4-2012.3) -> Professor, Faculty of Medicine, Kagawa University
- Tomonobu Watanabe, Assistant Professor (2008.2-2011.3) -> Team Leader, QBiC, RIKEN
- Masao Imaizumi, Lecturer (2010.4-2012.3) -> Lecturer, PET Center, Hyogo College of Medicine
- Bai Zhongbin, Assistant Professor (2008.4-2012.3) -> Associate Professor, Yunnan Agricultural University, China
- Fernandez Llamasa Michael, Post-doctoral Research Fellow (2010.10-2011.8) -> Post-doctoral Research Fellow, University of Ottawa, Canada

- Daisuke Kuroda, Post-doctoral Research Fellow (2011.4-2011.9) -> Post-doctoral Research Fellow, Johns Hopkins University, USA
- Jeon Seong Gyu, Post-doctoral Research Fellow (2009.4-2011.10) -> Post-doctoral Research Fellow, POSTECH, Korea
- Kim Taeho, Post-doctoral Research Fellow (2009.5-2011.11) -> Researcher, National Institute of Biological Resources, Korea
- Verjan Garcia Noel, Post-doctoral Research Fellow (2008.10-2012.3) -> Assistant Professor, Universidad del Tolima, Colombia
- Cai Linjun, Post-doctoral Research Fellow (2010.10-2012.3) -> Associate Professor, Jilin University, Changchun, China

1-2. Satellites and partner institutions

- List the satellite and partner institutions in the table below.
- Indicate newly added and deleted institutions in the “Notes” column.
- If satellite institutions have been established, describe by satellite the Center’s achievements in coauthored papers and researcher exchanges in Appendix 4.

<Satellite institutions>

Institution name	Principal Investigator(s), if any	Notes
RIKEN Research Center for Allergy and Immunology	Takashi Saito	
Kyoto University, Institute for Frontier Medical Sciences		
The National Institute of Biomedical Innovation	Ken Ishii	

< Partner institutions>

Institution name	Principal Investigator(s), if any	Notes
Institute for Systems Biology, USA		
Division of Life Science & Division Of Integrative Bioscience and Biotechnology, Pohang University of Science and Technology (POSTECH)		
Indian Institute of Science Education and Research (IISER), Bhopal, India		
Seoul St. Mary’s Hospital, The Catholic University of Korea Convergent Research Consortium for Immunologic Disease (CRCID)		
Maurice Wilkins Center, The University of Auckland, New Zealand		

2. Securing competitive research funding

- Competitive and other research funding secured in FY2011:

Total: 2,579,334,753 JPY

- Describe external funding warranting special mention. Include the name and total amount of each grant.

<Major external funds in FY2011>

- Funding Program for World-Leading Innovative R&D on Science and Technology (The FIRST Akira Project, 744 million JPY, Akira from 2009).

- Grants-in-Aid for Scientific Research (KAKENHI), Specially Promoted Research (159 million JPY, Akira from 2008; 78 million JPY, Sakaguchi from 2008).
- KAKENHI, Scientific Research (S) (32 million JPY, Kurosaki from 2009).
- KAKENHI on Innovative Areas (22 million JPY, Kaisho from 2009; 14 million JPY, M. Ishii from 2010).
- JST CREST programs (26 million JPY, Arase from 2009; 81 million JPY, Kurosaki from 2009; 45 million JPY, Takeda from 2010; 105 million JPY, M. Ishii from 2010).
- Strategic Funds for the Promotion of Science and Technology (62 million JPY, Kishimoto from 2010).
- Regional Innovation Strategy Support Program (20 million JPY, Sakaguchi from 2011).

<Newcomer: PI>

- JST PRESTO program (11 million JPY, Suzuki).
- HFSP Career Development Award (19 million JPY, Hanayama).

<Overseas Researcher>

- JST PRESTO program (20 million JPY, Smith from 2009).

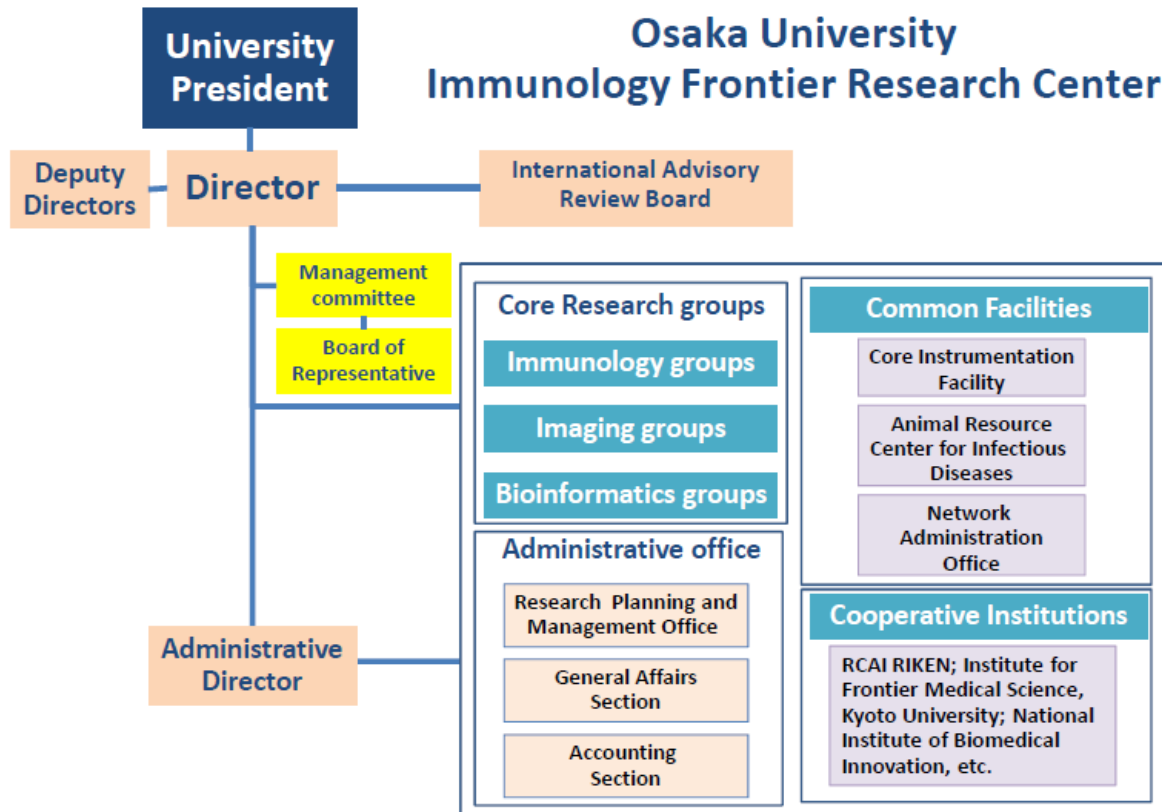
3. International research conferences or symposiums held to bring world's leading researchers together

- Indicate the number of international research conferences or symposiums held in FY2011 and give up to three examples of the most representative ones using the table below.

FY 2011: 3 meetings	
Major examples (meeting title and place held)	Number of participants
IFReC / IPR Joint Seminar -Multilevel Systems Biology: Genomes, Structures, and Networks-, Nov. 16-17, 2011, Taniguchi Memorial Hall, Osaka University.	From domestic institutions: 60 From overseas institutions: 10
Joint Symposium of CRCID, IFReC & IBB "Prevention and intervention of human immune disorders", Dec. 19, 2011, Seoul St. Mary's Hospital, Korea.	From domestic institutions: 20 From overseas institutions: 230
The 5th Immunoparasitology Meeting, Mar. 1-2, 2011, Taniguchi Memorial Hall, Osaka University.	From domestic institutions: 60 From overseas institutions: 2

4. Center's management system

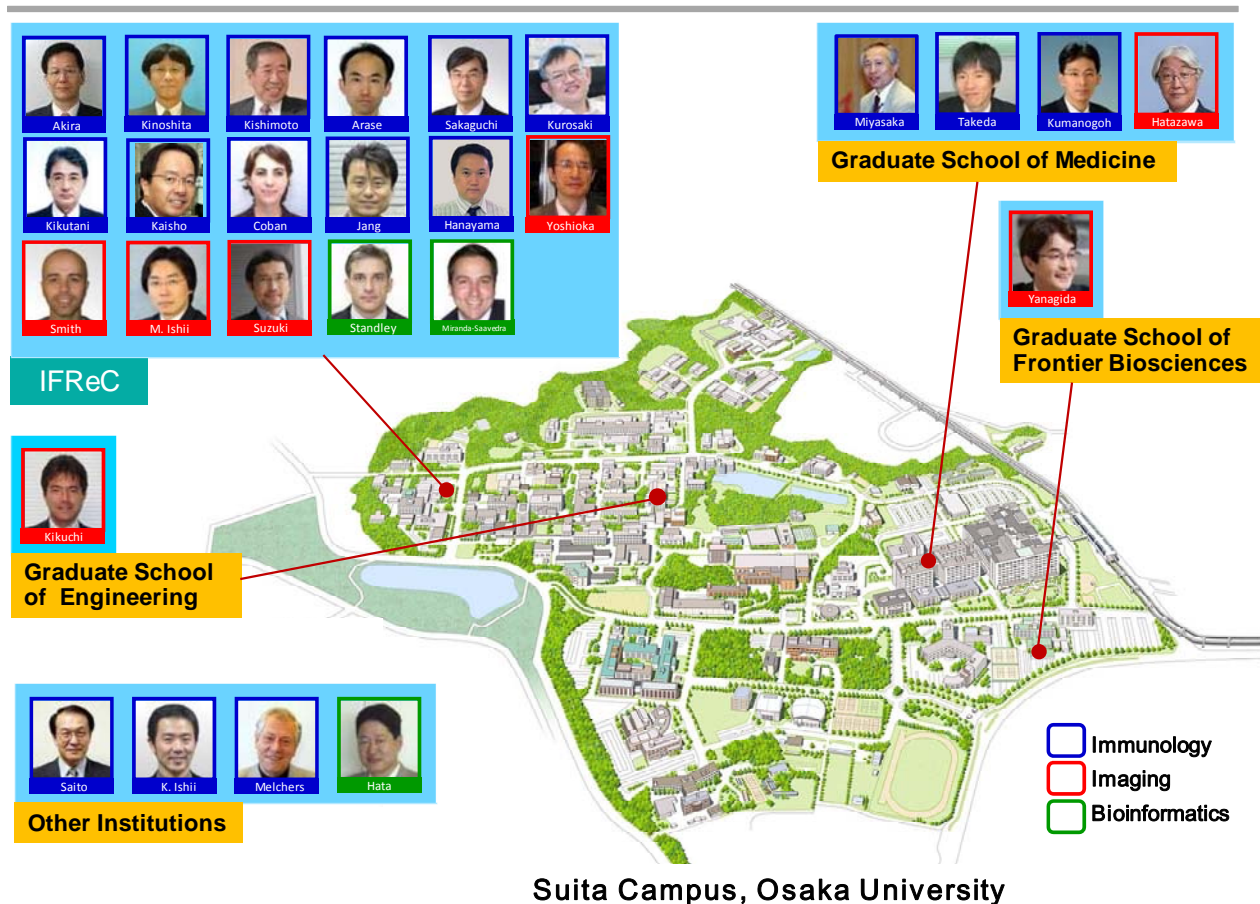
- Please diagram management system in an easily understood manner.
- If any changes have been made in the management system from that in the "Post-interim evaluation revised center project," please describe them. Please describe any changes made in the administrative director, head of host institution, and officer(s) in charge at the host institution (e.g., executive vice president for research)



5. Campus Map

- Please draw a simple map of the campus showing where the main office and principle investigator(s) are located.

IFReC Principal Investigators



6. FY2011 Project Expenditures (the exchange rate used: 1USD= 80JPY)

i) Overall project funding

Ten thousand dollars

Cost Items	Details	Costs (10,000 dollars)
Personnel	Center director and Administrative director	39
	Principal investigators (no. of persons): 14	180
	Other researchers (no. of persons): 144	790
	Research support staffs (no. of persons): 45	244
	Administrative staffs (no. of persons): 27	167
	Total	1420
Project activities	Gratuities and honoraria paid to invited principal investigators (no. of persons):	0
	Cost of dispatching scientists (no. of persons): 6	10
	Research startup cost (no. of persons): 2	12
	Cost of satellite organizations (no. of satellite organizations): 3	0
	Cost of international symposiums (no. of symposiums): 1	2
	Rental fees for facilities	2
	Cost of consumables	138
	Cost of utilities	52
	Other costs	475
	Total	691
Travel	Domestic travel costs	1
	Overseas travel costs	2
	Travel and accommodations cost for invited scientists (no. of domestic scientists): 1 (no. of overseas scientists): 14	7
	Travel cost for scientists on secondment (no. of domestic scientists): 7 (no. of overseas scientists): 5	7
	Total	17

WPI grant	16930
Costs of establishing and maintaining facilities	0
Cost of equipment procured	337
Name of equipment: computing system for integrating immunology information	40
Number of units: 1 Costs paid:	
BD FACSVerser flow cytometer system	29
Number of units: 1 Costs paid:	
multi-photon imaging system	18
Number of units: 1 Costs paid:	
PC cluster	18
Number of units: 1 Costs paid:	
ultra low temperature freezer	13
Number of units: 1 Costs paid:	
individually ventilated cage system	11
Number of units: 1 Costs paid:	
561nm laser system for upgrad	10
Number of units: 1 Costs paid:	
Cryogenic biological sample storage system using liquid nitrogen	9
Number of units: 1 Costs paid:	
PL quantum measuring system	6
Number of units: 1 Costs paid:	
multi-photon imaging system	5
Number of units: 1 Costs paid:	
Infrared meeting unit	5
Number of units: 1 Costs paid:	
1H-19F double tune RF coil	3
Number of units: 1 Costs paid:	
1H/13C double tune RF coil	2
Number of units: 1 Costs paid:	
erectoron sign system	2
Number of units: 1 Costs paid:	

Equipment	Depreciation of buildings	521
	Depreciation of equipment	619
	Total	1140
Other research projects	Projects supported by other government subsidies, etc.	61
	Commissioned research projects, etc.	881
	Grants-in-Aid for Scientific Research, etc.	595
	Total	1537
Total		4805

Pulse Oxymetry module	1
Number of units:1 Costs paid:	
Fiberoptic Temperature module	1
Number of units:1 Costs paid:	
anesthesia machine for small animals	1
Number of units:1 Costs paid:	
others	163

ii) Costs of Satellites and Partner institutions

Cost Items	Details	Costs (10,000 dollars)
Personnel	Principal investigators (no. of persons): 0	/
	Other researchers (no. of persons): 1	
	Research support staffs (no. of persons): 0	
	Administrative staffs (no. of persons): 0	
	Total	5
Project activities		0
Travel		1
Equipment		0
Other research projects		65
	Total	71

FY 2011 Visit Records of World Top-caliber Researchers from Abroad

Researchers Total:26

Name (Age)	Current affiliation (Position title, department, organization)	Academic degree, specialty	Record of research activities (Awards record, etc.)	Time, duration	Summary of activities during stay at center (e.g., participation as principal investigator; short-term stay for joint research; participation in symposium)
Jeffrey Ravetch (59)	Theresa and Eugene M. Lang Professor, Laboratory of Molecular Genetics and Immunology, The Rockefeller University	MD, PhD Molecular-Genetic s and Immunology	Coley Award from the Cancer Research Institute in 2007, the American Association of Immunologists-Huang Foundation Meritorious Career Award in 2005, the Lee C. Howley Sr. Prize for Arthritis Research in 2004 Member of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, the National Academy of Sciences and the Institute of Medicine.	May 22-23,2011 2 days	Attending an International Scientific Advisory Board Meeting
Anne O'Garra (51)	Head, Division of Immunoregulation, The National Institute for Medical Research	PhD Immunology	The Royal Society Fellow, the American Association for the Advancement of Science (AAAS) Fellow, and the Academy of Medical Sciences Fellow	May 22-23,2011 2 days	Attending an International Scientific Advisory Board Meeting
Yale Goldman (64)	Professor, Pennsylvania Muscle Institute, University of Pennsylvania	MD Physiology	Upjohn Achievement Award, University of Pennsylvania Muscular Dystrophy Association National Research Service Award, (NIH) Research Career Development Award, (NIH) Award for Distinguished Teaching Lampton Lecturer of the University of Washington University	May 22-23,2011 2 days	Attending an International Scientific Advisory Board Meeting
Lewis Lanier (57)	Professor, University of California, San Francisco	PhD Immunology	2001 American Association of Immunologists Distinguished Service Award 2002 William B Coley Award 2003 American Cancer Society Research Professorship 2005 American Society for Histocompatibility and Immunogenetics Rose Payne Award 2006 NIH Merit Grant Award Member of National	May 22-23,2011 2 days	Attending an International Scientific Advisory Board Meeting

			Academy of Science		
David Westhead (43)	Professor and Research Group Leader, School of Biochemistry and Microbiology, Leeds University	PhD	Medical Research Council Panel member	May 22-23,2011 2 days	Attending an International Scientific Advisory Board Meeting
Vladimir Brusic (44)	Director of Bioinformatics, Dana-Farber Cancer Institute, Harvard Medical School	PhD Bioinformatics	Director of Bioinformatics, Cancer Vaccine Center, Harvard University	May 22-23,2011 2 days	Attending an International Scientific Advisory Board Meeting
Denis Le Bihan (53)	Director of NeuroSpin, France	PhD Physical Sciences	2004: Elected Member, French Academy of Technologies 2004: Elected Honorary Member, American Society of NeuroRadiology 2003: Elected Member of the Institut de France, Academy of Sciences 2003: Louis D. Foundation Award, Institut de France 2002: Loundsbery Award from the National Academy of Sciences (US) and the French Academy of Sciences	May 30, 2011 1 day	IFReC Seminar
Z. Hong Zhou	Director, Electron Imaging Center for NanoMachines (EICN) Professor, Department of Microbiology, Immunology and Molecular Genetics, University of California Member, ACCESS Program, California NanoSystems Institute, UCLA	Ph.D.Biochemistry	2008 K.H. Kuo Award for Distinguished Scientist from the K.H. Kuo Educational Fund, USA 2004 Burton Award from the American Microscopy Society 2002 Established Investigator Award from the American Heart Association 2000 Basil O'Connor Scholar Award of the March of Dimes Foundation 1999 Pew Scholar in the Biomedical Sciences 1995 NLM/NIH-sponsored postdoctoral trainee (1995-1997). 1995 Best Ph.D. Dissertation Award, Rice Univ./Texas Medical Center Sigma Xi Society	Jun 9, 2011 1 day	Research meeting
Anthony Leung (35)	Assistant Professor, Department of Biochemistry and Molecular Biology, Johns	PhD Genetics	2010 Idea Award, Department of Defense Breast Cancer Research Program 2007-2010 Special Fellowship, The	June 14, 2011 1 day	IFReC Seminar

	Hopkins University		Leukemia & Lymphoma Society 1995-1999 Fitzgerald Prize, University of Oxford, UK		
Alexander Makarov (46)	Director of Global Research in Life Sciences Mass Spectrometry, Thermo Fisher Scientific, AMG. Bremen, Germany	Ph.D. Engineering Physic	2008 ASMS Distinguished Contribution in Mass Spectrometry Award	Jul 7, 2011 1 day	seminar
Roman Jerala	Head of Department of biotechnology at the National Institute of Chemistry, Ljubljana, Slovenia	PhD Biology	2009 Pregl award by the National institute of chemistry for outstanding scientific achievements 2009 Zois award for outstanding scientific achievements 2010 Grand prize winner at iGEM competition at MIT	Aug 17, 2011 1 day	IFReC Seminar
Robert Turner (55)	Director, Department of Neurophysics, Max Plank Institute for Human Cognitive and Brain Sciences	Ph D. Physics	2009 Outstanding Achievement Award 1995 Thorsten Almen Prize (University of Munich)	Aug. 31, 2011 1 day	Research meeting, Seminar
Juan Rivera (55)	Deputy Scientific Director, National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institutes of Health	PhD Biology	Member, American Association of Immunologists 2005 NIH Directors Award 2002 NIH Merit Award	Nov. 15, 2011 1 day	IFReC Seminar
Tim Hubbard (51)	Head of Informatics, Wellcome Trust Sanger Institute, UK	PhD Biology	Advisory council of the RIKEN Genome Science Centre (2005-2007) Advisory board of ukPMC (UK PubMedCentral) as deputy chair (2007-) The E-Health Records Research Board of the UK Government Office for Strategic Coordination of Health Research (2007-2009)	Nov.15-16, 2011 2 days	IFReC / IPR Joint Seminar
Xeutao Cao (47)	President of CSI Director, National Key Laboratory of Medical Immunology, China	MD, PhD Immunology	Member, American Association of Immunologists Member, American Society of Hematology Chief Scientist, China National Program of Immunological Research (2001-) Member, Chinese Academy of Engineering (2005.10-) President, Chinese Society for	Dec. 5, 2011 1 day	Site Visit

			Immunology (2006.11-) Vice-President, FAMSA (2008.10-)		
Chong-Kil Lee	President of KAI Professor, Chungbuk National University, Korea	PhD Immunology	President, Korean Association of Immunologists	Dec 5, 2011 1 day	Site Visit
Michael L. Tremblay (54)	Professor and Director, Goodman Cancer Research Center, McGill University	Ph. D. Biochemistry	Member, American Association for Cancer Research Member, Canadian Society of Immunology Member, International Society for Neuroscience Member, Canadian Society of Cellular and Molecular Biology "Discovery of the Year 2007" Quebec Science Magazine. Top discovery of the year.	Jan. 16-Oct. 31, 2012	Joint research
Gabriel Nunez (69)	Professor, Department of Pathology, University of Michigan	MD Immunology	Basic Science Research Award(2001)	Jan. 17-19, 2012 3 days	IFReC-SIgN Winter School 2012
Rafi Ahmed (60)	Professor, Emory University	PhD Microbiology	Director of Emory Vaccine Center Member of National Academy of Science	Jan. 17-19, 2012 3 days	IFReC-SIgN Winter School 2012
Wayne Yokoyama (58)	Professor, School of Medicine, Washington University	MD Rheumatology	Carl and Gerty Cori Faculty Achievement Award, 2011 Listed in Best Doctors in America, 2009, 2010 (Best Doctors, Inc) Fellow, American Association for the Advancement of Science, 2009 American Academy of Arts and Sciences, 2009 Fellow, American Academy of Microbiology, 2007 National Academy of Sciences, 2007 Novartis Prize for Basic Research in Immunology 2001	Jan.15-21, 2012 6 days	IFReC-SIgN Winter School 2012
Vijay Kuchroo (56)	Professor, Harvard Medical School	DVM PhD	Hoc reviewer for the research grants for various study sections at the National Institutes of Health. Javits Neuroscience Award by NIH, 2002 The first incumbent of the Samuel L. Wasserstrom Chair in Neurology at Harvard Medical School.	Jan. 18-20, 2012 3 days	IFReC-SIgN Winter School 2012

Kunle Odunsi (46)	Professor, Roswell Park Cancer Institute	MD, PhD	Chair, Department of Gynecologic Oncology Director, Division of Gynecologic Oncology Director, Center for Immunotherapy, RPCI Director, US Cancer Vaccine Collaborative Program	Jan. 18-22, 2012 5 days	IFReC-SIgN Winter School 2012
Moshe Arditi (52)	Professor, Executive Vice-Chair of Research in the Department of Pediatrics, Director of the Division of Pediatric Infectious Diseases, Allergy and Immunology at Cedars-Sinai Medical Center, LA, USA	MD Pediatrics	Member, Society of Pediatric Research, American Academy of Pediatrics, American Society of Microbiology, Infectious Disease Society and the International Endotoxin Society	Feb. 6, 2012 1 day	IFReC Seminar
Peter J. Peters (54)	Group Leader, Division of Cell Biology NKI-AVL & Kavli Institute for Bionanoscience, Technical University Delft	Ph.D.	Feulgen Lecture 2009 symposium of the Society for Histochemistry	Feb. 21, 2012 1day	Research meeting
Vaughn Cleghon (45)	Division of Developmental Biology, Cincinnati Children's Hospital Medical Center	PhD Microbiology	Group Leader: Beatson Institute for Cancer Research, UK	Feb. 29, 2012 1 day	IFReC Seminar
Maria Mota (38)	Instituto de Medicina Molecular, Faculdade de Medicina de Lisboa	PhD Biology	2008 Prémio Amélia da Silva de Mello para as Ciências da Saúde 4 ^a Edição, 2005 AMI Health Prize 2005 International Research Scholar Award, Howard Hughes Medical Institute 2004 European Young Investigator Award to Maria M. Mota – European Science Foundation	Mar. 1, 2012 1 day	The 5th Immunoparasitology Meeting

State of Outreach Activities

- Using the table below, show the achievements of the Center's outreach activities in FY2011 (number of activities, times held).
- Describe those activities that have yielded novel results or that warrant special mention in the "Special Achievements" space below.
- In appendix 7, list and describe media coverage (e.g., articles published, programs aired) in FY2011 resulting from press releases and reporting.

Activities	FY2011(number of activities, times held)
PR brochure, pamphlet	4
Lectures, seminars for general public	2
Teaching, experiments, training for elementary and secondary school students	4
Science cafe	4
Open houses	3
Participating, exhibiting in events	3
Press releases	17

Special Achievements

- Director Shizuo Akira gave a keynote lecture to "Super Science High Schools (SSH)" students at "The Congress of SSH" in Kobe on August 11.
- IFRc office employed "Digital Signage System" to provide all the members and passengers with lots of information on seminars, events *etc.*

FY 2011 List of Project's Media Coverage

- Select main items of coverage, and list them within these 2 pages.

No.	Date	Type media (e.g., newspaper, television)	Description
1	2011.5.16	Nikkei Shimbun	Toward the visualization of immune reaction (Prof. Akira)
2	2011.6.14	Nikkei Shimbun	Clarifying the mechanism of Toxoplasmosis (Prof. Takeda)
3	2011.6.28	Nikkan Kogyo Shimbun Chemical Daily	CIN85 drives B cell responses by linking BCR signals to the canonical NF- κ B pathway (Prof. Kurosaki)
4	2011.7.4	Yomiuri Shimbun	Authority on immunology (Prof. Sakaguchi)
5	2011.7.25	Sankei Shimbun	Life was created by "Fluctuations", Commemorative Presentation on author Ryotarou Shiba (Prof. Yanagida)
6	2011.8.10	Yomiuri Shimbun	A gene involving in rheumatoid arthritis was identified. (Prof. Kishimoto)
7	2011.8.16-18	Nikkei Shimbun	Immunology, launch to the world - vol. 1,2,3- (Prof. Akira, Prof. Kishimoto, Prof. Hirano)
8	2011.8.28	Nikkei Shimbun	A protein involving in rheumatoid arthritis was identified. (Prof. Kishimoto)
9	2011.8.29	Yomiuri Shimbun	A protein involving Toxoplasmosis was identified. (Prof. Takeda, Associate Prof. Yamamoto)
10	2011 Summer Vol.63, No.3	Manufacturing & Technology	Latest immunology research and outreach activity (Prof. Akira)
11	2011.9.15	Asahi Shimbun	Mechanism of rheumatoid arthritis was revealed. (Prof. Kishimoto)
12	2011.9.24	NHK Educational TV	Science ZERO (Prof. Yanagida)

13	2011.10.4	Asahi Shimbun, Mainichi Shimbun, Yomiuri Shimbun, Sankei Shimbun	Great achievements in immunology (Prof. Akira)
14	2011.10.6	Asahi Shimbun	Nobel laureates for three fields were announced, Groundbreaking discovery in innate immune system (Prof. Akira, Prof. Kishimoto, Prof. Kaisho)
15	2011.10.9	Yomiuri Shimbun	Nobel Prize natural science fields in year 2011 (Prof. Akira)
16	2011.10.31	Sankei Shimbun	Mechanism of regulating rheumatism was clarified. (Prof. Akira)
17	2011.11.10	Sankei Shimbun	"Suita City Mayor's Prize" was awarded. (Prof. Akira)
18	2011.11.24	Nikkei Shimbun	Reviving Japan by intellectual power of Kansai region, The world's top level institute in immunology (IFReC, Osaka University)
19	2011.11.28	Yomiuri Shimbun	Groundbreaking discovery of immune sensors (Prof. Akira)
20	2012.1.1	Asahi Shimbun	Recipients of the Asahi Prize (Prof. Sakaguchi)
21	2012.1.22	Yomiuri Shimbun	Vaccine therapy for leukemia (Prof. Sakaguchi, Associate Prof. Nishikawa)
22	2012.1.28	Asahi Shimbun	Immunology in a different light (Prof. Sakaguchi)
23	2012.2.11	Asahi Shimbun, Mainichi Shimbun	Cancer vaccine therapy for adult T-cell leukemia (Prof. Sakaguchi, Associate Prof. Nishikawa)
24	2012.2.14	Yomiuri Shimbun	A cell causing asthma was detected. (Prof. Akira)
25	2012.3.6	Asahi Shimbun	An immune cell that prevents intestinal inflammation was Identified. (Prof. Takeda)
26	2012. 3.13	Asahi Shimbun, Mainichi Shimbun, Nikkei Shimbun, Sankei Shimbun	Japan Academy Prize (Prof. Sakaguchi, Prof. Namba)