World Premier International Research Center Initiative (WPI)
Activities Report of the WPI Academy Center
(FY 2017 – FY 2019)

Host Institution	Osaka University	Host Institution Head	NISHIO Shojiro
Research Center	Immunology Frontier Research Center		
Center Director	TAKEDA Kiyoshi	Administrative Director	

Common Instructions:
* Unless otherwise specified, prepare this report based on the current (31 March 2020) situation of your Center.
* Use yen (¥) when writing monetary amounts in the report. If an exchange rate is used to calculate the yen amount, give the rate.
* Prepare this report within 10 pages (excluding the appendices, and including "Summary of State of WPI Academy Center Progress" (within 2 pages)).

Summary of WPI Academy Center's Activities (write within **2 pages**)

Established as a WPI center in 2007, the Immunology Frontier Research Center (IFReC) of Osaka University has produced excellent results by conducting research activities aimed toward a "comprehensive understanding of the immune system" through the integration of immunology, imaging, and informatics. Although WPI grant support for IFReC was terminated at the end of FY 2016, in recognition of IFReC's distinguished research capabilities demonstrated by its outstanding research achievements, IFReC received major funding since FY2017 from pharmaceutical companies within a new framework for industry-academia collaboration. This funding has provided IFReC with the financial base for its operations. IFReC has maintained the same scale of operations as when IFReC was funded by WPI and continues to carry out activities pursuant to the WPI philosophy of world-leading scientific research, interdisciplinary research, internationalization, and organizational reform.

Dr. AKIRA Shizuo, the former IFReC Director, established an operational foundation for IFReC through the above comprehensive collaborations with pharmaceutical companies. Then, in July 2019, the directorship of the center changed from Dr. AKIRA to Dr. TAKEDA Kiyoshi. Dr. TAKEDA subsequently set a goal of contributing to society through IFReC's basic research results based on the industry-academia collaboration framework. He set policies for activities for the next five years: promotion of human immunology, nurture of the next generation of researchers, and internationalization of the center. Specific activities are described below.

World-leading scientific research

With more than 1,700 published papers to date reaching an average of 61.5 citations and an h-index of 132, IFReC has accumulated an extremely high level of research achievements in the last three years. The percentage of top 1% and top 10% papers is 5.1% and 25.5%, respectively, which demonstrate the high international level of research that IFReC maintains.

Securing the operational foundation through industry-academia collaboration

In April 2017, IFReC began comprehensive cooperation agreements with both Chugai Pharmaceutical Co., Ltd. and Otsuka Pharmaceutical Co., Ltd. and received grants totaling more than 10 billion yen over a 10-year period. Through these partnerships, IFReC has secured a financial base for its operations to replace the previous WPI grant. In return for the funding, IFReC discloses its research results to the companies. This allows the partner companies to conduct preferred joint research and utilize patents. As a result, the funding has become available for use in almost the same way as the public funding from the WPI. Furthermore, IFReC researchers are guaranteed the freedom to conduct basic research according to their own interests as before.

In these collaborations, practically all of IFReC's research results are promptly disclosed to the partner companies, which assess whether the results are worth pursuing. This has led to the commencement of many joint research projects, which are funded separately under the normal joint research agreements. Each of the partner companies brings their own unique technology for drug discovery to the collaboration so that the discovery of innovative new drugs based on the basic research results of IFReC is expected.

Promotion of human immunology

Recent rapid developments in measurement and analysis technologies, such as single cell analysis, have enabled the measurement of small amounts of human-derived samples, and resulted in human immunology research becoming a global trend. IFReC strongly promotes basic research in human immunology by taking advantage of the availability of human samples through its collaboration with Osaka University Hospital. IFReC established the Human Immunology Laboratory, hired two PIs (associate professors), and started systematic support for utilizing the advanced technologies led by the two PIs.

Nurture of the next generation of researchers

IFReC has enhanced its research competitiveness by appointing two full-time PIs and eight adjunct PIs in FY2017-2019, and now has a total of 34 research groups.

A few PIs who have made significant contributions as core members of IFReC reached the age of official retirement. Those PIs who are able to secure sufficient external research funding and who are capable of leading the world through their research ability are allowed to continue research activities at IFReC after the retirement age. IFReC clarified the conditions for employment and its compensation package to provide a stable research environment. Furthermore, the PIs at retirement age are required to actively contribute as mentors to nurture researchers for the next generation and to pass on the tradition of immunology research at Osaka University.

IFReC has supported young researchers with programs to promote their international circulation such as the Program for International Circulation for Young Talented Researchers, the Advanced Postdoc Program, and the Winter School. Furthermore, IFReC set up a grant program in FY2018 to support the next generation of PIs (50 years of age and under) who are expected to be the core researchers of IFReC in the future. In the program, IFReC has supported five PIs with a research grant to allow them to produce their representative research achievements and provided them with evaluation and advice from senior PIs.

Promotion of international circulation of researchers and cooperation with overseas research institutions

It is important for IFReC to recruit international talent and to promote research collaboration with overseas researchers and institutions in order to enhance its research competitiveness by stimulating research and ensuring diversity.

IFReC has created opportunities for international research exchange. IFReC organized eight international symposia in the last three years as opportunities to disseminate its latest research results and introduce the hottest research results from abroad to researchers in Japan. IFReC also organized the Winter School, which is highly regarded for their effectiveness in training young talented researchers from all over the world.

IFReC established the Advanced Postdoc Program to promote the international circulation of young talented researchers. The program provides an international-level salary, which is up to 1.3 times that of the standard pay for a postdoc in Japan, and an annual research grant of 3 million JPY over three years. To date a total of 11 Advanced Postdocs were employed. IFReC has also provided financial travel support to nine young IFReC researchers to allow them to participate in overseas research activities.

IFReC has developed a cooperative relationship with ImmunoSensation, a Cluster of Excellence of the University of Bonn, and University College London (UCL), one of the Global Knowledge Partners of Osaka University.

Support from host institution

Osaka University has fully supported the new IFReC in its operations in the manner described below;
Osaka University established the International Advanced Research Institute (IARI) in FY 2017 with the university president as its director, and has allowed IFReC to be managed by the leadership of the IFReC Director as an independent department within IARI. Six tenure posts were provided.

In the comprehensive collaboration agreement with Chugai Pharmaceutical Co., Ltd., the entire budget for indirect costs that was allocated to the head office was allocated back to IFReC, and the entire amount received (1 billion yen per year) was made available to IFReC.

Osaka University actively supports the promotion of IFReC's international cooperation through original funding programs. In particular, Osaka University took the lead in promoting collaboration with UCL, a Global Knowledge Partner of Osaka University.

* Describe clearly and concisely the progress being made by the Center from the viewpoints below.
- In addressing the below-listed 1-8 viewpoints, place emphasis on the following:
  (1) Whether research standards and operation of the Center is maintaining a "world premier" status.
  (2) Whether the Center participate and cooperate to the activities to advance the overall development of the WPI Program and to promulgate its achievements.

1. Overall Image of Your Center

・Describe the Center's current identity and overall image.
・List the Principal Investigators in Appendix 2, diagram the Center's management system in Appendix 3-1, enter the number of center personnel in Appendix 3-1a, and enter center funding in Appendix 3-2.

Established as a WPI center in 2007, the Immunology Frontier Research Center (IFReC) of Osaka University has produced excellent results by conducting research activities aimed toward a "comprehensive understanding of the immune system" through the integration of immunology, imaging, and informatics. In 2015, IFReC was also highly evaluated by the WPI Program Committee for attaining World Premier Status. Although WPI grant support for IFReC was terminated at the end of FY2016, in recognition of IFReC's distinguished research capabilities demonstrated by its outstanding research achievements, IFReC received major funding since FY2017 from pharmaceutical companies within a new framework for industry-academia collaboration. This funding has provided IFReC with the financial base for its operations. IFReC has maintained the same scale of operations as when IFReC was funded by the WPI and continues to carry out activities pursuant to the WPI philosophy. In addition, as one of the centers of the WPI Academy, IFReC endeavors to accelerate and expand the international circulation of young talented researchers.

Maintaining a high level of research With more than 1,700 published papers to date reaching an average of 61.5 citations and an h-index of 132, IFReC has accumulated an extremely high level of research achievements. The percentage of top 1% and top 10% papers is 5.1% and 25.5%, respectively, which demonstrates the high international level of research (Web of Science and InCites as of March 30, 2020). There were also four hot papers (top 0.1% of cited papers) in 2018-2019, which is more than 10 times the average.

Change of director and new policies In July 2019, Dr. TAKEDA Kiyoshi succeeded Dr. AKIRA Shizuo as the center director. Dr. TAKEDA set a goal of contributing to society through IFReC's basic research results based on the industry-academia collaboration framework established at IFReC. He has set the following policies for the next five years: (1) promotion of human immunology, (2) nurture of the next generation of researchers, and (3) internationalization of the center.

Establishing industry-academia partnerships In April 2017, IFReC began comprehensive cooperation agreements with both Chugai Pharmaceutical Co., Ltd. and Otsuka Pharmaceutical Co., Ltd. and received grants totaling more than 10 billion yen over a 10-year period. Through these partnerships, IFReC has secured the necessary funding to replace the previous WPI grant, thereby giving IFReC researchers the freedom to pursue basic research. In return for the grants provided, IFReC discloses its latest results in basic research, which allows the partner companies to effectively use the research results and establishes a system for seamless collaboration with the partner companies. As a result, many joint research projects were started and the results of the basic research are being actively used.

Promotion of human immunology Recent rapid developments in measurement and analysis technologies, such as single cell analysis, have enabled the measurement of small amounts of human samples, and resulted in human immunology research becoming a global trend. IFReC strongly promotes basic research in human immunology by taking advantage of the availability of human samples in collaboration with Osaka University Hospital. IFReC has made the latest measurement equipment available as common-use facilities and started to establish a support system and support programs.

Nurture of the next generation of researchers IFReC has enhanced its research competitiveness by appointing two full-time PIs and eight adjunct PIs in FY2017-2019, and now has a total of 34 research groups. As a few core members of IFReC have reached the age of official retirement in the past few years, a generational change of executive board members was made by the new director. IFReC supports the international circulation of young researchers and young PIs to promote their development into core researchers of IFReC through various support programs. Even after the retirement age, PIs are allowed to keep their positions and continue with their research activities as long as they can lead the world through their research and contribute as mentors to nurture the next generation of researchers.

Cooperation with leading overseas research institutions In order to ensure diversity in research and to complement our technology and know-how, such as informatics in human immunology, it is necessary to enhance cooperation with leading overseas research institutions. IFReC has promoted

collaboration with ImmunoSensation at the University of Bonn in Germany and with University College London (UCL) in the UK, which is a Global Knowledge Partner of Osaka University, by concluding academic exchange agreements and holding continual joint symposia.

2. Advancing Research of the Highest Global Level

- Describe what's been accomplished in the Center's research objectives and plans.
- In Appendix 1, list the papers underscoring those research achievement and list the Center's research papers published in 2017-2019 in a manner prescribed in Appendix A.

Approximately 450 refereed articles have been published by IFReC researchers from 2017 to 2019. Although there was no significant change in the number of papers each year, there was an improvement in the quality of the papers. The number of papers in high-impact journals such as Nature, Cell, Science, and their sister journals, Journal of Experimental Medicine and Journal of Clinical Investigation, was 20 and 17 in 2017 and 2018, respectively, and was 30 in 2019 (Web of Science™ as of March 11, 2020). During the period of WPI funding (FY2007-FY2016), IFReC researchers published an average of 13% to 14% of their articles in high-impact journals. This percentage reached about 20% in 2019 for the first time since 2008. It is thought that the quality of IFReC's research papers has improved over that during the period of WPI funding.

At present, not much time has elapsed since the papers were published so the number of citations is provided for reference only. However, here we compare IFReC with the La Jolla Institute for Immunology (LJI) of the USA, which is one of the world's leading immunology institutes, and whose scale of research is close to that of IFReC. The average number of citations for all articles was "IFReC: 10.8, LJI: 14.1", the average number of citations for immunology was "IFReC: 10.8, LJI: 13.2", the h-index for all articles was "IFReC: 30, LJI: 37", the h-index for immunology papers was "IFReC: 19, LJI: 24", the top 1% of all papers was "IFReC: 5.0, LJI: 6.5", and the top 1% of immunology papers was "IFReC: 8.3, LJI: 5.5". Overall, LJI was slightly superior to IFReC in both average citations and h-index, but IFReC was superior in the top 1% of papers in immunology. Comparing IFReC with the Institute of Medical Science at the University of Tokyo, which is one of the top institutes in Japan, IFReC was superior in all criteria that indicate a paper's quality.

It should be clear from the above that IFReC is the top immunology research institute in Japan, and has been producing results comparable to the world's leading immunology research institutes. In terms of internationalization, IFReC's internationally co-authored papers accounted for 41-42% during the period, which was less than 54% for LJI, but was unrivaled in Japan.

Research achievements As new PIs join IFReC, the research themes in IFReC continue to diversify:

(1) By using big data and with many collaborators, Dr. OKADA Yukinori and his group classified human leukocytes (Ref. 7 in Appendix 1-1) and analyzed the type of constitution that makes one susceptible to stroke (Ref. 13 in Appendix 1-1).

(2) Dr. YAMASHITA Toshihide discovered the role of B lymphocytes in the development of the central nervous system (Ref. 6 in Appendix 1-1).

(3) Dr. AKIRA Shizuo showed a mechanism of how ribonuclease Regnase-1, discovered by the group, is phosphorylated by IL-17 and stabilizes the mRNA (Ref. 17 in Appendix 1-1).

(4) Dr. TAKAKURA Nobuyuki found that the activities of hematopoietic stem/progenitor cell are regulated by Regnase-1 (Ref. 15 in Appendix 1-1).

(5) Dr. TAKEDA Kiyoshi (IFReC Director) analyzed the effects of substances produced by gut microbiota and their mechanism on intestinal immune responses (Ref. 12 in Appendix 1-1).

(6) Dr. KUMANOGOH Atsushi obtained important findings in semaphorin reaction (Ref. 10 in Appendix 1-1) and in elucidating the principles of blood cancer and Car-T cell therapy (Refs. 2 and 11 in Appendix 1-1).

(7) Dr. SAKAGUCHI Shimon further investigated the mechanism of immune regulation by regulatory T cells, which he discovered (Refs. 9 and 14 in Appendix 1-1).

(8) Dr. ISHII Masaru observed living osteoclasts and discovered the osteoclasts progenitor that causes autoimmune diseases using original bioimaging technology (Ref. 19 in Appendix 1-1).

(9) In the field of infectious diseases, some important papers were published on the mechanism of pathogen recognition and immune responses against malaria or toxoplasma (Refs. 1, 3, 4, and 18 in Appendix 1-1). A number of important papers related to immune reactions during inflammation and infection were produced by IFReC researchers (Refs. 5, 8, 16, and 20 in Appendix 1-1).

Invited Lectures Over the past three years, Dr. SAKAGUCHI Shimon and Dr. KISHIMOTO Tadamitsu received a number of international awards, and they were invited to give many commemorative lectures. Other senior researchers including Dr. TAKEDA Kiyoshi (IFReC Director) and Dr. AKIRA Shizuo (former IFReC Director) were often invited to established gatherings such as the International Union of Immunological Societies or Keystone Symposia (Appendix 1-2).

Awards In this period, Dr. SAKAGUCHI Shimon received a large number of awards. In addition to prestigious national and international awards, he was named a Person of Cultural Merit in 2017 and a recipient of the Order of Culture in 2019. Dr. KISHIMOTO Tadamitsu received the King Faisal International Award and the Keio International Medical Award. Other researchers were presented awards mainly in Japan, such as the highly esteemed Japan Academy Prize to Dr. NAGASAWA Takashi and the Medal with Purple Ribbon to Dr. KINOSHITA Taroh. The prestigious Japanese Society for Immunology (JSI) presented the JSI Award to Dr. YAMASAKI Sho (2018) and Dr. ISHII Ken (2019). In addition, Dr. Cevayir COBAN and Dr. KINOSHITA Taroh were awarded in 2017 the JSI Prize for Women Immunologists and the JSI Human Immunology Research Award, respectively. Michelle Sue Jann LEE, a brilliant graduate student, was awarded the JSPS Ikushi Prize 2018. She was the only winner at Osaka University and the only overseas recipient in all fields (Appendix 1-3).

3. Facilitating Interdisciplinary Research Activities

- Describe the content of measures taken by the Center to facilitate interdisciplinary research activities. For example, measures that create an environment that will facilitate doing joint research by researchers in differing fields.
- Describe the contents and results of interdisciplinary research activities yielded by the measures described above.

IFReC has promoted interdisciplinary integration from the WPI era and continues to organize IFReC Colloquia in order to enhance the exchange of information among researchers. The Live Immuno-Imaging Facility, which IFReC operates as one of its prominent facilities, significantly contributes to interdisciplinary research. The bioimaging and bioinformatics techniques have been widely adopted among the researchers at IFReC and are now part of IFReC's research methodology. In 2019, IFReC appointed two young PIs to promote human immunology. In their labs, mass cytometry and a next-generation sequencer were introduced for research on single human cells. Active joint research activities with other laboratories is expected to result in new knowledge in the field of human immunology. The technologies that have advanced over the past three years and the achievements from their use are mentioned below.

(1) Using MRI, Dr. Cevayir COBAN and her colleagues found that malaria infection causes strong activation of immunity, and invasion of plasmodium by-products into the bone marrow significantly reduces bone homeostasis (Lee et al. Sci Immunol 2017). The image in the article appeared on the cover of the journal.

(2) Dr. ISHII Masaru and his group reported novel non-labeling multiphoton excitation microscopy imaging of fresh human colorectal mucosa (Matsui et al. Sci Report 2017). The group showed bone-forming mature osteoblasts and bone-resorptive mature osteoclasts functions are regulated via direct cell-cell contact between these cell types (Furuya et al. Nat Commun 2018). They discovered the osteoclasts in pannus originate exclusively from circulating bone marrow-derived cells and not from locally resident macrophages (Hasegawa et al. Nat Immunol 2019).

(3) Dr. Nicholas SMITH and his group developed a label-free multimodal microscopy platform that allows the non-invasive study on immune cells without any labeling. In combination with machine learning technology (Deep Learning), they applied this system in the analysis of fine cellular processes such as macrophage cells activation upon exposure to lipopolysaccharide (LPS). (Pavillon et al. PNAS 2018).

(4) Primarily by the use of positron emission tomography (PET) technology, Dr. Jun Hatazawa and his group proposed an astatine isotope as a potentially new radiation source for use in cancer treatments (Ikeda et al. Appl Rad Isotop 2018).

(5) Dr. OKADA Yukinori and his group developed a novel in silico screening method (MIGWAS) and revealed that microRNAs are involved in the development of human diseases, such as rheumatoid arthritis, by acting in a tissue-specific manner. (Sakanue et al. Nucl Acid Res 2018). Furthermore, the research group discovered an increase in the number of species belonging to Prevotella and a decrease in the genes-related redox reactions in the patients of rheumatoid arthritis (Kishikawa et al. Annal Rheumat Dis 2019). The international research groups including Dr. OKADA Yukinori conducted a multiancestry genome-wide-association meta-analysis on 521,612 individuals and discovered 22 new stroke risk loci, bringing the total to 32 (Malik et al. Nat Gen 2018).

(6) Dr. Daron STANDLEY and his group made significant contributions to collaborative research with many research groups. A paper published by the group on MAFFT (multiple sequence alignment program) (Katoh & Standley Mol Biol Evol 2013) has the highest number of citations since the establishment of IFReC, and

an improved version of the MAFFT paper was published (Nakamura et al. Bioinformatics 2018).

4. Maintaining an International Research Environment

・Describe what's been accomplished in the efforts to raise the Center's recognition as a genuine globally visible research institute, along with innovative efforts proactively being taken, including the following points, for example:
- Efforts being developed to maintain an international research environment based on the analysis of number and state of world-leading, frontline 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 researchers from around the world (such as creating of an environment in which researchers can concentrate on their research, providing startup research funding, supporting efforts that will foster young researchers and contribute to advancing their career paths, and arranging support system for the research activities of overseas researchers.)
- Consolidation of the administrative structures to support implementing the efforts described above

・In Appendix 3-1, describe the state of cooperation with overseas satellites, and list the main international research meetings held by the Center.

It is important for IFReC to accept international researchers and to promote research collaboration with overseas researchers and institutions in order to enhance its research competitiveness by stimulating research and ensuring diversity. IFReC has created opportunities for international exchange at international symposia and Winter Schools, strengthened relationships with leading overseas research institutions to promote international joint research, and promoted the international circulation of young talented researchers. In particular, in order to promote this circulation of young researchers, it is necessary to actively recruit young researchers and to create many successful cases where young researchers at IFReC produce excellent results and are promoted and transferred to other institutions. This makes it important for IFReC to attract excellent researchers. IFReC continues to improve its international research environment and support system established during the WPI era in order to create many such success stories.

Collaboration with leading overseas research institutions ImmunoSensation, a Cluster of Excellence of the University of Bonn (Germany), was established by the German Research Excellence Initiative program in 2012 and is rapidly increasing its research competitiveness. In FY2018, IFReC and the University of Bonn concluded an academic exchange agreement and held their first joint symposium in Bonn, Germany. The researchers were invited to International Symposia and the Winter School hosted by IFReC to promote academic exchange. IFReC has developed a cooperative relationship in the research field of acquired immunity with University College London (UCL), one of the Global Knowledge Partners of Osaka University. In FY2019, IFReC invited 10 speakers from UCL and hosted their first joint symposium in Osaka, Japan.

International symposia IFReC organized eight international symposia including two symposia held abroad in the last three years as opportunities to disseminate the latest research results of IFReC and introduce the hottest research results from abroad to researchers in Japan.

Winter School on Advanced Immunology The Winter School on Advanced Immunology has been held jointly with the Singapore Immunology Network each year since FY2011. In FY2019, there were 233 applications from Ph.D. students and early postdocs, of which 53 were selected through rigorous screening. The Winter School has succeeded in globally fostering young researchers and providing them with an opportunity to network with other talented researchers. Furthermore, the Winter School has been a place for recruiting young researchers to IFReC and its participants were offered opportunities to join IFReC as advanced postdocs. Among the past Winter School participants, those who became PIs at their affiliated institutions were invited as lecturers to IFReC International Symposia. They were the role models for the international circulation of talent and became familiar goals for the young researchers.

Advanced Postdoc Program IFReC established the Advanced Postdoc Program in FY2017 to recruit excellent young international researchers. The program provided an international-level salary, which is up to 1.3 times that of an ordinary postdoc in Japan, and an annual research grant of 3 million JPY over 3 years. In total, 11 Advanced Postdocs were employed. The progressive research activities of the Advanced Postdocs have been highly regarded and are expected to produce excellent results.

Program for International Circulation for Young Talented Researchers IFReC provides financial travel support to young IFReC researchers for them to participate in overseas research activities. Under the program, nine researchers took advantage of the support. The young researchers later posted activity reports on IFReC's internal website to share their experiences.

Support for international researchers The Research Planning and Management Office (RPMO) manages the activities described above, and also provides researchers from overseas with various forms of support for research and in their daily life. For example, the RPMO members holding PhDs work with researchers to assist them in applying for external funding programs. Not only do the members provide the necessary language translation, but they also help improve the applications by writing them from a

scientific viewpoint. Knowledge of Japanese laws and regulations is required to conduct experiments with genetically modified organisms, experimental animals, pathogens, and human samples. In order to ensure that researchers from abroad are able to conduct their research seamlessly, the RPMO members who are knowledgeable and experienced in the field assist them with the various procedures and conduct an annual orientation program in English to educate them in this regard. Furthermore, IFReC provides weekly Japanese language classes for about 40 international researchers.

5. Making Organizational Reforms and their Ripple Effects

- Describe distinctive effort in managing research operation and administrative organization, such as the strong leadership that the director is giving on the Center's operation, strong performance by the administrative director who provides the center director with strong administrative and managerial support, and division of roles and authority between the Center and its host institution.
- Describe the ripple effects that activities to disseminate experience and know-how accumulated by the Center, such as the followings, have/had on the host institution (or other research institutes, if any):
  - System reforms made through the Center's leading activities to its research operation and administrative organization
  - Experience and know-how accumulated by the Center as it have worked to establish itself as top world-level research institutes.
- Other than the above, give examples, if any, of cooperative activities by the Center and the whole WPI Program or other WPI centers, to disseminate experience and know-how accumulated by the WPI program and/or the WPI centers.

Center management through the strong leadership of the center's director The IFReC directorship changed from Dr. AKIRA Shizuo to Dr. TAKEDA Kiyoshi in July 2019. Both directors provided strong leadership as Dr. AKIRA established an operational foundation for IFReC through comprehensive collaboration agreements with companies with the strong support of the former administrative director, Dr. SAKAGUCHI Nobuo, and Dr. TAKEDA in turn promoted human immunology. Dr. TAKEDA upgraded equipment with the center director's discretionary funds and established a support system.

(1) Senior PIs A few PIs including Dr. AKIRA Shizuo (in FY2018) and Dr. SAKAGUCHI Shimon (in FY2016) who have made significant contributions reached the age of official retirement. Those PIs who are able to secure sufficient external research funding and who are capable of leading the world through their research are allowed to continue research activities at IFReC after the retirement age. IFReC clarified the conditions for employment and its compensation package to provide a stable research environment. Furthermore, the PIs at retirement age are required to actively contribute to nurturing the next generation of researchers and to pass on the tradition of immunology research at Osaka University.

(2) Researchers of the next generation IFReC supports young researchers mainly through the Program for International Circulation of Young Talented Researchers, Advanced Postdoc Program, Winter School, and other programs by promoting the international circulation of their talents. The Grant Program for Next Generation PI was set up in FY2018 to support the PIs under 50 years of age who are expected to be the core members of IFReC in the future. The program aims to support the PIs to produce their representative research results that will give them an advantage in obtaining future competitive funding. To date, IFReC supports five PIs with research grant and provides them with evaluation and advice by senior PIs.

(3) Research management personnel In order to maintain and improve the international research environment, it is essential to nurture research management personnel. At IFReC, two PhD-level staff members were hired in the RPMO and trained on-the-job to enhance PR and outreach activities that promote the international circulation of talented researchers and to enhance industry-academia management centering on the comprehensive collaboration agreements.

Dissemination of achievements

The experience and know-how accumulated at IFReC were disseminated as follows:

(1) New industry-academia collaboration Large-scale industry-academia collaboration agreements for promoting basic research between IFReC and Chugai Pharmaceutical Co., Ltd. and Otsuka Pharmaceutical Co., Ltd. have attracted much attention. Having shared that experience within the university, Osaka University has begun a similar agreement with Daikin Industries, Ltd. that provides a total of 5.6 billion yen in funding over a 10-year period starting July 2017.

In FY2018, Osaka University and its partner companies (Chugai Pharmaceutical Co., Ltd., Otsuka Pharmaceutical Co., Ltd., and Daikin Industries, Ltd.) were awarded the first Japan Open Innovation Awards Minister's Prize by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) that recognizes leading and highly original initiatives that are expected to serve as shining examples of open innovation in Japan.

This comprehensive collaboration has led to the active implementation within Osaka University of joint research with private companies. As a result, according to a report by MEXT entitled "Status of Industry-Academia Collaboration of Universities in FY2018", Osaka University is ranked first among universities in Japan in terms of both the amount of research funding received from private companies and the amount of large joint research funding of over 10 million yen from private companies.

The experience was also shared with external institutions at the 10th Osaka University Joint Research Chair Symposium (December 7, 2016) and at the 2nd Research University Consortium Symposium (October 25, 2018, Tokyo). It was also published as commentary articles in journals "Ensho-to-Meneki" (Vo1.24, No. 6, 2016) and "Seisan-Gijyutsu" (Vol. 70, No. 1, 2018).

(2) PR and outreach activities IFReC has been actively engaged in international PR and outreach activities to date, and has accumulated considerable know-how. To share our know-how, IFReC issued press releases and held events in collaboration with the PR offices of the Graduate School of Medicine and the Research Institute of Microbial Diseases (RIMD) of Osaka University.

(3) Support for international researchers The documents translated by IFReC into English regarding procedures related to research are provided to the university. IFReC made an educational training seminar in English in the legal aspects of research available to all researchers in Osaka University. The efforts made by IFReC are thus being utilized by all international researchers within Osaka University.

6. Effort to Enhance and Amplify the Visibility and Brand of the Overall WPI Program

- Describe how the Center's outreach activities have contributed to enhancing and amplifying the visibility and brand of the WPI program. Describe the successful cases of the Center's outreach activities in Appendix 4, and enter the number of activities in Appendix 4a.
- Other than the above, describe, if any, the activities and their concrete contents that have contributed to the enhancement and amplification of the visibility and brand of the WPI program (such as holding a large international research meeting, collaborative activities with multiple WPI centers). If you have already provided this information, please indicate where in the report.

In order to further enhance the brand strength that IFReC has established, it was important to select methods for effectively communicating with strategically selected targets. Since FY2017, IFReC has strengthened its PR and outreach efforts targeting young researchers in Japan and abroad to accelerate and expand the international circulation of talented researchers. IFReC has also actively promoted outreach activities to the general public to increase public awareness and to garner support for IFReC's activities as a WPI Academy center.

Acceleration and expansion of international circulation of talented researchers Efforts to improve the visibility of the center for young researchers in Japan and abroad were made mainly through the Advanced Postdoc Program and other international student support programs set up by IFReC. IFReC conducted PR activities by utilizing the network of IFReC alumni, by posting job advertisements on the websites of leading academic journals, and by exhibiting a booth at Nature Careers Live, a global job fair intended for young overseas researchers, and at the Annual Meeting of the American Association for the Advancement of Science (AAAS). At the booths, IFReC researchers discussed science and explained IFReC's world-class research environment. Administrative staff were also available to discuss the living environment in Japan and answer a wide range of questions from visitors. This resulted in an increase in the number of Advanced Postdoc applications from 78 (FY2017) to 166 (FY2019). IFReC continues to hold the Winter School for young researchers. Through similar PR and outreach efforts, IFReC was able to attract 233 applications from 21 countries around the world and select 53 participants for the Winter School in FY2019. This increase in the number of applications is an indication the ongoing activities to date combined with a new multifaceted approach have been effective in improving the visibility of IFReC among the targeted international immunologists of the next generation.

Outreach to general public PR and outreach activities aimed at raising the level of public awareness in Japan were enhanced. In addition to the annual report, IFReC started the publication of a new PR magazine, Imuneco, in FY2018, which is more accessible to the general public. In FY2019, IFReC held 34 events. Among them, eleven Science Cafés (5.5 times increase from the previous year) attracted approximately 540 visitors (1.7 times increase from the previous year). IFReC was able to gain understanding and support for its research activities from the public who attended the events. Such activities targeting the general public were conducive to fundraising activities.

Press releases were issued and events were held in collaboration with PR offices of the Graduate School of Medicine and RIMD of Osaka University. A total of 339 articles about IFReC were published in newspapers and media in the three years from 2017 to 2019. The number of Facebook Likes increased 1.38 times from April 2018 to March 2020.

Branding WPI The AAAS Annual Meeting is a valuable opportunity to make direct contact with international science journalists. IFReC participated in the meeting and conducted PR activities about the initiatives undertaken by IFReC as a WPI center and the research results of IFReC thus far. IFReC continues to participate in the AAAS Annual Meeting, where it has been working as a WPI center, and continues activities to enhance its international brand on behalf of the WPI. IFReC also co-hosted an event with iCeMS of Kyoto University to improve visibility in Japan as a WPI center.

7. Effort to Secure the Center's Future Development over the Mid- to Long-term

・Address each of the following items that have been done to secure mid- to long-term center development:
- Contents of the measures taken by the host institution to support maintaining the activities of the Center (such as securing financial and personnel resources, coordination among host institution to bring together in-house researchers, in-kind provision and/or facilities afforded in terms of usage of building, lab space and other equipment, new management reform carried out after the funding period ends).
- Actions and measures taken to sustain the Center as a world premier international research center.

Appropriate operation of comprehensive collaboration and ensuring stable operation of IFReC In April 2017, IFReC began 10-year comprehensive collaboration agreements with Chugai Pharmaceutical Co., Ltd. and with Otsuka Pharmaceutical Co., Ltd. comprising a total funding of more than 10 billion yen. Thus, through these agreements IFReC secured a financial base for its operations in lieu of WPI support. In exchange for the funding provided, IFReC discloses its latest research results to its partner companies. As a result, the partner companies are given priority for conducting joint research and patent use. Under the agreements, the funding provided by the partner companies can be used in almost the same way as the public WPI funding in that IFReC can spend the funding with a high degree of freedom on activities leading to research results. Since no specific research theme was set as in a typical joint research agreement, IFReC researchers are guaranteed the freedom to conduct their curiosity-driven basic research as in the past.

To date, there have been limited opportunities in Japan for academic research results to actually attract the attention of companies. However, in these comprehensive collaborations, practically all of IFReC's research results are disclosed to its partner companies, which assess whether they are worth pursuing. This functions as a practical system for seamlessly developing basic research results into applied research and has led to increased opportunities to conduct joint research with partner companies. Joint research based on the disclosed results is funded separately under the normal joint research agreement procedures. Each company's research space in IFReC has been set up as joint research chairs (established in April 2017 for Chugai Pharmaceutical Co., Ltd. and established in February 2020 for Otsuka Pharmaceutical Co., Ltd.). Since each of the partner companies has its own unique technology for drug discovery, the discovery of innovative new drugs based on the results of IFReC is expected. On the other hand, because it is impossible for the partner companies to conduct applied research on all the research results created by IFReC, IFReC also promotes collaboration with other companies. In order to manage the increasingly sophisticated and complex industry-academia collaboration, including the management of such comprehensive collaborations, IFReC recruits and trains research management personnel in the RPMO through MEXT's Program for Promoting the Enhancement of Research Universities.

Effort to promote human immunology The new director, Dr. TAKEDA Kiyoshi, set up policies to promote human immunology research in addition to interdisciplinary research, which were approved by the WPI Program Committee. IFReC is able to conduct these types of research due to its access to human samples through the PIs affiliated concurrently with Osaka University Hospital. In addition, recent remarkable technological innovations have made it possible to analyze single cells and improved computing capability has enabled the analysis of big data, thereby clearing the way for progress in human immunology research. In order to upgrade the equipment available for common use, in FY2019 IFReC purchased single cell analyzers (Chromium by 10xGenomics and Rhapsody by BD) and a next-generation sequencer (NovaSeq6000). In addition, IFReC established the Human Immunology Laboratory and hired two PIs (associate professors) to provide systematic research support. By covering the cost of expensive analysis techniques, IFReC makes these expensive state-of-the-art technologies available to IFReC researchers.

Recruitment and nurture of the next generation of researchers IFReC provides support to researchers at different stages in their careers. IFReC has fostered young researchers through the Advanced Postdoc Program, the Program for International Circulation of Young Talented Researchers, and the Winter School, and has supported young PIs with research funding through the Grant Program for Next Generation PI to promote their development into core researchers at IFReC. Furthermore, IFReC recognizes PIs who have the ability to continue to lead the world in research even after their retirement age, and encourages them to actively contribute to nurturing the next generation of researchers as mentors.

Evaluation and support by host institution As the host institution, Osaka University established the International Advanced Research Institute (IARI) in FY2017 with the university president as its director, and has allowed the IFReC director to manage IFReC as a department within IARI under his leadership. Osaka University holds IFReC in high regard with respect to the following points. (1) IFReC has many world-class researchers and continues to produce world-class research results, thereby contributing significantly to the improvement of academic standards at Osaka University; (2) IFReC contributes significantly to the internationalization of the university as it has a high proportion of international

researchers and actively promotes the international circulation of young researchers and the exchange of research with overseas research institutions; and (3) IFReC contributes significantly to industry-academia collaboration at Osaka University as it promotes new forms of collaboration, mainly through large-scale comprehensive cooperation agreements, and obtains a large amount of external funding from companies, thereby establishing and maintaining an independent management system. As the host institution, Osaka University has provided the following support to IFReC.

(1) Human resources support Six tenured posts (two professors, two associate professors, and two assistant professors) were provided and bilingual administrative staff were assigned preferentially to IFReC.

(2) Financial support In the comprehensive collaboration agreement with Chugai Pharmaceutical Co., Ltd., the entire budget for all indirect costs that was allocated to the head office was allocated back to IFReC, and the entire amount received (1 billion yen per year) was made available to IFReC.

(3) Support for international cooperation Osaka University supports the promotion of IFReC's international cooperation. In particular, Osaka University took the lead in promoting collaboration with UCL, a Global Knowledge Partner of Osaka University. Immunology is one of the fields that UCL requested for collaboration with Osaka University, which has created opportunities for promoting interaction. Accordingly, the aforementioned joint symposium was held with the support of Osaka University, and a Strategic Partnership Agreement between the universities was signed in October 2019. In addition, Osaka University promotes international joint research through funding.

(4) Support for industry-academia collaboration With the start of the comprehensive collaboration, a close collaborative relationship has been established within Osaka University. The number of collaborative research projects derived from this comprehensive collaboration and the amount of grants received from them have also increased. Therefore, the department in charge of industry-academia collaboration has provided sufficient support to help IFReC with its increasingly complex management.

8. Others

- Describe the Center's efforts over the past 3 years in making it a place that expands and accelerates the international circulation of the world's best brains. Give about 5 example of their success cases and describe their concrete contents and effect in narrative.
- In addition to the above1-7, note any of the Center's notable efforts and activities.

Results to accelerate and expand international circulation for young researchers as a WPI Academy center The specific results are as follows.

(1) Advanced Postdocs To date, IFReC has recruited 11 outstanding young researchers. In FY 2019, 166 applications were received and 3 were hired.

(2) Collaboration with ImmunoSensation, University of Bonn In response to a request by the Rector of the university on his visit to IFReC, a partnership was established and an academic exchange agreement was signed. A joint symposium was held in Bonn in 2018. The next one will be held in Osaka.

(3) Collaboration with UCL A collaborative relationship was established in the field of immunology under the leadership of Osaka University. A joint symposium was held in Osaka. The next symposium will be held in London in 2020.

(4) Winter School of Advanced Immunology The school is highly regarded for successfully recruiting outstanding young researchers selected from many applications from all over the world. The school also contributed to the recruitment of young researchers to IFReC.

(5) PR and outreach activities to accelerate international circulation of young researchers Recruitment activities were carried out overseas. This led to an increase in applications to the Winter School and Advanced Postdoc Program and increased the visibility of IFReC to young researchers.

Operational system in the absence of an administrative director Dr. SAKAGUCHI Nobuo, the former administrative director, stepped down in July 2019. Until a new administrative director is appointed, Director Takeda also serves as the administrative director with the assistance from two associate professors in the RPMO. A new administrative director will be selected and appointed in 2020.

Decrease in research competence due to outflow of fixed-term staff In IFReC, there are a very limited number of tenured positions for researchers and administrative/technical staff, most of whom are employed in fixed-term. Following the revised Labor Contract Act Law enacted in 2013, Osaka University cannot employ fixed-term researchers for more than 10 years and other fixed-term employees for more than five years. In recruiting professor-level researchers, it is difficult to offer tenured positions at present so only fixed-term positions can be offered, making it extremely difficult to recruit them in practice.

Currently, only associate professor-level researchers can be recruited as new PIs on the assumption that they will be transferred within 10 years, thereby reducing the potential for IFReC's development. In addition, there is a strong concern that research level and operational efficiency have been reduced due to the inevitable outflow of experienced technical and administrative staff over the past few years.

Appendix 1 List of Center's Major Research Achievements

1. List of Major Refereed Papers

*List **up to 20 papers** representative of the Center's research activities during the period between FY 2017 and FY 2019, and give brief descriptions (within 5 to 10 lines) of them.
*For each, write the author name(s); year of publication; journal name, volume, page(s), and article title. Any listing order may be used as long as format is the same. If a paper has many authors, underline those affiliated with the Center.
*If a paper has many authors (say, more than 10), all of their names do not need to be listed.

1. Plasmodium products persist in the bone marrow and promote chronic bone loss.
   Michelle S. J. Lee, Kenta Maruyama, Yukiko Fujita, Aki Konishi, Patrick M. Lelliott, Sawako Itagaki, Toshihiro Horii, et al. Science Immunology 2:12, eaam8093 (2017).
   Cevayir Coban's group and others have revealed that malaria infection induces robust immune activation and invasion of parasite by-products into the bone marrow leading to harmful outcomes on bone homeostasis. The research group additionally showed that supplementation of alfacalcidol, a vitamin D3 analog, reverses the adverse outcomes of malaria infection on bone. Their results highlight the risk of bone loss in malaria-infected patients and the potential benefits of coupling bone therapy with anti-malarial treatment.

2. The activated conformation of integrin β7 is a novel multiple myeloma–specific target for CAR T cell therapy.
   Naoki Hosen, Yukiko Matsunaga, et al. Nature Medicine 23:1436-1443 (2017).
   Naoki Hosen, Athushi Kumanogoh and their research group showed that the active conformer of an integrin can serve as a specific therapeutic target for multiple myeloma (MM). They identified MMG49 as an MM specific mAb specifically recognizing a subset of integrin β7 molecules. MMG49 CAR T cell therapy is promising for MM, and a receptor protein with a rare but physiologically relevant conformation can serve as a cancer immunotherapy target.

3. Immune evasion of Plasmodium falciparum by RIFIN via inhibitory receptors.
   Fumiji Saito, Kouyuki Hirayasu, Takeshi Satoh, et al. Nature 552:101-105 (2017).
   Hisashi Arase and others revealed a novel molecular mechanism that P. falciparum suppresses host's immune response and causes severe malaria. The research group found that proteins called RIFIN expressed on P falciparum-infected erythrocytes bind to a host inhibitory receptor LILRB1. Furthermore, RIFIN suppresses the immune response to malaria, resulting in severe complications of malaria. This result is expected to greatly contribute to the development of therapeutic drug and vaccine against malaria.

4. Intracellular metabolite β-glucosylceramide is an endogenous Mincle ligand possessing immunostimulatory activity.
   Masahiro Nagata, Yoshihiro Izumi, Eri Ishikawa, Ryoko Kiyotake, Rieko Doi, Satoru Iwai, Zakaria Omahdi, Toshiyuki Yamaji, Tomofumi Miyamoto, Takeshi Bamba, and Sho Yamasaki. PNAS 114(16):E3285-E3294 (2017).
   Group A Streptococcus (GAS) causes invasive streptococcal infections in humans, resulting high mortality. Thus, GAS is also known as "killer bacteria" or "flesh-eating bacteria". Sho Yamasaki and his research group reported that the C-type lectin receptor macrophage inducible Ctype lectin (Mincle) recognizes GAS and initiates anti-bacterial immunity. Their findings indicate that Mincle plays a central role in protective immunity against acute GAS infection.

5. Regulation of inflammatory responses by dynamic subcellular localization of RNA-binding protein Arid5a.
   Mitsuru Higa, Masahiro Oka, Yoshitaka Fujihara, Kazuya Masuda, Yoshihiro Yoneda, and Tadamitsu Kishimoto. PNAS 115 (6):E1214-E1220 (2018).
   Tadamitsu Kishimoto, and the research group revealed the regulatory mechanism of subcellular localization of Arid5a in response to inflammation. They showed 1) Arid5a translocates to the cytoplasm from the nucleus in response to inflammation, 2) bimax, which inhibit cNLS-dependent nuclear import via highaffinity interactions with NLS-binding sites of importin-α, inhibits the nuclear import of Arid5a, 3) CRM1 inhibitor, Leptomycin B, inhibits the

nuclear export of Arid5a after LPS stimulation.

6. B-1a lymphocytes promote oligodendrogenesis during brain development.
Shogo Tanabe & Toshihide Yamashita. Nature Neuroscience 21:506-516 (2018).
Toshihide Yamashita and his research group showed the most abundant infiltrating lymphocytes in the developing brain are B cells. They identified the subtypes of lymphocytes that are present in neonatal mouse brains and investigated their functions. They found that B-1a cells, a subtype of B cells, were abundant in the neonatal mouse brain and infiltrated into the brain in a CXCL13–CXCR5-dependent manner.

7. Multiancestry genome-wide association study of 520,000 subjects identifies 32 loci associated with stroke and stroke subtypes.
Rainer Malik, Ganesh Chauhan, Matthew Traylor, Muralidharan Sargurupremraj, Yukinori Okada, et al. Nature Genetics 50:524-537 (2018).
Stroke has multiple etiologies, but the underlying genes and pathways are largely unknown. The international research groups including Yoshinori Okada conducted a multiancestry genome-wide-association meta-analysis in 521,612 individuals (67,162 cases and 454,450 controls) and discovered 22 new stroke risk loci, bringing the total to 32.

8. T Follicular Helper Cell-Germinal Center B Cell Interaction Strength Regulates Entry into Plasma Cell or Recycling Germinal Center Cell Fate.
Wataru Ise, Kentaro Fujii, et al. Immunity 48(4):702-715 (2018).
Wataru Ise, Tomohiro Kurosaki and the research group discovered how high affinity antibodies, which are essential for host protection from pathogens, are generated. This study analyzed germinal center B cells carefully and identified plasma cell precursors among germinal center B cells. The findings in this study are expected to contribute to the development of novel vaccine that targets efficient production of antibody against various virus.

9. Autoimmune Th17 Cells Induced Synovial Stromal and Innate Lymphoid Cell Secretion of the Cytokine GM-CSF to Initiate and Augment Autoimmune Arthritis.
Keiji Hirota, Motomu Hashimoto, et al. Immunity 48(6):1220-1232 (2018).
Using a model of spontaneous autoimmune arthritis, Keiji Hirota and Shimon Sakaguchi's group identified in an animal model of rheumatoid arthritis an inflammatory cellular cascade instigated by an arthritogenic T helper subset and enhanced by GM-CSFproducing synovial-resident innate lymphoid cells.

10. Semaphorin 6D reverse signaling controls macrophage lipid metabolism and anti-inflammatory polarization.
Sujin Kang, Yoshimitsu Nakanishi, Yoshiyuki Kioi, et al. Nature Immunology 19:561–570 (2018).
Polarization of macrophages into pro-inflammatory or anti-inflammatory states has distinct metabolic requirements, with mechanistic target of rapamycin (mTOR) kinase signaling playing a critical role. Sujin Kang, Athushi Kumanogoh, and their research group showed that an mTOR–Semaphorin 6D (Sema6D)-Peroxisome proliferator receptor γ (PPARγ) axis plays critical roles in macrophage polarization. Their findings highlight crucial roles for Sema6D reverse signaling in macrophage polarization, coupling immunity, and metabolism via PPARγ.

11. Sequestration of T cells in bone marrow in the setting of glioblastoma and other intracranial tumors.
Pakawat Chongsathidkiet, Christina Jackson, Shohei Koyama, et al. Nature Medicine 24:1459-1468 (2018).
Shohei Koyama (Kumanogoh group) and the researchers of Harvard University, Duke University, and the John Hopkins University revealed that in a patient with a brain tumor, the tumor prevents the migration of T lymphocytes from the bone marrow. This T cell sequestration is accompanied by tumor-imposed loss of S1P1 from the T cell surface and is

reversible upon precluding S1P1 internalization. In murine models of glioblastoma, hindering S1P1 internalization and reversing sequestration licenses T cell- activating therapies that were previously ineffective.

12. GPR31-dependent dendrite protrusion of intestinal CX3CR1+ cells by bacterial metabolites.
Naoki Morita, Eiji Umemoto , et al. Nature 566:110-114 (2019).
Naoki Morita, Eiji Umemoto, and Kiyoshi Takeda's group revealed the role of bacterial metabolites lactate and pyruvate in intestinal immune response. These metabolites produced by gut microbiota stimulate intestinal macrophages through the receptor GPR31, allowing macrophages to protrude trans-epithelial dendrites and take up pathogenic bacteria efficiently in the intestine. Accordingly, lactate and pyruvate cause enhanced immune responses to pathogenic bacteria and increased resistance to the infection.

13. Genetic and phenotypic landscape of the major histocompatibilty complex region in the Japanese population.
Jun Hirata, Kazuyoshi Hosomichi, Saori Sakaue, Masahiro Kanai, Hirofumi Nakaoka, Kazuyoshi Ishigaki, Ken Suzuki, Masato Akiyama, Toshihiro Kishikawa, Kotaro Ogawa, Tatsuo Masuda, Kenichi Yamamoto, Makoto Hirata, Koichi Matsuda, Yukihide Momozawa, Ituro Inoue, Michiaki Kubo, Yoichiro Kamatani, and Yukinori Okada. Nature Genetics 51:470-480 (2019).
To perform detailed fine-mapping of the major-histocompatibility-complex region, Yukinori Okada and the research group conducted next-generation sequencing -based typing of the 33 human leukocyte antigen genes in 1,120 individuals of Japanese ancestry. They showed that the Japanese HLC type consists of 11 patterns, and its individual difference involves in more than 50 phenotypes including diseases.

14. Satb1 regulates the effector program of encephalitogenic tissue Th17 cells in chronic inflammation.
Keiko Yasuda, Yohko Kitagawa, Ryoji Kawakami, Yoshitaka Isaka, Hitomi Watanabe, Gen Kondoh, Terumi Kohwi-Shigematsu, Shimon Sakaguchi, and Keiji Hirota. Nature Communications 10:549 (2019).
Keiko Yasuda, Keiji Hirota, Shimon Sakaguchi and their research group demonstrate that Satb1 (special AT-rich sequence-binding protein-1) differentially regulates gene expression profiles in non-pathogenic and pathogenic Th17 cells and promotes the pathogenic effector program of encephalitogenic Th17 cells by regulating GM-CSF via Bhlhe40 and inhibiting PD-1 expression.

15. Regnase-1-mediated posttranscriptional regulation is essential for hematopoietic stem and progenitor cell homeostasis.
Hiroyasu Kidoya, Fumitaka Muramatsu, Teppei Shimamura, Weizhen Jia, Takashi Satoh, Yumiko Hayashi, Hisamichi Naito, Yuya Kunisaki, Fumio Arai, Masahide Seki, Yutaka Suzuki, Tsuyoshi Osawa, Shizuo Akira, and Nobuyuki Takakura. Nature Communications 10:1072 (2019).
Regnase-1, a member of the CCCH zinc finger protein family has RNAse activity, and mediates post-transcriptional regulatory activity through degradation of target mRNAs. Nobuyuki Takakura and his research group showed that Regnase-1 regulates self-renewal of HSPCs (hematopoietic stem and progenitor cells) through modulating the stability of Gata2 and Tal1 mRNA.

16. The COMMD3/8 complex determines GRK6 specificity for chemoattractant receptors.
Akiko Nakai, Jun Fujimoto, Haruhiko Miyata, Ralf Stumm, Masashi Narazaki, Stefan Schulz, Yoshihiro Baba, Atsushi Kumanogoh, Kazuhiro Suzuki. J Exp Med 216 (7):1630–1647 (2019).
Akiko Nakai, Kazuhiro Suzuki and the research group identified a protein complex consisting of copper metabolism MURR1 domain-containing (COMMD) 3 and COMMD8 (COMMD3/8 complex) as an adaptor that selectively recruits a specific GRK (G protein-coupled receptors kinase) to chemoattractant receptors and promotes lymphocyte migration. The COMMD 3/8 complex plays a crucial role in humoral immune responses and can be a drug target for the treatment of inflammatory diseases.

17. Phosphorylation-dependent Regnase-1 release from endoplasmic reticulum is critical in IL-17 response.
Hiroki Tanaka, Yasunobu Arima , Daisuke Kamimura, Yuki Tanaka, Noriyuki Takahashi, Takuya Uehata, Kazuhiko Maeda, Takashi Satoh, Masaaki Murakami, and Shizuo Akira. J Exp Med 216 (6):1431–1449 (2019).
Regnase-1 is an endoribonuclease involved in mRNA degradation of inflammation-associated genes. Hiroki Tanaka, Shizuo Akira, and their research group demonstrated that interleukin (IL)-17 induces phosphorylation of Regnase-1 in an Act1-TBK1/IKKi–dependent manner, especially in nonhematopoietic cells. By the stimulation with interleukin 17, Regnase-1 is phosphorylated and translocated to the cytoplasm. As a result, the mRNA targeted by Regnase-1 is stabilized and translated.

18. CXCR4 regulates Plasmodium development in mouse and human hepatocytes.
Hironori Bando, Ariel Pradipta, Shiroh Iwanaga, Toru Okamoto, Daisuke Okuzaki, Shun Tanaka, Joel Vega Rodríguez, Youngae Lee, Ji Su Ma, Naoya Sakaguchi, Miwa Sasai, Yoshiharu Matsuura, Masao Yuda, Marcelo Jacobs-Lorena, and Masahiro Yamamoto. J Exp Med 216 (6):1431–1449 (2019).
The research group of Masahiro Yamamoto showed that enhanced CXCR4 expression increases calcium ion concentration in hepatocytes, and malaria parasites differentiate into erythroid phase. Blocking CXCR4 expression by genetic or pharmacological intervention profoundly inhibited the liver stage development of the P. berghei rodent malaria parasite and the human P. falciparum parasite also. CXCR4 inhibitors that have been used are expected to be new preventive agents for malaria.

19. Identification of a novel arthritis-associated osteoclast precursor macrophage regulated by FoxM1.
Tetsuo Hasegawa, Junichi Kikuta, Takao Sudo, Yoshinobu Matsuura, Takahiro Matsui, Szandor Simmons, Kosuke Ebina, Makoto Hirao, Daisuke Okuzaki, Yuichi Yoshida, Atsushi Hirao, Vladimir V. Kalinichenko, Kunihiro Yamaoka, Tsutomu Takeuchi, and Masaru Ishii. Nature Immunology 20:1631–1643 (2019).
Junichi Kikuta, Masaru Ishii and their research group discovered the osteoclasts in pannus originate exclusively from circulating bone marrow-derived cells. They identify murine CX3CR1hiLy6CintF4/80+I-A+/I-E+ macrophages (named [AtoMs]) as the osteoclast precursor (OP)-containing population in the inflamed synovium, comprising a subset distinct from conventional OPs in homeostatic bone remodelling. Tamoxifen-inducible Foxm1 deletion suppressed the capacity of AtoMs to differentiate into osteoclasts in vitro and in vivo. .

20. Cross-talks of glycosylphosphatidylinositol biosynthesis with glycosphingolipid biosynthesis and ER-associated degradation.
Yicheng Wang, Yusuke Maeda, Yi-Shi Liu, Yoko Takada, Akinori Ninomiya, Tetsuya Hirata, Morihisa Fujita, Yoshiko Murakami, and Taroh Kinoshita. Nature Communications 11:860 (2020).
The structure of the core backbone of Glycosylphosphatidylinositol (GPI) is conserved whereas the structural variation of GPI anchors is introduced by side-chain modifications. In some mammalian GPI-APs, the N-acetylgalactosamine side-chain linked to the first mannose is further modified with galactose by an unknown galactosyltransferase (GPI-Gal-T). The research group of Taroh Kinoshita found that B3GALT4, known as GM1 synthase, is GPI-Gal-T. They also demonstrated the requirement of lactosylceramide for efficient galactosylation of GPI side chain.

2. Major Invited Lectures, Plenary Addresses (etc.)

*List up to 10 main presentations made between FY 2017 and FY 2019 in order from most recent.
*For each, write the date(s), lecturer/presenter's name, presentation title and conference name.

Date(s)	Lecturer/Presenter's name	Presentation title	Conference name
March 14. 2020	SAKAGUCHI Shimon	Discovery of regulatory T cell and its clinical Application	Memorial Lecture for Paul Elrich and Ludwig Darmstaedter Prize, Germany
March 9. 2020	SAKAGUCHI Shimon	Discovery of regulatory T cell	Memorial Symposium for Order of Culture, Japan
March 2, 2020	KUROSAKI Tomohiro	B Cell Renaissance: Epigenetics, Regulation and Immunotherapy	Keystone Symposia, Canada
December 19, 2019	KISHIMOTO Tadamitsu	IL-6: From Molecule to Medicine	Memorial Lecture for Keio Medical Prize, Japan
October 20, 2019	TAKEDA Kiyoshi	Regulation of intestinal homeostasis by epithelia and immunity	International Union of Immunological Societies, China
September 11, 2019	SAKAGUCHI Shimon	Discovery of regulatory T cell and its molecular basis for clinical application	Memorial Lecture for the German Immunology Prize
July 30, 2019	SAKAGUCHI Shimon	Regulatory T cell: From Molecule to Medicine	Memorial Lecture for Honorary Doctorate from University of Birmingham, UK
April 9, 2019	AKIRA Shizuo	RNA degradation controls inflammation	NIH WALS Lecture Series, USA
March 11, 2019	AKIRA Shizuo	The control of inflammatory and immune responses by the endoribonuclease Regnase-1	Keystone Symposia, USA
April 4, 2017	KISHIMOTO Tadamitsu	IL-6: From Molecule to Medicine	Memorial Lecture for King Faisal International Prize, Saudi Arabia

3. Major Awards

*List main awards received between FY 2017 and FY 2019 in order from the most recent.
*For each, write the date issued, recipient's name and the name of award. In case of multiple recipients, underline those affiliated with the Center.

Date	Recipient's name	Name of award
January 23, 2020	SAKAGUCHI Shimon	Paul Elrich and Ludwig Darmstaedter Prize
December 25, 2019	AKIRA Shizuo, SAKAGUCHI Shimon	The World's Most Influential Scientific Minds 2019 (Highly Cited Researchers)
December 12, 2019	ISHII Ken	JSI (Japanese Society for Immunology) Award
November 3, 2019	SAKAGUCHI Shimon	the Order of Cultural Merit
October 28, 2019	TAKEDA Kiyoshi	Mochida Memorial Foundation Award
September 12, 2019	KISHIMOTO Tadamitsu	The Keio Medical Science Prize
September 11, 2019	SAKAGUCHI Shimon	The German Immunology Prize
July 30, 2019	SAKAGUCHI Shimon	Honorary Doctorate from University of Birmingham
March 14, 2019	NAGASAWA Takashi	The Japan Academy Prize
January 5, 2019	YAMAMOTO Masahiro	The JSPS Prize
December 27, 2018	YAMAMOTO Masahiro	The Japan Medical R&D Grand Prize
December 10, 2018	YAMASAKI Sho	JSI (Japanese Society for Immunology) Award
November 3, 2018	KINOSHITA Taroh	The Medal with Purple Ribbon
April 15, 2018	KIKUCHI Kazuya	MEXT the Scientists' Prize
April 6, 2018	Michelle Sue Jann LEE	JSPS Ikushi Prize
December 25, 2017	AKIRA Shizuo, SAKAGUCHI Shimon, TAKEDA Kiyoshi, YAMAMOTO Masahiro	The World's Most Influential Scientific Minds 2017 (Highly Cited Researchers)
December 13, 2017	KINOSHITA Taroh	JSI Human Immunology Research Award
December 13, 2017	Cevayir COBAN	JSI Prize for Women Immunologists
October 25, 2017	SAKAGUCHI Shimon	Person of Cultural Merit of Japan
October 2, 2017	KINOSHITA Taroh	Takeda Prize for Medical Science.
April 10, 2017	KISHIMOTO Tadamitsu	The King Faisal International Prize for Medicine

Appendix 2 FY 2019 List of Principal Investigators

NOTE:

*Underline names of principal investigators who belong to an overseas research institution.

*Indicate newly added researchers in FY 2019 (2019.4.1-2020.3.31) in the “Notes” column.

<Principal Investigators at the end of FY 2019> **Principal Investigators Total: 34**

Name	Age	Affiliation (Position title, department, organization)	Academic degree, Specialty	Effort (%)*	Starting date of participation	Status of participation (Describe in concrete terms)	Note
Center director TAKEDA Kiyoshi	53	Director and Professor, WPI Immunology Frontier Research Center, and, Graduate School of Medicine, Osaka University	MD, PhD (Immunology)	100	01/11/2007	usually stays at the center	
AKIRA Shizuo	66	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	15	01/10/2007	usually stays at the center	
KUROSAKI Tomohiro	64	Deputy Director and Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology and molecular biology)	80	03/12/2007	usually stays at the center	
ARASE Hisashi	54	Deputy Director and Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	40	01/10/2007	usually stays at the center	
KUMANOGOH Atsushi	53	Professor, Graduate School of Medicine, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	25	01/10/2007	usually stays at guraduate school of medicine	
ISHII Ken J.	51	Professor The Institute of Medical Science, The University of Tokyo Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology, Vaccine Science)	5	01/11/2007	join to meetings every two months, workshops several times a year, and symposiums occasionally.	

Cevayir COBAN	46	Professor, The Institute of Medical Science, The University of Tokyo, WPI Immunology Frontier Research Center, Osaka University	MD (Clinical Microbiology specialty)	20	01/04/2008	stays at the center once (1 week) a month, joint IFReC Management meetings, at skype meeting three times a week.	Cross appointment started on 2019/06/01
SUZUKI Kazuhiro	44	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immune cell dynamics)	90	01/04/2011	usually stays at the center	
YAMAMOTO Masahiro	41	Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center,Osaka University	PhD (Immunology)	45	01/04/2012	usually stays at the center	
Benjamin John SEYMOUR	47	NICT Invited Executive Researcher and Wellcome Trust Intermediate Clinical Fellow (Cambridge University)	PhD (Neurological Science)	10	01/04/2014	He visits IFReC several times/year to attend symposia, etc. to contribute to research at IFReC. He regularly communicates with us by emails.	
HATAZAWA Jun	66	Professor, Research Center for Nuclear Physics, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Nuclear Medicine)	5	16/01/2009	stays at the center once a month, usually stays at Research Center for Nuclear Physics Osaka University、RCNP	research for new radionuclide development for medical use
KIKUCHI Kazuya	54	Professor, Graduate School of Engineering, WPI Immunology Frontier Research Center, Osaka University	PhD (Chemical Biology)	10	01/08/2009	usually stays at the center	
ISHII Masaru	46	Professor, Graduate School of Frontier Biosciences, WPI Immunology Frontier Research Center,Osaka University	MD, PhD (Bioimaging)	10	01/12/2008	usually stays at the center	
Nicholas Isaac SMITH	44	Associate Professor, WPI Immunology Frontier Research Center, Osaka University	PhD Engineering/ Applied Physics)	100	01/06/2009	usually stays at the center, except when teaching or during conference travel	

Daron M.STANDLEY	51	Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center, Osaka University	PhD (Bioinformatics)	15	01/10/2008	usually stays at the center	
NAGATA Shigekazu	70	Professor, WPI Immunology Frontier Research Center, Osaka University	PhD (Molecular/Cell Biology)	80	01/04/2015	usually stays at the center	
KINOSHITA Taroh	68	Endowed Chair Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center, Osaka University	PhD (Immunology, Biochemistry)	70	01/10/2007	usually stays at the center	
SAKAGUCHI Shimon	69	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	70	01/04/2011	usually stays at the center	
SAITO Takashi	69	Team leader, RIKEN, Research Center for Integrative Medical Sciences, Professor, WPI Immunology Frontier Research Center, Osaka University	PhD (Immunology)	10	01/04/2008	join to meetings every two months, workshops several times a year, and symposiums occasionally.	
KIKUTANI Hitoshi	69	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	100	01/10/2007	usually stays at the center	
KISHIMOTO Tadamitsu	80	Professor, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	80	01/10/2007	usually stays at the center	
Fritz MELCHERS	83	Max Planck Fellow	PhD (Immunology)	10	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.	

YANAGIDA Toshio	73	Professor, Graduate School of Frontier Biosciences, WPI Immunology Frontier Research Center, Osaka University	PhD (Molecular Imaging)	10	01/10/2007	join seminars, symposium, and meetings (several times a year at IFReC)/ interdisciplinary research promotion at NICT CiNet	
OKADA Yukinori	38	Professor, Graduate School of Medicine, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Bioinformatics)	5	01/04/2017	conducts research 2 or 3 times a week at the center	
YAMASHITA Toshihide	55	Professor, Graduate School of Medicine, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Neurological Science)	10	01/04/2017	conducts research 2 or 3 times a week at the center	
NAGASAWA Takashi	58	Professor, Graduate School of Frontier Biosciences, WPI Immunology Frontier Research Center, Osaka University	MD, PhD (Immunology)	36	01/04/2017	Conducts research relating to the Center and participates several times a month (includes visits) in exchanging information with the Center's researchers.	
YAMASAKI Sho	50	Deputy Director and Professor, WPI Immunology Frontier Research Center, and Research Institute for Microbial Diseases, Osaka University	PhD (Immunology)	80	01/04/2017	usually stays at the center	
OKADA Masato	61	Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center, Osaka University	PhD(Science)	15	01/08/2018	stays at the center once a week	
HARA Eiji	55	Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center, Osaka University	PhD (Molecular Biology)	5	01/08/2018	usually stays beside the center	
TAKAKURA Nobuyuki	57	Professor, Research Institute for Microbial Diseases, WPI Immunology Frontier Research Center, Osaka University	MD,PhD(Vascular and Stem Cell Biology)	15	01/08/2018	usually stays beside the center	

FUJIMOTO Manabu	53	Professor, Graduate School of Medicine, WPI Immunology Frontier Research Center, Osaka University	MD.PhD. (Dermatology)	15	01/04/2019	usually stays at guraduate school of medicine	New
MORO Kazuyo	43	Professor, Graduate School of Medicine, WPI Immunology Frontier Research Center, Osaka University	MD.PhD. (Immunology)	10	01/08/2019	usually stays at guraduate school of medicine	New
James Badger WING	39	Associate Professor, WPI Immunology Frontier Research Center, Osaka University	PhD. (Immunology)	100	01/11/2019	usually stays at the center	New
OKUZAKI Daisuke	47	Associate Professor, WPI Immunology Frontier Research Center, Osaka University	PhD. (Human Immunology)	50	01/11/2019	usually stays at the center	New

*Percentage of time that the principal investigator devotes to his/her work for the Academy center vis-à-vis his/her total working hours.

Principal Investigators resigned since FY 2017

Name	Next Affiliation (Position title, department, organization)	Period of participation

Appendix 3-1 Record of Center Activities (FY 2017-FY 2019)

1. Researchers and Center Staffs, Satellites, Partner Institutions

1-1. Researchers and Center Staffs Participated in the Center's Activities

- Enter the number of researchers and center staffs affiliated with the Center in the table in Appendix 3-1a.

Special mention

- Describe the Center's concrete plans for the future and already-established schedules for employing researchers, particularly principal investigators.
- As background to how the Center is working on the global circulation of 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.
- In Appendix 3-1b, describe the positions that postdoctoral researchers acquire upon leaving the Center.

1-2. Satellites and Partner Institutions

- List the satellite and partner institutions, both domestic and overseas, in the table below.
- Indicate newly added and deleted institutions in the "Notes" column.

<Satellite institutions>

Institution name	Principal Investigator(s), if any	Notes

< Partner institutions>

Institution name	Principal Investigator(s), if any	Notes

2. Status of Collaboration with Overseas Satellites

2-1. Coauthored Papers

- List the refereed papers published between FY 2017 and FY 2019 that were coauthored between the Center's researcher(s) in domestic institution(s) (include satellite institutions) and overseas satellite institution(s). List them by overseas satellite institution in the below blocks.
- Transcribe data in same format as in Appendix 1. Italicize the names of authors affiliated with overseas satellite institutions.

Overseas Satellite 1 Name (Total: OO papers)
1)
2)
3)

Overseas Satellite 2 Name (Total: OO papers)
1)
2)
3)

2-2. Status of Researcher Exchanges

- Using the below tables, indicate the number of researcher exchanges between the Center (include domestic satellite institutions) and overseas satellite institutions during the period of FY 2017-FY 2019. Enter by institution and fiscal year.
- Write the number of principal investigator visits in the upper space and the number of other researcher visits in the lower space.

Overseas Satellite 1:

<To overseas satellite>

	FY 2017	FY 2018	FY 2019	Total
Principal investigators				
Other researchers				
Total				

<From overseas satellite>

	FY 2017	FY 2018	FY 2019	Total
Principal investigators				
Other researchers				
Total				

Overseas Satellite 2:

<To overseas satellite>

	FY 2017	FY 2018	FY 2019	Total
Principal investigators				
Other researchers				
Total				

<From overseas satellite>

	FY 2017	FY 2018	FY 2019	Total
Principal investigators				
Other researchers				
Total				

3. Holding and Participating in International Research Meetings

3-1. Holding international Research Meetings

- Indicate the number of international research conferences or symposiums held between FY 2017 and FY 2019, and give up to five examples of the most representative ones using the table below.

FY 2017: 2 meetings	FY 2018: 4 meetings	FY 2019: 2 meetings
Major examples (meeting titles, places and dates held)		Number of participants
Cluster Science Days 2018 and the 10th international symposium of IFReC Venusberg Campus of the University Hospital Bonn, Bonn, Germany November 5-6, 2018		From domestic institutions: 9 From overseas institutions: 200
Next Gen Immunology in Health and Disease Grand Cube Osaka, Osaka, Japan February 7-8, 2019		From domestic institutions: 180 From overseas institutions: 10

The 1st UCL-OU Joint Symposium on Immunology Taniguchi Memorial Hall, Osaka, Japan June 27-28, 2019	From domestic institutions: 148 From overseas institutions: 10
The 9th Winter School on Advanced Immunology The Awaji Yumebutai International Conference Center, Hyogo, Japan January 20-24, 2020	From domestic institutions: 12 From overseas institutions: 59
The 11th International Symposium of IFReC Grand Cube Osaka, Osaka, Japan January 24, 2020	From domestic institutions: 92 From overseas institutions: 89

3-2. Participating in International Research Meetings

- Give up to five examples of the most representative case in which the Center, not individual researchers, participated in international research meetings to enhance the visibility and brand of the Center or of the overall WPI Program

Meeting titles, places, dates held and number of participants	Form of participation (e.g. operating a booth)	Number of participants from the Center
N/A		

4. List of the Cooperative Research Agreements with Overseas Institutions

- Indicate the number of agreements concluded with overseas institutions still in effect as of the end of FY 2019 (March 31, 2020). Give five examples of the most representative agreements.

Number of effective agreements (as of March 31, 2019): 1

Five examples of the most representative agreements:

1. Name of the Agreement:
   AGREEMENT ON ACADEMIC EXCHANGE BETWEEN IMMUNOLOGY FRONTIER RESEARCH CENTER, RESEARCH INSTITUTE FOR MICROBIAL DISEASES, AND GRADUATE SCHOOL OF FRONTIER BIOSCIENCES OF OSAKA UNIVERSITY, AND THE RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITY OF BONN FOR ITS IMMUNOSENSATION CLUSTER OF EXCELLENCE
   Dates of the Agreement: Nov.5, 2018
   Counterpart in the Agreement: University of Bonn
   Summary of the Agreement:
   The Immunology Frontier Research Center, the Research Institute for Microbial Diseases, and the Graduate School of Frontier Biosciences of Osaka University have entered into an agreement with the University of Bonn for the purposes of academic exchange, such as collaborative research and

the exchange of personnel.

2. Name of the Agreement:
   Dates of the Agreement:
   Counterpart in the Agreement:
   Summary of the Agreement:

3. Name of the Agreement:
   Dates of the Agreement:
   Counterpart in the Agreement:
   Summary of the Agreement:

4. Name of the Agreement:
   Dates of the Agreement:
   Counterpart in the Agreement:
   Summary of the Agreement:

5. Name of the Agreement:
   Dates of the Agreement:
   Counterpart in the Agreement:
   Summary of the Agreement:

5. Postdoctoral Positions through Open International Solicitations

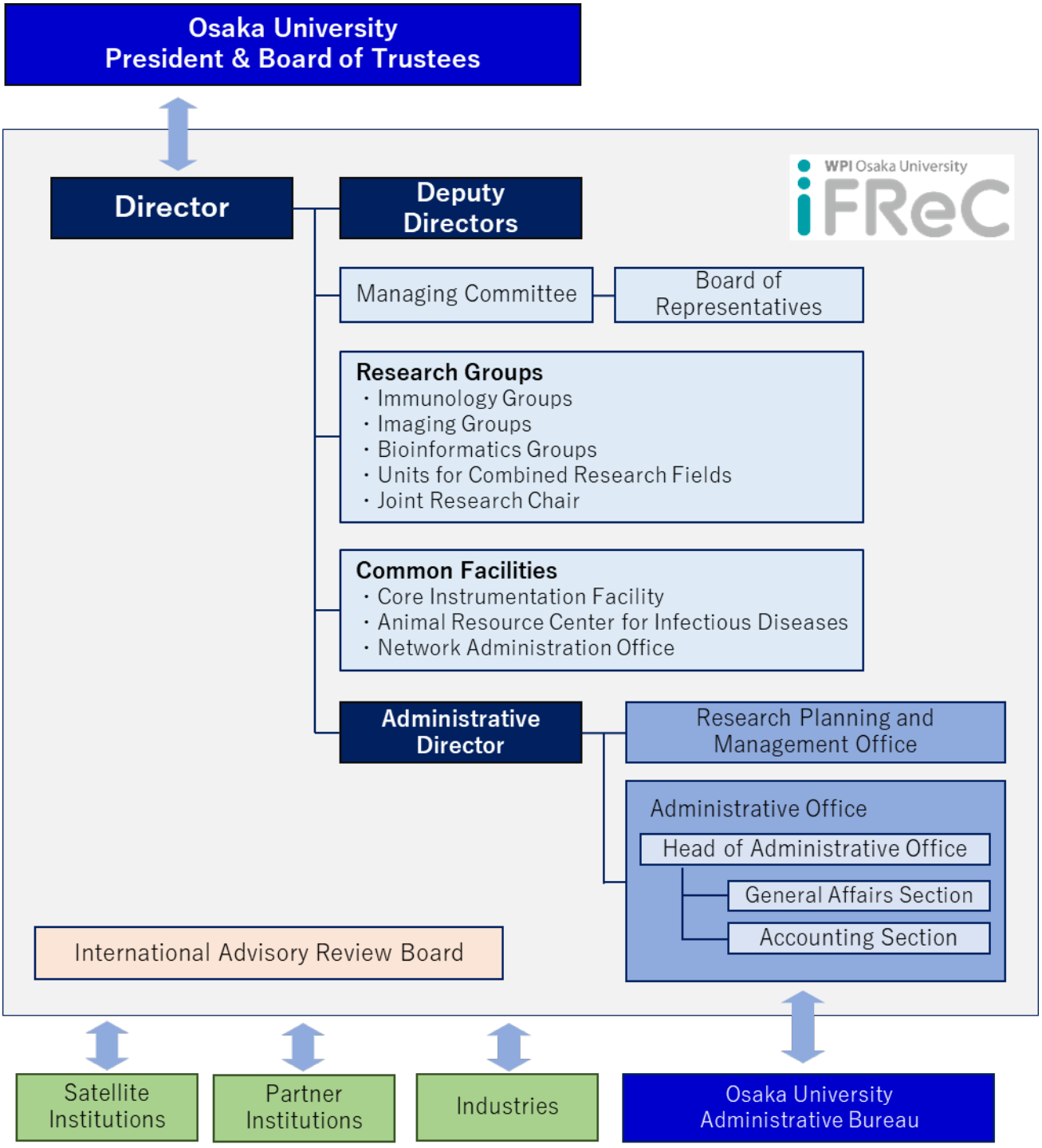
- In the columns “number of applications” and “number of selections,” put the total number (upper) and the number and percentage of overseas researchers in the < > brackets (lower).
- In Appendix 3b, describe the status of employment of postdoctoral researchers.

Fiscal year	Number of applications	Number of selections
FY 2016	2	2
	〈 2, 100%〉	〈 2, 100%〉
FY 2017	78	3
	〈 78, 100%〉	〈 3, 100%〉
FY 2018	176	9
	〈 176, 100%〉	〈 9, 100%〉
FY 2019	169	7
	〈 169, 100%〉	〈 7, 100%〉

6. Diagram of Management System

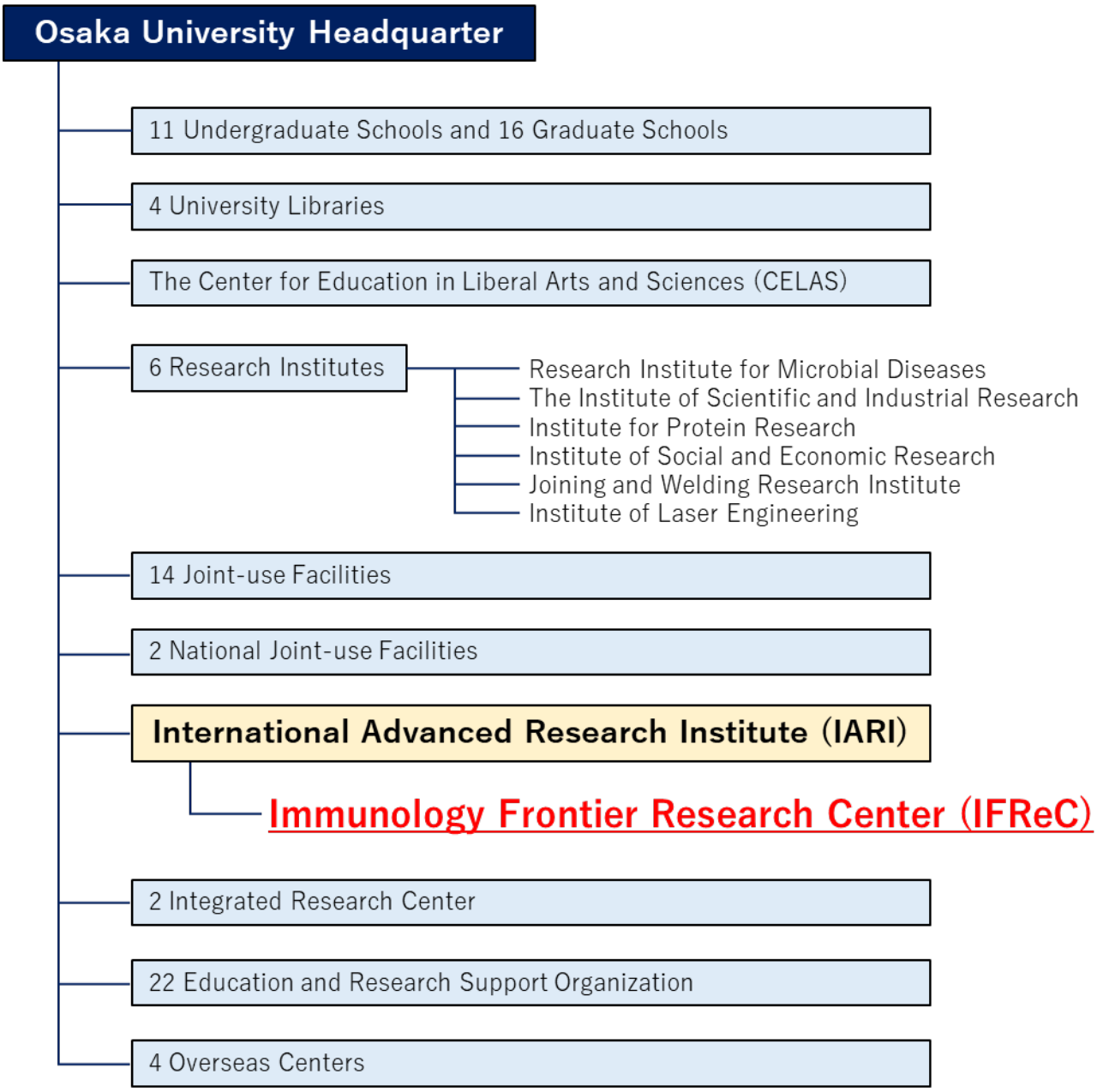
6-1.

- Diagram the Center's management system within the Center in an easily understood manner.
- If any changes have been made in the Center's management system vis-à-vis that stated in the application for WPI Academy center certification, describe them. Especially describe any important changes made in such as the center director, administrative director, head of host institution, and officer(s) in charge at the host institution (e.g., executive vice president for research).



6-2.

- Make a diagram of the organizational chart to show Center's position within the host institution.



7. Campus Map

- Draw a simple map of the campus showing where the main office and principal investigator(s) are located.

①, ②IFReC, RIMD: 17
③Graduate School of Engineering: 1
④Graduate School of Medicine: 8
⑤Graduate School of Frontier Bioscience: 1
⑥CiNet: 2
⑦Other Institutes: 3

1 IFReC
2 RIMD
3 Graduate School of Engineering [GSE-Common east (U1E)]
4 Graduate School of Medicine
5 Graduate School of Frontier Biosciences
6 CiNet
7 Senri-mon Gate
8 West Gate
9 Main Gate
10 East Gate
11 Onoharaguchi Entrance
12 Kitasenri Sta. of Hankyu Line
13 Handai-byoin-mae Sta. of Osaka Monorail
14 Bus Stop "Handai-guchi"
15 Bus Stop "Handai-honbu-mae"
16 Bus Stop "Handai-igakubu-mae"
17 Bus Stop "Handai-igakubu-byouin-mae"
18 Icho Kaikan

Appendix3-1a Number of Center Personnel FY2016-FY2019

	FY2016		FY2017		FY2018		FY2019	
	Number of persons	%	Number of persons	%	Number of persons	%	Number of persons	%
Researchers	126		108		116		123	
Overseas researchers	37	29.4%	27	25.0%	27	23.3%	37	30.1%
Female researchers	19	15.1%	22	20.4%	21	18.1%	25	20.3%
Principal investigators (PIs)	27		27		30		34	
Overseas PIs	5	18.5%	4	14.8%	4	13.3%	5	14.7%
Female PIs	1	3.7%	1	3.7%	1	3.3%	2	5.9%
Other researchers	68		63		65		58	
Overseas researchers	10	14.7%	11	17.5%	13	20.0%	14	24.1%
Female researchers	13	19.1%	14	22.2%	12	18.5%	13	22.4%
Postdocs	31		18		21		31	
Overseas Postdocs	22	71.0%	12	66.7%	10	47.6%	18	58.1%
Female Postdocs	5	16.1%	7	38.9%	8	38.1%	10	32.3%
Research support staffs	125		121		112		122	
Administrative staffs	26		27		27		32	
TOTAL	277		256		255		277	

Number of persons who were/have been paid using the host institution's operating budget (excluding indirect funding) among the above persons.

	FY2016	FY2017	FY2018	FY2019
Principal investigators (PIs)				
Other researchers				
Postdocs				
Research support staffs				
Administrative staffs				

※ Make consistent with the number of persons reported in Appendix 3-2.

Changes vis-à-vis the Center's application for academy center certification

※ If changes have been made vis-à-vis the Center's application for academy center certification, describe the main changes and the reasons for them.

Appendix 3-1b　　Career Path of WPI Postdocs

Enter the information below during the period from the start of the center through the end of FY 2019.

- For each person, fill in the spaces to the right. More spaces may be added.
- Leave "Position as of April 2020" blank if unknown.

Japanese Postdocs

Employment period	Position before employed at WPI center		Next position after WPI center		Position as of April 2020*	
	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located
2008.4.1- 2009.9.30	Graduate School of Medicine, Kyoto University, Postdoctoral Researcher	Japan	Institute for Frontier Medical Sciences, Kyoto University,JSPS Postdoctoral Fellowship	Japan	Division of Infectious Diseases, Imperial College London, Research Associate	UK
2008.10.16- 2009.10.15	Graduate School of Frontier Biosciences, Osaka University,Specially Appointed Researcher	Japan	Graduate School of Medicine, Osaka University,Specially Appointed Researcher	Japan	Specially Appointed Associate Professor(full-tme), Institute for Radiation Sciences, Osaka University	Japan
2008.4.1- 2011.3.31	The department of internal medicine, Kyoto Hospital Medical doctor	Japan	Graduate School of Medicine, Kyoto University,Assistant Professor	Japan	Graduate School of Medicine, Kyoto University, Assistant Professor	Japan
2009.10.16- 2011.3.31	Graduate School of Medicine, Osaka University,Specially Appointed Researcher	Japan	KAN Research Institute Inc., Researcher	Japan	N/A	N/A
2008.4.1- 2011.3.31	Institute for Frontier Medical Sciences, Kyoto University, Part-time Lecturer	Japan	Immunology Frontier Research Center, Osaka University,Specially Appointed Assistant Professor (Full-time)	Japan	Representative executive, Regcell Co., Ltd.	Japan
2010.4.1- 2011.3.31	Graduate School of Engineering, Kyoto University,Graduate Student	Japan	Immunology Frontier Research Center, Osaka University, Specially Appointed Assistant Professor (Full-time)	Japan	Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Assistant Professor	Japan
2010.6.1- 2011.6.30	Research Institute for Microbial Diseases, Osaka University,Specially Appointed Researcher	Japan	Immunology Frontier Research Center, Osaka University,Specially Appointed Technical Staff	Japan	N/A	N/A
2010.9.1- 2011.6.30	Osaka University Hospital,Medical doctor	Japan	Eli Lilly Japan K.K., Clinical Research Physician	Japan	Eli Lilly Japan K.K., Clinical Development Doctor	Japan
2011.4.1- 2011.9.30	Institute for Protein Research, Osaka University,JSPS Postdoctoral Fellowship	Japan	Department of Chemical & Biomolecular Engineering, Johns Hopkins University,Post-Doctoral Research Fellow	USA	Graduate School of Engineering, Tokyo University, Lecturer	Japan
2009.4.1- 2012.3.31	Graduate School of Medicine, Osaka University, JSPS Postdoctoral Research Fellow	Japan	Immunology Frontier Research Center, Osaka University, Specially Appointed Assistant Professor (Full-time)	Japan	Department of Pathology, University of Michigan, Research Fellow	U.S.A
2010.4.1- 2012.3.31	Graduate School of Medicine, Kyoto University, JSPS Postdoctoral Research Fellow	Japan	Immunology Frontier Research Center, Osaka University, Specially Appointed Assistant Professor (Full-time)	Japan	Department of Immunology, Graduate School of Medicine & WPI Nano Life Science Institute, Kanazawa University, Project Associate Professor	Japan
2011.4.1- 2012.3.31	Graduate School of Frontier Biosciences, Osaka University,Graduate Student	Japan	Graduate School of Medicine, Osaka University, Specially Appointed Researcher	Japan	Department of Microbiology and Immunology, Graduate School of Medicine, Tohoku University, Assistant Professor	Japan
2010.4.1- 2012.6.15	School of Medicine, University of California San Diego,Postdoctoral researcher	USA	Institute for Virus Research, Kyoto University, Assistant Professor	Japan	Department of Medical Chemistry Graduate School of Medicine, Kyoto University, Assistant Professor	Japan
2011.4.1- 2012.7.31	Institute for Frontier Medical Science, Kyoto University, Postdoctoral researcher	Japan	National Hospital Organization Osaka Minami Medical,Medical Staff	Japan	National Hospital Organization Osaka Minami Medical,Medical Staff	Japan
2010.4.1- 2012.10.15	Graduate School of Life Science, Hokkaido University,Graduate Student	Japan	The Institute of Medical Science, The University of Tokyo, Assistant Professor	Japan	Lecturer, Graduate School of Pharmaceutical Sciences, Osaka University	Japan
2010.4.1- 2012.12.31	Takeda Pharmaceutical Company Limited Medical writer	Japan	Astellas Pharma Inc.,Researcher	Japan	Astellas Pharma Inc., Section Chief	Japan
2009.4.1- 2013.3.31	Murakami Medical Hospital Asahi University, Internal medicine doctor	Japan	Immunology Frontier Research Center, Osaka University, Specially Appointed Assistant Professor (Full-time)	Japan	Department of Endocrinology and Metabolism, Kyoto Prefectural University of Medicine Graduate School of Medical Science, Lecturer	Japan
2009.4.1- 2013.3.31	Research Institute for Microbial Diseases, Osaka University,Specially Appointed Researcher	Japan	Immunology Frontier Research Center, Osaka University,Specially Appointed Technical Staff	Japan	N/A	N/A

2010.4.1- 2013.3.31	Graduate School of Medicine, Osaka University,Graduate Student	Japan	Immunology Frontier Research Center, Osaka University, Specially Appointed Assistant Professor (Full-time)	Japan	Associate Professor, Immunology Frontier Research Center, Osaka University	Japan
2010.4.1- 2013.3.31	Graduate School of Science, Nagoya University,Assistant Professor	Japan	Immunology Frontier Research Center, Osaka University, Specially Appointed Assistant Professor (Full-time)	Japan	Specially Appointed Associate Professor(full-time), Immunology Frontier Research Center, Osaka University	Japan
2011.4.1- 2013.3.31	School of Medicine, Iwate Medical University, Postdoctoral researcher	Japan	Immunology Frontier Research Center, Osaka University, Specially Appointed Assistant Professor (Full-time)	Japan	Center for Translational Neuromedicine, University of Copenhagen, Associate Professor	Danmark
2012.4.1- 2013.3.31	Graduate School of Frontier Biosciences, Osaka University,Graduate student	Japan	Graduate School of Medicine, Osaka University,JSPS Postdoctoral Fellowship	Japan	Assistant Professor, Graduate School of Medicine, Osaka University	Japan
2010.4.1- 2013.3.31	Graduate School of Frontier Biosciences, Osaka University,Specially Appointed Researcher	Japan	Graduate School of Frontier Biosciences, Osaka University,Specially Appointed Researcher	Japan	N/A	N/A
2012.4.1- 2013.3.31	L'Oreal Paris Japan Researcher	Japan	Institute for Academic Initiative, Osaka University,Specially Appointed Assistant Professor (Full-time)	Japan	TAKARA BELMONT CORPORATION	Japan
2010.4.1- 2013.4.15	Research Institute for Microbial Diseases, Osaka University,Specially Appointed Technical Staff	Japan	Immunology Frontier Research Center, Osaka University,Specially Appointed Technical Staff	Japan	N/A	N/A
2010.1.1- 2013.4.30	Paul O' Gorman Leukaemia Research Centre, Division of Cancer Sciences and Molecular Pathology, Section of Enperimental Haematology, University of Glasgow, Gartnavel General Hospital	UK	Babraham Institute, Researcher	UK	The Francis Crick Institute, Senior Research Scientist	UK
2010.4.1- 2013.5.15	Frontier Research Center for Applied Atomic Sciences, Ibaraki UniversityPart-time researcher	Japan	NARA Institute of Science and Technology,Part-time researcher	Japan	Nara Institute of Science and Technology Graduate School of Science and Technology Division of Biological Science, Assistant Professor	Japan
2010.6.1- 2013.6.30	Research Institute of Molecular Pathology,Postdoctoral researcher	Austria	National Institute for Basic Biology,Researcher	Japan	Institute for Genome Research,Tokushima University, Assistant Professor	Japan
2011.4.1- 2013.11.30	RIKEN Research Center for Allergy and Immunology,Junior Research Associate	Japan	Immunology Frontier Research Center, Osaka University,Endowed Chair Associate Professor	Japan	Department of Physiological Regulation Mechanisms, Institute of Advanced Medicine, Wakayama Medical University, Lecturer	Japan
2013.4.1- 2014.3.31	Research Institute for Microbial Diseases, Osaka University,Specially Appointed Researcher	Japan	Graduate School of Medicine, Osaka University, Specially Appointed Researcher	Japan	Specially Appointed Researcher(full-time), Immunology Frontier Research Center, Osaka University	Japan
2013.4.1- 2014.6.30	Graduate School of Medicine, Kyoto University, Graduate Student	Japan	Institute for Frontier Medical Sciences, Kyoto University,Specially Appointed Researcher	Japan	Japanese Red Cross Wakayama Medical Center, Clinical Departments of Hematology, Deputy Director	Japan
2012.4.1- 2014.8.31	Graduate School of Frontier Biosciences, Osaka University, Graduate Student	Japan	AbbVie GK	Japan	Bristol-Myers Squibb, Medical Project Manager	Japan
2013.4.1- 2014.8.31	Graduate School of Medicine, Nagoya University, Graduate Student	Japan	Graduate School of Frontier Biosciences, Osaka University, Assistant Professor	Japan	Graduate School of Frontier Biosciences, Osaka University, Assistant Professor	Japan
2012.4.1- 2015.5.31	Graduate School of Pharmaceutical Sciences, Osaka University, Graduate Student	Japan	Kanazawa University, Researcher	Japan	Department of Immunology, Graduate School of Medicine & WPI Nano Life Science Institute, Kanazawa University, Project Assistant Professor	Japan
2011.8.1- 2015.7.31	Research Associate, Department of Cell Biology, Johns Hopkins University	USA	RIKEN Center for Life Science Technologies, Engineer	Japan	N/A	N/A
2012.11.16- 2015.11.30	Postdoctoral fellow, University of Pennsylvania school of medicine, Dept. of Cell & Developmental Biology	USA	Kanazawa University, Assistant Professor	Japan	Department of Immunology, Graduate School of Medicine & WPI Nano Life Science Institute, Kanazawa University, Assistant Professor	Japan
2016.4.1- 2016.9.30	Specially Appointed Researcher(Full-Time), Research Institute for Microbial Deseases, Osaka University	Japan	Researcher, National Institute of Biomedical Innovation, Health and Nutrition	Japan	Researcher, National Institute of Biomedical Innovation, Health and Nutrition	Japan

2013.1.1- 2016.9.30	Research Fellow, Mechanobiology Institute, National University of Singapore	Singapore	Assistant Professor, Tokyo Medical University	Japan	Lecturer, Tokyo Medical University	Japan
2016.4.1- 2018.3.31	PhD student, Graduate School of Medicine, Kyoto University	Japan	Researcher, Kyoto University	Japan	Department of Anatomy and Cell Biology , Graduate School of Medicine, Kyoto University, Reseacher	Japan
2015.7.1- 2018.6.30	Technical Staff, Immunology Frontier Research Center, Osaka University	Japan	N/A	N/A	N/A	N/A
2018.6.16- 2018.9.30	PhD student, Graduate School of Medical Sciences, Kyusyu University	Japan	Specially Appointed Researcher(Full-Time), Research Institute for Microbial Deseases, Osaka University	Japan	N/A	N/A
2015.4.1- 2019.3.15	Researcher, Graduate School of Medicine, Kyoto University	Japan	Lifematics. Inc	Japan	Lifematics. Inc	Japan
2018.10.1- 2019.3.31	Specially Appointed Researcher(Full-Time), Research Institute for Microbial Deseases, Osaka University	Japan	Specially Appointed Researcher(Full-Time), Research Institute for Microbial Deseases, Osaka University	Japan	Specially Appointed Researcher(Full-Time), Research Institute for Microbial Deseases, Osaka University	Japan
2016.4.1- 2019.4.30	PhD student, Graduate School of Medicine, Kyoto University	Japan	Specially Appointed Researcher(Full-Time), Graduate School of Medicine, Osaka University	Japan	Specially Appointed Researcher(Full-Time), Graduate School of Medicine, Osaka University	Japan
2018.4.1- 2019.7.31	Student, Kumamoto University/Part-time, Immunology Frontier Research Center, Osaka University	Japan	Researcher, Graduate School of Health Sciences, Kumamoto University	Japan	Researcher, Graduate School of Health Sciences, Kumamoto University	Japan
2018.2.16- 2020.2.29	Specially Appointed Researcher(Full-Time), Research Institute for Microbial Deseases, Osaka University	Japan	Assistant Professor, Research Institute for Microbial Deseases, Osaka University	Japan	Assistant Professor, Research Institute for Microbial Deseases, Osaka University	Japan
2019.4.1- 2020.3.31	Specially Appointed Researcher(Full-Time), Research Institute for Microbial Deseases, Osaka University	Japan	Researcher, JSPS Postdoctoral Fellowships for Research	Japan	Researcher, JSPS Postdoctoral Fellowships for Research	Japan
2020.2.1- 2020.3.31	Technical Assistant, Research Institute for Microbial Deseases, Osaka University	Japan	N/A	N/A	N/A	N/A

Overseas Postdocs

Employment period	Position before employed at WPI center		Next position after WPI center		Position as of April 2020*		Nationality
	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	
2008.3.1- 2008.8.15	Research Institute for Microbial Diseases, Osaka University,Specially Appointed Researcher	Japan	Department of Microbiology, Yogi vemana University,Associate Professor	India	Department of Microbiology, Yogi vemana University,Associate Professor	India	India
2008.1.1- 2010.2.28	Graduate school of Medicine, Osaka University, Part-time Technical Staff	Japan	(Pohang University of Science and Technology: POSTECH),Research Assistant Professor	Korea	N/A	N/A	Korea
2008.8.1- 2010.7.15	Blood Research Institute, Blood Center of Wisconsin, Pre-doctoral Fellow	USA	St Jude Children's Research Hospital, (USA)Postdoctoral Fellow	USA	MAYO Clinic, Center for Immunology and Immune Therapies, Assistant Professor of Immunology	USA	China
2009.5.16- 2010.7.19	Become Japan Corporation,Principal Software Engineer	Japan	DeNA Co. Ltd., Engineers	Japan	N/A	N/A	USA
2008.3.1- 2010.8.30	Graduate School of Engineering, Osaka University, JSPS Postdoctoral Fellowship	Japan	Graduate School of Engineering, Osaka University, JSPS Postdoctoral Fellowship for Foreign Researcher	Japan	The Division of Electron Microscopic Research, Korea Basic Science Institute	Korea	Korea
2008.4.1- 2010.8.30	Graduate School of Medicine Osaka University, Part-time Technical Staff	Japan	RIKEN, Postdoctoral Researcher	Japan	DAIKIN INDUSTRIES, Ltd.	Japan	Korea
2009.11.1- 2010.9.30	Graduate School of Frontier Biosciences, Osaka University,JSPS Postdoctoral Fellowship for Foreign Researchers	Japan	Immunology Frontier Research Center, Osaka University,Specially Appointed Assistant Professor (Full-time)	Japan	N/A	N/A	UK
2008.11.1- 2011.3.31	National Institute of Public Health, Researcher	Korea	Childbirth		Dong-Eui University, Department of Life Science and Biotechnology	Korea	Korea
2008.4.1- 2011.3.31	Graduate School of Medicine, Osaka University, Graduate Student	Japan	Immunology Frontier Research Center, Osaka University,Specially Appointed Assistant Professor (Full-time), (Japan)	Japan	Key Laboratory of Pu-erh Tea Science, Ministry of Education, Yunnan Agricultural University	China	China
2008.4.1- 2011.3.31	Research Institute for Microbial Diseases, Osaka University,JST Researcher	Japan	Immunology Frontier Research Center, Osaka University, Specially Appointed Assistant Professor (Full-time), (Japan)	Japan	PSI CRO AG, Clinical Research Associate	Swiss	UK
2010.6.16- 2011.3.31	University of Hyogo, JST researcher	Japan	Xiamen University, Research Fellow	China	N/A	N/A	China

2010.10.1- 2011.8.8	Graduate School of Computer Science and Systems Engineering, Kyushu Institute of Technology,Graduate Student	Japan	Department of Chemistry, University of Ottawa,Postdoctoral Research Fellow	USA	the Commonwealth Scientific and Industrial Research Organisation, Materials Science and Engineering, Post-Doc	Australia	Cuba
2010.8.16- 2011.9.30	Graduate School of Natural Science and Technology, Okayama University, Teaching Assistant	Japan	N/A	N/A	Associate Professor, Al Hussein Bin Talal University	Jordan	Jordan
2009.4.1- 2011.10.31	Laboratory of Allergy and clinical Immunology, Department of Life Science, (Pohang University of Science and Technology: POSTECH), Postdoctoral Fellow	Korea	(Pohang University of Science and Technology: POSTECH),Postdoctoral Research Fellow	Korea	Aeonmedix, Inc	Korea	Korea
2010.12.1- 2011.10.31	University of Ulsan, Postdoctoral Fellow	Korea	N/A	N/A	N/A	N/A	Korea
2009.5.16- 2011.11.15	Center for High Performance Computing, University of Utah,Visiting Fellow	USA	National Institute of Biological Resources (NIBR),Researcher	Korea	National Institute of Biological Resources (NIBR),Researcher	Korea	Korea
2008.10.1- 2012.3.31	The Institute of Medical Science, the University of Tokyo, Postdoctoral Fellow	Japan	Epidemiology and Public Health, Facultad de Medicina Veterinaria, Ibague Colombia, Universidad del Tolima, Assistant Professor	Columbia	RIKEN Center for Integrative Medical Sciences Laboratory for Cell Signaling, Research Associate	Japan	Columbia
2010.1.1- 2012.3.31	Department of Preventive Veterinary Medicine, Molecular Immunology and Pathogenic Microorganism, Jilin University,Graduate Student	China	Jilin University, Changchu,Associate Professor	China	Associate professor, National Engineering Laboratory for AIDS Vaccine, School of Life Science, Jilin University	China	China
2010.4.1- 2012.7.31	Research Institute for Microbial Diseases, Osaka University,Specially Appointed Researcher	Japan	N/A	N/A	H&R Block Australia, Tax Consultant	Australia	Sri Lanka
2009.10.1- 2012.7.31	The Institute of Medical Science, the University of Tokyo,Visiting Researcher	Japan	Immunology Frontier Research Center, Osaka University, Specially Appointed Assistant Professor (Full-time)	Japan	Lecturer, Institute for Frontier Life and Medical Sciences, Institute for Liberal Arts and Sciences, Kyoto University	Japan	Belgium
2011.9.1- 2012.9.15	Miller School of Medicine, Diabetes Research Institute,Postdoctoral Fellow	USA	Immunology Frontier Research Center, Osaka University,JSPS Postdoctoral Research Fellow for Foreign Researchers	Japan	N/A	N/A	Nigeria
2012.8.1- 2013.3.31	Guangzhou Institute of Advanced Technology, Chinese Academy of Sciences (GIAT), Principal Investigator	China	N/A	N/A	N/A	N/A	China
2009.4.1- 2013.3.31	Research Institute for Microbial Diseases, Osaka University,JST Postdoctoral Researcher	Japan	N/A	N/A	N/A	N/A	China
2009.4.1- 2013.3.31	Hanoi University of Science,Lecturer	Vietnam	Immunology Frontier Research Center, Osaka University, Specially Appointed Assistant Professor (Full-time)	Japan	Vietnam Academy of Science and Technology, Institute of Biotechnology, Deputy Director	Vietnam	Vietnam
2010.4.1- 2013.3.31	Platform Computing Beijing Branch, Senior 2nd-line Technical Support Engineer and Team leader	China	IBM Investment Company Limited, Technical Support Professional	China	N/A	N/A	China
2009.4.1- 2013.3.31	Department of Clinical Pharmacology, Niigata University of Pharmacy and Applied Life Sciences, Postdoctoral Fellow	Japan	Graduate School of Medicine, Osaka University, JSPS Postdoctoral Fellowship for Foreign Researchers	Japan	International Medical University, Department of Pharmaceutical Chemistry School of Pharmacy, Lecturer	Malaysia	India
2010.9.1- 2013.3.31	Max Planck Institute for Infection Biology, Department of Lymphocyte Development,Postdoctoral Fellow, (Germany)	Germany	Immunology Frontier Research Center, Osaka University, Specially Appointed Assistant Professor (Full-time)	Japan	Junior Research Group Leader, CharitéUniversity Medicine Berlin	Germany	Germany
2009.4.1- 2013.3.31	Institute of Pharmacology, Center of Biomedical Medicine and Pharmacology, Medical University of Vienna, Graduate Student	Austria	N/A	N/A	Safety Scientist, Otsuka Pharmaceutical	Japan	Austria
2011.9.1- 2013.6.30	College of Life Science, East China Normal University, Graduate Student	China	N/A	N/A	N/A	N/A	China
2010.8.16- 2013.8.15	Immunology Division, Indian Institute of Toxicology Research, Scientist	India	N/A	N/A	N/A	N/A	India
2010.3.1- 2013.8.15	Stem Cell and Development Biology, Genome Institute of Singapore, Pre-doctoral Fellow	Singapore	Guangzhou Institutes of Biomedicine and Health,Researcher	China	Southern University of Science and Technology,Regulatory Genomics and Human Disease Laboratory, Associate Professor	China	UK

2010.7.16- 2013.9.30	Centre of Biological Resources, Teaching Hospital of Nancy/INSERM U724, Cellular and Molecular Pathologies of Nutrition, School of Medicine, University Henri Poincare, Nancy,Research Assistant	France	RIKEN Center for Life Science Technologies, Researcher	Japan	The University of Tokyo, Institute of Industrial Science, Research Scientist	Japan	France
2012.7.1- 2013.11.15	Department of Chemistry, University of California, Irvine, Postdoctoral Researcher	USA	Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, JSPS Postdoctoral Fellowship for Foreign Researchers	Japan	Assistant Professor at Northwestern Polytechnical University	China	China
2010.7.1- 2013.12.31	Graduate School of Frontier Biosciences, Osaka University,Specially Appointed Researcher	Japan	N/A	N/A	Department of Immunology, Graduate School of Medicine, Osaka City University	Japan	China
2011.4.1- 2014.3.31	Applied Molecular Biology Lab, School of Life Science, Jawaharlal Nehru University,Graduate Student	India	Hokkaido University, Researcher	Japan	Chief Research Advisor, WERP	India	India
2010.4.1- 2014.3.31	Immunology Frontier Research Center, Osaka University,Temp staff (Technician)	Japan	N/A	N/A	Software engineer at Factset	Japan	France
2011.4.1- 2014.3.31	School of Life Sciences, Jawaharlal Nehru University	India	N/A	N/A	Chief Research Advisor, WERP	India	India
2010.4.1- 2014.3.31	Immunology Frontier Research Center, Osaka University, Temp staff (Technician)	Japan	N/A	N/A	Software engineer at Factset	Japan	France
2011.9.1- 2014.4.30	Kyushu University,JSPS Postdoctoral Research Fellow for Foreign Researchers	Japan	N/A	N/A	Associate Professor at Faculty of Science, Mahidol University	Thailand	Thailand
2008.2.1- 2014.5.15	N/A	N/A	Institute for Genetic Medicine, Hokkaido University, Postdoctoral fellow	Japan	N/A	N/A	China
2013.4.1- 2014.6.15	Graduate School of Medicine, Osaka University, Graduate Student	Japan	School of Medicine, University of Pennsylvania Postdoc researcher	USA	N/A	N/A	Korea
2013.1.1- 2014.9.30	Graduate School of Frontier Sciences, The University of Tokyo, Specially Appointed Researcher	Japan	Institute for Virus Research, Kyoto University, Specially Appointed Researcher	Japan	Bioinformatics Scientist, StemRIM, Inc. & COMIT Osaka University	Japan	Indonesia
2014.4.1- 2014.9.30	Graduate School of Medicine, Osaka University, Assistant Professor	Japan	Graduate School of Medicine, Division of Health Sciences, Osaka University, Assistant Professor	Japan	Graduate School of Medicine, Division of Health Sciences, Osaka University, Assistant Professor	Japan	Taiwan
2014.10.1- 2014.11.15	Immunology Frontier Research Center, Osaka University,JSPS Postdoctoral Research Fellow for Foreign Researchers	Japan	Dana Farber Cancer Institute, Harvard University Instructor/Research Fellow	USA	N/A	N/A	Nigeria
2011.1.1- 2014.12.31	Postdoctral fellow, Department of Dermatology, Seoul National University College of Medicine	Korea	Research Institute for Microbial Diseases, Osaka University,Specially Appointed Researcher	Japan	Research Institute for Microbial Diseases, Osaka University,Specially Appointed Assistant Professor	Japan	Korea
2011.4.16- 2015.1.15	Immunology Frontier Research Center, Osaka University, Research Fellow	Japan	Ewha Womans University Mokdong Hospital, Research Professor/Clinical Assistant Professor	Korea	N/A	N/A	Korea
2011.4.1- 2015.3.31	Postdoctoral Researcher, Department of Microbiology and Immunology National Cheng Kung University	Taiwan	Immunology Frontier Research Center, Osaka University,JSPS Postdoctoral Research Fellow for Foreign Researchers	Japan	Endowed Chair Associate Professor, Immunology Frontier Research Center, Osaka University	Japan	Taiwan
2012.1.16- 2015.3.31	Graduate School of Life and Environmental Sciences, University of Tsukuba, Graduate Student	Japan	Researcher, Riken	Japan	Researcher, Riken	Japan	Tunisia
2014.5.1- 2015.4.30	Research Institute for Microbial Diseases, Osaka University,Specially Appointed Researcher	Japan	Research Institute for Microbial Diseases, Osaka University,JSPS Postdoctoral Research Fellow for Foreign Researchers	Japan	Specially Appointed Researcher(Full-Time), Research Institute for Microbial Deseases, Osaka University	Japan	China
2014.12.16- 2015.7.31	Graduate student, University of Texas Medical Branch	USA	N/A	N/A	N/A	N/A	Taiwan
2015.2.1- 2015.7.31	Ph.D. Student, Middle East Technical University (METU)	Turkey	N/A	N/A	Postdoctoral fellow, Division of Medical Protein Chemistry, Department of Translational Medicine, Lund University, Malmö, Sweden.	Sweden	Turkey
2015.4.1- 2015.10.31	Institute for Virus Research, Kyoto University, Technical Staff	Japan	LINE Fukuoka Software, Engineer	Japan	N/A	N/A	Swiss
2014.11.16- 2015.11.15	Immunology Frontier Research Center, Osaka University,JSPS Postdoctoral Research Fellow for Foreign Researchers	Japan	Novartis, Researcher	Slovenia	Lab Head Quality Control/Analytical science&technology, Bioanalytics at Lek Pharmaceuticals d.d.	Slovenia	Slovenia
2013.1.16- 2015.12.31	n/a		Institute for Virus Research, Kyoto University, Specially Appointed Assistant Professor	Japan	Assistant Professor, Research Institute for Microbial Deseases, Osaka University	Japan	China

2015.4.1- 2015.12.31	Graduate School of Biomedical Science, Tokyo Medical and Dental University, Graduate Student	Japan	National Institutes of Health Postdoctoral, fellow	USA	N/A	N/A	Egypt
2012.7.1- 2016.6.30	Research Associate,Division of Bacteriology, National Institute of Cholera and Enteric Diseases	India	University of Washington School of Medicine、Postdoctoral researcher	USA	Boston Children's Hospital, Postdoctral Research Fellow	USA	India
2014.9.1- 2016.6.30	Cancer Biology and Inflammatory Disorder Division, Indian Institute of Chemical Biology	India	TATA MEDICAL CENTER、PI	India	TATA MEDICAL CENTER、PI	India	India
2014.4.1- 2016.9.30	Researcher, Laboratory of Adjuvant Innovation, National Institute of Biomedical Innovation	Japan	N/A	N/A	Kyoto University, Student	Japan	China
2012.11.1- 2016.10.31	Research Associate, DNA Fingerpringing Unit, National Bureau of Animal Genetic Resources	India	N/A	N/A	N/A	N/A	India
2016.6.1- 2016.10.31	Lecturer of Clinical and Chemical Pathology/Faculty of Medicine, Fayoum University	Egypt	N/A	N/A	N/A	N/A	Egypt
2015.4.16- 2016.11.30	Research Associate/Department of Brain Behaviour and Mental Health, Neuroscience and Psychiatry Unit, School of Health Sciences, University of Manchester	UK	Elekta Limited、Senior Physicist-MR	UK	N/A	N/A	Australia/UK
2014.4.1- 2017.3.15	Specially Appointed Researcher, Immunology Frontier Research Center, Osaka University	Japan	N/A	N/A	School of Medicine, Cardiff University, Research Associate	UK	UK
2014.4.1- 2017.3.31	PhD student, Graduate School of Comprehensive Human Sciences, University of Tsukuba/Tsukuba Branch, RIKEN	Japan	Washington University、Research Associate	USA	Washington University、Research Associate	USA	Bangladesh
2014.10.1- 2017.3.31	Attending physician, Rheumatoid Immune Medicine,Department of Rheumatology, First Hospital of Jilin University, Jilin Province	China	Attending physician, Rheumatoid Immune Medicine,Department of Rheumatology, First Hospital of Jilin University	China	N/A	N/A	China
2015.10.1- 2017.3.31	Researcher, JSPS Postdoctoral Fellowships for Research in Japan/Immunology Frontier Research Center, Osaka University	Japan	Researcher, JSPS Postdoctoral Fellowships for Research in Japan	Japan	Specially Appointed Researcher(full-time), Immunology Frontier Research Center, Osaka University	Japan	Australia
2015.4.1- 2017.3.31	PhD Student, Universitat Pompeu Fabra, Barcelona	Spain	LPM, Formation as Psychotherapist	Germany	LPM, Formation as Psychotherapist	Germany	Germany/Japan
2013.9.1- 2017.3.31	Tutor/Postdoc, Department of Physics and Astronomy, University of Canterbury	New Zealand	Karolinska Institutet、Bioinfomatician	Sweden	Scania, Data Scientist	Sweden	Germany
2013.10.1- 2017.7.15	Ph.D Student, Doctoral Course in Genetics, Faculty of Biotechnology, University of Ljubljana	Slovania	LEK d.d、Researcher	Slovania	N/A	N/A	Slovania
2015.10.16- 2017.10.15	Ph. D. student, John Curtin School of Medical Research, Immunology Department, Australian National University	Australia	N/A	N/A	N/A	N/A	Australia
2017.11.1- 2018.2.28	N/A	N/A	N/A	N/A	N/A	N/A	Russia
2017.5.1- 2018.6.30	Researcher, JSPS Postdoctoral Fellowships for Research in Japan	Japan	N/A	N/A	Chemtastic (A science education promotoin firm）, Representative	Australia	Australia
2014.12.1- 2019.4.8	Specially Appointed Researcher(Full-Time), Immunology Frontier Research Center, Osaka University	Japan	N/A	N/A	N/A	N/A	China
2014.5.1- 2019.4.30	Specially Appointed Researcher(Full-Time), Research Institute for Microbial Deseases, Osaka University	Japan	Specially Appointed Researcher(Full-Time), Research Institute for Microbial Deseases, Osaka University	Japan	Specially Appointed Researcher(full-time), Immunology Frontier Research Center, Osaka University	Japan	China
2016.4.1- 2019.10.31	PhD Student, Autoimmunity and Immune Regulation, Department of Clinical and Experimental Medicine, Linköping University	Sweden	City of Hope、Researcher	USA	Immunology Frontier Research Center, Osaka University, Researcher	Japan	Nepal
2019.4.16- 2020.3.31	University of Lübeck, Germany, Department for Psychiatry and Psychosomatics Resident Physician	Germany	University of Hamburg、Physician	Germany	University of Hamburg、Physician	Germany	Germany

Project Expenditures FY2016

（Thousand yens）

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others	
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details
Personnel	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency					18,924	Center director 1										
	-	Funding by WPI Academy					12,188	Administrative director 1										
	701,963	Government Subsidies except Funding from WPI Academy	-	0	-	0	86,091	Principal investigator 9	-	0	-	0	-	0	-	0	-	0
	-	Donations					57,904	・Full-time／Japanese 6										
	-	Indirect funding					26,899	・Concurrent／Japanese 2										
	-	Joint research projects						・Full-time／Overseas 0										
	-	Competitive funding					1,288	・Concurrent／Overseas 1										
	-	Others	-	0	-	0	226,647	Other researchers 32	-	0	-	0	-	0	-	0	-	0
							226,647	・Associate professor /Assistant professor 32 ・Others										
							92,394	Postdocs 68										
							234,323	Research support staffs 58										
							31,396	Administrative staffs 6										
Subtotal	701,963		-	0	-	0	701,963	175	-	0	-	0	-	0	-	0	-	0
Project activities	16,506	Operational subsidies to National University Corporations/Incorporated Administrative Agency	16,506				113,051	Cost of consumables			2,010							
	-	Funding by WPI Academy					54,862	Cost of utilities										
	440,623	Government Subsidies except Funding from WPI Academy					272,710	Other costs										
	-	Donations																
	2,010	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	459,139		16,506		-		440,623		-		2,010		-		-		-	
Travel	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency					1,842	Domestic travel costs										
	-	Funding by WPI Academy					4,110	Overseas travel costs										
	7,018	Government Subsidies except Funding from WPI Academy					1,066	Travel cost for scientists on secondment										
	-	Donations																
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	7,018		-		-		7,018		-		-		-		-		-	
Equipment	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency					15,984	C1 Single-Cell Auto Prep system										
	-	Funding by WPI Academy					9,374	Seahorse XFp Analyzer										
	69,380	Government Subsidies except Funding from WPI Academy					6,426	405nm laser kit										
	-	Donations					5,659	Amersham Imager 600 UV system										
	-	Indirect funding					4,990	GloMax Discover System										
	-	Joint research projects					26,947	Others										
	-	Competitive funding																
	-	Others																
Subtotal	69,380		-		-		69,380		-		-		-		-		-	
Research projects	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency							197,758				62,868		317,841	Grants-in-Aid for Scientific Research, etc.	44,239	
	-	Funding by WPI Academy													214,551	Commissioned research projects, etc.		
	-	Government Subsidies except Funding from WPI Academy																
	197,758	Donations																
	-	Indirect funding																
	62,868	Joint research projects																
	532,392	Competitive funding																
	44,239	Others																
Subtotal	837,257		-		-		-		197,758		-		62,868		532,392		44,239	
Others	45,331	Operational subsidies to National University Corporations/Incorporated Administrative Agency	45,331	Debt repayment			5,574	Labor insurance fee			101,356	Debt repayment					12,585	Debt repayment
	-	Funding by WPI Academy																
	5,574	Government Subsidies except Funding from WPI Academy																
	-	Donations																
	101,356	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	12,585	Others																
Subtotal	164,846		45,331		-		5,574		-		101,356		-		-		12,585	
Total	2,239,603		61,837		-		1,224,558		197,758		103,366		62,868		532,392		56,824	

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際頭脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金（WPIアカデミー国際頭脳循環の加速・拡大事業を除く
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2017

（Thousand yens）

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others	
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details
Personnel	1,440	Operational subsidies to National University Corporations/Incorporated Administrative Agency	1,440	Center director 1														
	2,265	Funding by WPI Academy					10,043	Administrative director 1					4,980	Administrative director				
	45,621	Government Subsidies except Funding from WPI Academy	-	0	-	0	-	0	-	0	-	0	39,491	Principal investigator 7	-	0	-	0
	-	Donations											37,443	・Full-time／Japanese 4				
	-	Indirect funding											2,048	・Concurrent／Japanese 3				
	437,090	Joint research projects												・Full-time／Overseas 0				
	-	Competitive funding												・Concurrent／Overseas 0				
	-	Others	-	0	-	0	-	0	-	0	-	0	150,423	Other researchers 24	-	0	-	0
													150,423	・Associate professor /Assistant professor 24				
														・Others 0				
					2,265	Postdocs 2							58,707	Postdocs 59				
							17,677	Research support staffs 4					159,891	Research support staffs 60				
							17,901	Administrative staffs 6					23,598	Administrative staffs 8				
Subtotal	486,416		1,440	1	2,265	2	45,621	11	-	0	-	0	437,090	158	-	0	-	0
Project activities	24,556	Operational subsidies to National University Corporations/Incorporated Administrative Agency	24,556		22,623		240				65,514		47,951	Cost of consumables				
	22,623	Funding by WPI Academy											55,259	Cost of utilities				
	240	Government Subsidies except Funding from WPI Academy											168,278	Other costs				
	-	Donations																
	65,514	Indirect funding																
	271,488	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	384,421		24,556		22,623		240		-		65,514		271,488		-		-	
Travel	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency			563	Domestic travel costs	58	Domestic travel costs					51	Domestic travel costs				
	4,549	Funding by WPI Academy			3,986	Overseas travel costs	4,081	Overseas travel costs					3,522	Overseas travel costs				
	4,139	Government Subsidies except Funding from WPI Academy											751	Travel cost for scientists on secondment				
	-	Donations																
	-	Indirect funding																
	4,324	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	13,012		-		4,549		4,139		-		-		4,324		-		-	
Equipment	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency											92,394	Helios Mass cytometry				
	-	Funding by WPI Academy											45,576	IVIS Imaging System				
	-	Government Subsidies except Funding from WPI Academy											15,941	3500xL Genetic Analyzer				
	-	Donations											22,356	Attune Nxt Acoustic Focusing Cytometer				
	-	Indirect funding											9,456	Others				
	185,723	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	185,723		-		-		-		-		-		185,723		-		-	
Research projects	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency							244,747				74,468		322,918	Grants-in-Aid for Scientific Research, etc.	3,337	
	-	Funding by WPI Academy													187,022	Commissioned research projects, etc.		
	-	Government Subsidies except Funding from WPI Academy																
	244,747	Donations																
	-	Indirect funding																
	74,468	Joint research projects																
	509,940	Competitive funding																
	3,337	Others																
Subtotal	832,492		-		-		-		244,747		-		74,468		509,940		3,337	
Others	20,545	Operational subsidies to National University Corporations/Incorporated Administrative Agency	20,545	Debt repayment	1,067	Consumption tax					42,220	Debt repayment	35,155	Consumption tax				
	1,067	Funding by WPI Academy											2,912	Labor insurance fee				
	-	Government Subsidies except Funding from WPI Academy																
	-	Donations																
	42,220	Indirect funding																
	38,067	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	101,899		20,545		1,067		-		-		42,220		38,067		-		-	
Total	2,003,963		46,541		30,504		50,000		244,747		107,734		1,011,160		509,940		3,337	

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際頭脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金（WPIアカデミー国際頭脳循環の加速・拡大事業を除く
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2018

（Thousand yens）

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others	
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details
Personnel	18,134	Operational subsidies to National University Corporations/Incorporated Administrative Agency	18,134	Center director 1														
	14,037	Funding by WPI Academy											15,282	Administrative director 1				
	41,975	Government Subsidies except Funding from WPI Academy	-	0	-	0	-	0	-	0	-	0	40,199	Principal investigator 7	-	0	-	0
	-	Donations											38,194	・Full-time／Japanese 4				
	-	Indirect funding											2,005	・Concurrent／Japanese 3				
	482,740	Joint research projects												・Full-time／Overseas 0				
	-	Competitive funding												・Concurrent／Overseas 0				
	-	Others	-	0	-	0	-	0	-	0	-	0	168,818	Other researchers 25	-	0	-	0
													168,818	・Associate professor /Assistant professor 25				
														・Others 0				
					14,037	Postdocs 2							67,210	Postdocs 63				
							31,609	Research support staffs 5					113,011	Research support staffs 40				
							10,366	Administrative staffs 2					78,220	Administrative staffs 18				
Subtotal	556,886		18,134	1	14,037	2	41,975	7	-	0	-	0	482,740	154	-	0	-	0
Project activities	46,718	Operational subsidies to National University Corporations/Incorporated Administrative Agency	46,718		10,888		1,156				130,946		102,987	Cost of consumables				
	10,888	Funding by WPI Academy											54,294	Cost of utilities				
	1,156	Government Subsidies except Funding from WPI Academy											165,651	Other costs				
	-	Donations																
	130,946	Indirect funding																
	322,932	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	512,640		46,718		10,888		1,156		-		130,946		322,932		-		-	
Travel	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency			282	Domestic travel costs	46	Domestic travel costs					2,760	Travel cost for scientists on secondment				
	5,301	Funding by WPI Academy			5,019	Overseas travel costs	1,823	Overseas travel costs										
	1,869	Government Subsidies except Funding from WPI Academy																
	-	Donations																
	-	Indirect funding																
	2,760	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	9,930		-		5,301		1,869		-		-		2,760		-		-	
Equipment	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency											99,997	Mass spectrometry system				
	-	Funding by WPI Academy											12,236	Rhapsody Basic System				
	-	Government Subsidies except Funding from WPI Academy											14,062	Attune Nxt Cytometer				
	-	Donations											14,548	FLUOVIEW FV3000				
	-	Indirect funding											10,800	nano UHPLC system				
	209,855	Joint research projects											14,969	Cell Sorter SH800SAP				
	-	Competitive funding											43,243	Others				
	-	Others																
Subtotal	209,855		-		-		-		-		-		209,855		-		-	
Research projects	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency							233,648				184,748		274,662	Grants-in-Aid for Scientific Research, etc.	44,623	
	-	Funding by WPI Academy													380,716	Commissioned research projects, etc.		
	-	Government Subsidies except Funding from WPI Academy																
	233,648	Donations																
	-	Indirect funding																
	184,748	Joint research projects																
	655,378	Competitive funding																
	44,623	Others																
Subtotal	1,118,397		-		-		-		233,648		-		184,748		655,378		44,623	
Others	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency			1,594	Consumption tax							38,606	Consumption tax				
	1,594	Funding by WPI Academy																
	-	Government Subsidies except Funding from WPI Academy																
	-	Donations																
	-	Indirect funding																
	38,606	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	40,200		-		1,594		-		-		-		38,606		-		-	
Total	2,447,908		64,852		31,820		45,000		233,648		130,946		1,241,641		655,378		44,623	

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際頭脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金（WPIアカデミー国際頭脳循環の加速・拡大事業を除く
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2019

（Thousand yens）

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects			Competitive funding		Others	
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details		Total costs	Details	Total costs	Details
Personnel	4,536	Operational subsidies to National University Corporations/Incorporated Administrative Agency	4,536	Center director									2,471	Center director	1				
	14,216	Funding by WPI Academy											3,875	Administrative director	1				
	33,424	Government Subsidies except Funding from WPI Academy	-	0	-	0	-	0	-	0	-	0	61,238	Principal investigator	10	-	0	-	0
	-	Donations											47,829	・Full-time／Japanese	6				
	-	Indirect funding											2,271	・Concurrent／Japanese	2				
	500,597	Joint research projects											11,138	・Full-time／Overseas	2				
	-	Competitive funding												・Concurrent／Overseas	0				
	-	Others	-	0	-	0	-	0	-	0	-	0	185,767	Other researchers	87	-	0	-	0
													133,295	・Associate professor /Assistant professor	20				
													52,472	・Others	67				
					14,216	Postdocs 2							61,886	Postdocs	14				
							33,424	Research support staffs 4					100,223	Research support staffs	36				
													85,137	Administrative staffs	24				
Subtotal	552,773		4,536	0	14,216	2	33,424	4	-	0	-	0	500,597		173	-	0	-	0
Project activities	42,454	Operational subsidies to National University Corporations/Incorporated Administrative Agency	42,454		12,937		734				150,051		177,811	Cost of consumables					
	12,937	Funding by WPI Academy											51,453	Cost of utilities					
	734	Government Subsidies except Funding from WPI Academy											264,862	Other costs					
	-	Donations																	
	150,051	Indirect funding																	
	494,126	Joint research projects																	
	-	Competitive funding																	
	-	Others																	
Subtotal	700,302		42,454		12,937		734		-		150,051		494,126			-		-	
Travel	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency			61	Domestic travel costs	170	Domestic travel costs					3,232	Travel cost for scientists on secondment					
	2,201	Funding by WPI Academy			2,140	Overseas travel costs	2,744	Overseas travel costs											
	2,914	Government Subsidies except Funding from WPI Academy																	
	-	Donations																	
	-	Indirect funding																	
	3,232	Joint research projects																	
	-	Competitive funding																	
	-	Others																	
Subtotal	8,347		-		2,201		2,914		-		-		3,232			-		-	
Equipment	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency											181,346	NovaSeq 6000					
	-	Funding by WPI Academy											39,209	Intermolecular interaction analysis system					
	-	Government Subsidies except Funding from WPI Academy											2,236	ECFG21 Super Electro- Cell Fusion System					
	-	Donations																	
	-	Indirect funding																	
	222,791	Joint research projects																	
	-	Competitive funding																	
	-	Others																	
Subtotal	222,791		-		-		-		-		-		222,791			-		-	
Research projects	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency							256,131				182,471			208,387	Grants-in-Aid for Scientific Research, etc.	28,891	
	-	Funding by WPI Academy														399,692	Commissioned research projects, etc.		
	-	Government Subsidies except Funding from WPI Academy																	
	256,131	Donations																	
	-	Indirect funding																	
	182,471	Joint research projects																	
	608,079	Competitive funding																	
	28,891	Others																	
Subtotal	1,075,572		-		-		-		256,131		-		182,471			608,079		28,891	
Others	-	Operational subsidies to National University Corporations/Incorporated Administrative Agency			1,926	Consumption tax							39,233	Consumption tax					
	1,926	Funding by WPI Academy																	
	-	Government Subsidies except Funding from WPI Academy																	
	-	Donations																	
	-	Indirect funding																	
	39,233	Joint research projects																	
	-	Competitive funding																	
	-	Others																	
Subtotal	41,159		-		1,926		-		-		-		39,233			-		-	
Total	2,600,944		46,990		31,280		37,072		256,131		150,051		1,442,450			608,079		28,891	

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際頭脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金（WPIアカデミー国際頭脳循環の加速・拡大事業を除く
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Appendix 4 Outreach Activities and Their Results

List up to three of the Center's outreach activities carried out during the period between FY 2017 and 2019 that have contributed to enhancing the brand or recognition of your Center and/or the brand of the overall WPI program, and describe its concrete contents and effect in narrative style. (Where possible, indicate the results in concrete numbers.)

Examples:
- As a result of using a new OO press-release method, a OO% increase in media coverage was obtained over the previous year.
- By holding seminars for the public that include people from industry, requests for joint research were received from companies.
- We changed our public relations media. As a resulting of using OO to disseminate information, a OO% increase in inquiries from researchers was obtained over the previous year.
- As a result of vigorously carrying out OO outreach activity, ¥OO in external funding was acquired.

Enter a list of your outreach activities in Attachment 4a.

Outcome 1: 78 applications for Advanced Postdoc program (FY2017) → 166 applications (FY 2019), a 2.1-fold increase

The increase in the number of international applications for postdoc positions is solid evidence of the improved international visibility of IFReC. In addition to posting job recruitment ads on academic journal websites, we exhibited booths at influential international events, such as Nature Careers Live and the AAAS Annual Meeting, to attract outstanding young researchers from abroad through increased exposure to our complete research support system and our Advanced Postdoc system including our original support program for research budgets. In particular, we were able to respond to a wide range of questions from our visitors by staffing our booths with some of our researchers and members from our administrative office, who were able to introduce our latest research results and hold academic discussions as well as provide information on the procedures for residency in Japan and on living in Japan. These efforts have led to increases in the number of applicants for the Advanced Postdoc position and the number of Kishimoto Fellows. We saw a significant increase of 2.1 times in the number of applications for the Advanced Postdoc position, from 78 applications in FY2017 to 166 applications in FY2019. These international public relations activities have been effective not only for recruitment but also for the WPI and IFReC activities targeting international researchers and we will continue to conduct these activities in the next fiscal year.

Outcome 2: Energizing the outreach events by gaining repeat visitors through regular outreach activities

In order to gain the continued support of the general public for IFReC's activities over the long term, we consider it important to increase the number of outreach events and to regularly

conduct outreach activities at the same venue, which were held only infrequently in the past. We increased the number of outreach events from 17 events in FY2017 to 34 events in FY2019. In particular, we increased the number of Science Cafés to 11 in FY2019. As a result, our Science Cafés attracted 540 visitors in FY2019. Furthermore, by regularly holding workshops at a large commercial complex, we increased the number of repeat visitors residing near IFReC and many of them quickly signed up and filled up the seats soon after an event was announced. Because of repeat visitors, our staff has started to recognize their faces and names and we have begun to receive much feedback on our outreach activities. Moreover, due to the active participation in our various outreach activities by the repeaters who have a strong interest in IFReC, we expect our exposure in the community to greatly increase.

Outcome 3: Joint events with other departments and a WPI center to reach new outreach audiences

IFReC, together with other departments in Osaka University (Graduate Schools of Medicine and Science), exhibited a booth at AAAS 2020 in Seattle in FY2019 for the first time. This resulted in a significant increase in the number of applicants from North America for Osaka University's entrance examination for foreign students. IFReC and the Graduate School of Medicine jointly participated in "Science Agora 2018 & 2019" (300 visitors each) and jointly held the outreach event "Knowledge Capital Super School 2019" (total of 200 visitors in four sessions). Furthermore, IFReC and RIMD jointly participated in "Science Agora 2017" (200 visitors) and held the "Science Cafe" (total of 120 participants in two sessions). Moreover, the "Knowledge Capital WPI Series 2019" was jointly held with Kyoto University WPI-iCeMS (total of 150 participants in three sessions). Through these joint events, we were able to arouse interest in the community among those who would not otherwise be interested in IFReC alone.

Appendix 4a　State of Outreach Activities from FY2017 to FY2019

* For each activity, enter the number of times that the activity was held each fiscal year.

Activities	FY2017 (number of activities, times held)	FY2018 (number of activities, times held)	FY2019 (number of activities, times held)
PR brochure, pamphlet	3	3	3
Lectures, seminars for general public	9	6	10
Teaching, experiments, training for elementary, secondary and high school students	2	1	3
Science café	2	2	11
Participating, exhibiting in events	4	6	10
Press releases	12	18	11
Media appearances (Newspaper, Netnews, SNS)	89	134	116

*If there are activities that the center hasn't implemented, delete those lines. If you have other activities, list them in the space between parentheses after "Others" and state the number of times they were held in the spaces on the right. Another line under "Others" can be added, if needed.

<Notes>

WPI Academy

Submittal of List of Center's Research Results

1. Refereed Papers published from 2017 to 2019 (Free format)

List only the Center's refereed papers published during the period from 2017 to 2019. (Note: The list should be for the calendar year, not the fiscal year.)

A. WPI papers

No	Article
1	Maeda, Y; Takeda, K. Host-microbiota interactions in rheumatoid arthritis. Experimental and Molecular Medicine 51, 150 (2019).
2	Sasai, M; Yamamoto, M. Innate, adaptive, and cell-autonomous immunity against Toxoplasma gondii infection. Experimental and Molecular Medicine 51, 156 (2019).
3	Nyati, KK; Agarwal, RG; Sharma, P; Kishimoto, T. Arid5a Regulation and the Roles of Arid5a in the Inflammatory Response and Disease. Frontiers in Immunology 10, 2790 (2019).
4	Romanov, V; Isohashi, K; Alobthani, G; Beshr, R; Horitsugi, G; Kanai, Y; Naka, S; Watabe, T; Shimosegawa, E; Hatazawa, J. Evaluation of the total distribution volume of F-18-FBPA in normal tissues of healthy volunteers by non-compartmental kinetic modeling. Annals of Nuclear Medicine 34, 155-162 (2020).
5	Hochsmann, B; Murakami, Y; Osato, M; Knaus, A; Kawamoto, M; Inoue, N; Hirata, T; Murata, S; Anliker, M; Eggermann, T; Jager, M; Floettmann, R; Hollein, A; Murase, S; Ueda, Y; Nishimura, JI; Kanakura, Y; Kohara, N; Schrezenmeier, H; Krawitz, PM; Kinoshita, T. Complement and inflammasome overactivation mediates paroxysmal nocturnal hemoglobinuria with autoinflammation. Journal of Clinical investigation 129, 5123-5136 (2019).
6	Leach, S; Shinnakasu, R; Adachi, Y; Momota, M; Makino-Okamura, C; Yamamoto, T; Ishii, KJ; Fukuyama, H; Takahashi, Y; Kurosaki, T. Requirement for memory B-cell activation in protection from heterologous influenza virus reinfection. International Immunology 31, 771-779 (2019).
7	Osada-Oka, M; Goda, N; Saiga, H; Yamamoto, M; Takeda, K; Ozeki, Y; Yamaguchi, T; Soga, T; Tateishi, Y; Miura, K; Okuzaki, D; Kobayashi, K; Matsumoto, S. Metabolic adaptation to glycolysis is a basic defense mechanism of macrophages for Mycobacterium tuberculosis infection. International Immunology 31, 781-793 (2019).
8	Endo, T; Mikedis, MM; Nicholls, PK; Page, DC; de Rooij, DG. Retinoic Acid and Germ Cell Development in the Ovary and Testis. Biomolecules 9, 775 (2019).
9	Fujimoto, K; Kawaguchi, Y; Shimohigoshi, M; Gotoh, Y; Nakano, Y; Usui, Y; Hayashi, T; Kimura, Y; Uematsu, M; Yamamoto, T; Akeda, Y; Rhee, JH; Yuki, Y; Ishii, KJ; Crowe, SE; Ernst, PB; Kiyono, H; Uematsu, S. Antigen-Specific Mucosal Immunity Regulates Development of Intestinal Bacteria-Mediated Diseases. Gastroenterology 157, 1530 (2019).
10	Hasegawa, T; Kikuta, J; Sudo, T; Matsuura, Y; Matsui, T; Simmons, S; Ebina, K; Hirao, M; Okuzaki, D; Yoshida, Y; Hirao, A; Kalinichenko, VV; Yamaoka, K; Takeuchi, T; Ishii, M. Identification of a novel arthritis-associated osteoclast precursor macrophage regulated by FoxM1. Nature Immunology 20, 1631 (2019).
11	Pavillon, N; Smith, NI. Immune cell type, cell activation, and single cell heterogeneity revealed by label-free optical methods. Scientific Reports 9, 17054 (2019).
12	Suematsu, R; Miyamoto, T; Saijo, S; Yamasaki, S; Tada, Y; Yoshida, H; Miyake, Y. Identification of lipophilic ligands of Siglec5 and-14 that modulate innate immune responses. Journal of Biological Chemistry 294, 16776-16788 (2019).
13	Gao, JC; Hori, Y; Shimomura, T; Bordy, M; Hasserodt, J; Kikuchi, K. Development of Fluorogenic Probes for Rapid High-Contrast Imaging of Transient Nuclear Localization of Sirtuin 3. Chembiochem, (2019).

14	Yamaguchi, T; Teraguchi, S; Furusawa, C; Machiyama, H; Watanabe, TM; Fujita, H; Sakaguchi, S; Yanagida, T. Theoretical modeling reveals that regulatory T cells increase T-cell interaction with antigen-presenting cells for stable immune tolerance. International Immunology 31, 743-753 (2019).
15	Leu, C; Stevelink, R; Smith, AW; Goleva, SB; Kanai, M; Ferguson, L; Campbell, C; Kamatani, Y; Okada, Y; Sisodiya, SM; Cavalleri, GL; Koeleman, BPC; Lerche, H; Jehi, L; Davis, LK; Najm, IM; Palotie, A; Daly, MJ; Busch, RM; Lal, D. Polygenic burden in focal and generalized epilepsies. Brain 142, 3473-3481 (2019).
16	Noguchi, E; Akiyama, M; Yagami, A; Hirota, T; Okada, Y; Kato, Z; Kishikawa, R; Fukutomi, Y; Hide, M; Morita, E; Aihara, M; Hiragun, M; Chinuki, Y; Okabe, T; Ito, A; Adachi, A; Fukunaga, A; Kubota, Y; Aoki, T; Aoki, Y; Nishioka, K; Adachi, T; Kanazawa, N; Miyazawa, H; Sakai, H; Kozuka, T; Kitamura, H; Hashizume, H; Kanegane, C; Masuda, K; Sugiyama, K; Tokuda, R; Furuta, J; Higashimoto, I; Kato, A; Seishima, M; Tajiri, A; Tomura, A; Taniguchi, H; Kojima, H; Tanaka, H; Sakai, A; Morii, W; Nakamura, M; Kamatani, Y; Takahashi, A; Kubo, M; Tamari, M; Saito, H; Matsunaga, K. HLA-DQ and RBFOX1 as susceptibility genes for an outbreak of hydrolyzed wheat allergy. Journal of Allergy and Clinical Immunology 144, 1354-1363 (2019).
17	Kumar, A; Kumar, H. Long noncoding RNA: TRIMming the viral load. Cellular & Molecular Immunology 16, 843-845 (2019).
18	Nakai, A; Suzuki, K. Adrenergic control of lymphocyte trafficking and adaptive immune responses. Neurochemistry international 130, 104320 (2019).
19	Mastellos, DC; Blom, AM; Connolly, ES; Daha, MR; Geisbrecht, BV; Ghebrehiwet, B; Gros, P; Hajishengallis, G; Holers, VM; Huber-Lang, M; Kinoshita, T; Mollnes, TE; Montgomery, RA; Morgan, BP; Nilsson, B; Pio, R; Ricklin, D; Risitano, AM; Taylor, RP; Mantovani, A; Ioannidis, JPA; Lambris, JD. 'Stealth' corporate innovation: an emerging threat for therapeutic drug development. Nature Immunology 20, 1409-1413 (2019).
20	Mizuno, A; Okada, Y. Biological characterization of expression quantitative trait loci (eQTLs) showing tissue-specific opposite directional effects. European Journal of Human Genetics 27, 1745-1756 (2019).
21	Clark, DW; Okada, Y; Moore, KHS; Mason, D; Pirastu, N; Gandin, I et al. Associations of autozygosity with a broad range of human phenotypes. Nature Communications 10, 4957 (2019).
22	Usui, R; Yabe, D; Fauzi, M; Goto, H; Botagarova, A; Tokumoto, S; Tatsuoka, H; Tahara, Y; Kobayashi, S; Manabe, T; Baba, Y; Kurosaki, T; Herrera, PL; Nagashima, K; Ogura, M; Nagashima, K; Inagaki, N. GPR40 activation initiates store-operated Ca2+ entry and potentiates insulin secretion via the IP3R1/STIM1/Orai1 pathway in pancreatic beta-cells. Scientific Reports 9, 15562 (2019).
23	Braganza, CD; Shibata, K; Fujiwara, A; Motozono, C; Sonoda, KH; Yamasaki, S; Stocker, BL; Timmer, MSM. The effect of MR1 ligand glyco-analogues on mucosal-associated invariant T (MAIT) cell activation. Organic & Biomolecular Chemistry 17, 8992-9000 (2019).
24	Motomura, Y; Kobayashi, T; Moro, K. The Neuropeptide CGRP Induces Bipolar Syndrome in Group 2 Innate Lymphoid Cells. Immunity 51, 598-600 (2019).
25	Herppich, S; Toker, A; Pietzsch, B; Kitagawa, Y; Ohkura, N; Miyao, T; Floess, S; Hori, S; Sakaguchi, S; Huehn, J. Dynamic Imprinting of the Treg Cell-Specific Epigenetic Signature in Developing Thymic Regulatory T Cells. Frontiers in Immunology 10, 2382 (2019).
26	Sakaue, S; Okada, Y. GREP: genome for REPositioning drugs. Bioinformatics 35, 3821-3823 (2019).
27	Cossarizza, A; Chang, HD; Radbruch, A; Acs, A; Adam, D; Adam-Klages, S et al.. Guidelines for the use of flow cytometry and cell sorting in immunological studies (second edition). European Journal of Immunology 49, 1457-1973 (2019).
28	Akamatsu, M; Mikami, N; Ohkura, N; Kawakami, R; Kitagawa, Y; Sugimoto, A; Hirota, K; Nakamura, N; Ujihara, S; Kurosaki, T; Hamaguchi, H; Harada, H; Xia, GL; Morita, Y; Aramori, I; Narumiya, S; Sakaguchi, S. Conversion of antigen-specific effector/memory T cells into Foxp3-expressing T-reg cells by inhibition of CDK8/19. Science Immunology 4, eaaw2707 (2019).
29	Hori, Y; Kikuchi, K. Chemical Tools with Fluorescence Switches for Verifying Epigenetic Modifications. Accounts of Chemical Research 52, 2849-2857 (2019).
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B. WPI-related papers: NONE