



Graduate School of Medicine and School of Medicine
Kobe University
 2021



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Kobe University School of Medicine, Academic Affairs Section
 (Open campus video)
https://www.youtube.com/channel/UCZnr_O0oqwcS3dXRHIQQheg



Message from the Dean

Professor MINAMI Yasuhiro, M.D., Ph.D.

Division of Cell Physiology

Dean of the Graduate School of Medicine and School of Medicine
Kobe University



The Faculty and Graduate School of Kobe University's School of Medicine provide students with a comprehensive, continuous education from undergraduate to graduate level. We strive to cultivate outstanding doctors and medical researchers who will be responsible for the future of medicine and medical treatment in Japan and the world, and our graduates possess a rich humanity and strong ethics combined with specialized knowledge and techniques, in addition to a scientific perspective and international awareness. Also, our special regional ties developed through collaboration with Hyogo Prefecture have enabled us to enhance medical care in underpopulated areas of the prefecture by training enthusiastic medical practitioners. Recently, we have also been furthering our cultivation of key medical researchers by establishing the Medical Scientist Training program and the MD-PhD program.

At the Graduate School of Medicine, we are promoting cutting-edge, fundamental medical research and clinical research in the fields of medicine, medical treatment and life sciences based on our collaborations with research institutions both domestically and abroad. We aim to bring about distinctive innovation by conducting research (such as research into new drugs and the development of medical devices) with the goal of producing new diagnosis methods and treatments based on an in-depth understanding of various diseases' pathology. In addition, both the School and Graduate School of Medicine are engaged in international academic exchange through our International Collaborative Research Center for Emerging and Re-emerging Infectious Diseases in Indonesia, and our collaborations with institutions such as the University of Washington (USA) and the University of Oslo (Norway). We aim to increase our contribution to international medical research and treatment through various initiatives while focusing on producing eminent graduates who are highly international. Furthermore, we will strengthen our cooperation with regional medical organizations, research institutes and industries in Hyogo Prefecture, such as those in Kobe City, playing a central role in community medicine and furthering regional innovation in medicine and medical treatment.

The novel coronavirus crisis that began in early 2020 has had a huge impact on education, research and medical care at the School of Medicine, Graduate School of Medicine and Kobe University Hospital. Thanks to everyone's support and hard work, we have been able to conduct safe and secure education, medical care and research under these circumstances through promoting the use of digital and remote methods. We are also currently establishing an education system for the corona/post-corona eras that will feature hybrid classes and blended classes. The current coronavirus crisis has been an opportunity for the vital role of medicine and medical care to be re-recognized on both societal and global levels. This role will be absolutely indispensable in building resilient societies, a resilient world, which can deal with the various imminent environmental changes, such as the next infectious disease outbreak, disasters and climate change.

Thanks to your continued support and cooperation, we are improving the unified strengths of the School and Graduate School of Medicine's basic medical divisions, clinical divisions and the University Hospital in terms of the quality of education, research and medical care. Under the leadership of Kobe University's President, I will strive to promote and strengthen interdisciplinary research, industry-academia-government cooperation, regional cooperation and international cooperation, in order to further develop the School of Medicine, Graduate School of Medicine, Kobe University Hospital, and Kobe University.

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1868	Apr.	The preparatory section for the Hospital was set up inside Kobe Foreign Public Office, and the construction of Kobe Hospital began.
1869	Apr.	Kobe Hospital was established. The training center for medical practitioners (called Igaku-Densyujo) was attached to Kobe Hospital.
Kobe Hospital's opening ceremony was held.		
1876		Igaku-Densyujo was promoted to Kobe Hospital Medical School.
1877	Feb.	Kobe Hospital was renamed Public Kobe Hospital.
	Nov.	The branch hospitals were established in Akashi and Nishinomiya.
1882	Apr.	Prefectural Kobe Medical School was established.
	Dec.	Public Kobe Hospital was promoted to Prefectural Kobe Hospital.
1883	Apr.	A Pharmaceutical School affiliated with Prefectural Kobe Hospital was established.
1888	Mar.	Prefectural Medical School and Hyogo Prefectural Pharmaceutical School were both closed.
	Apr.	A new building for Prefectural Kobe Hospital was constructed. Subsequently, the Hospital was moved to the new location. (7-chome, Kusunoki-cho, Chuo-ku.)
1930	Dec.	The main building of the Hospital was constructed. (ca. 14,193m2)
1944	Apr.	Prefectural Medical School was established. Also Prefectural Kobe Hospital was renamed Prefectural Medical School Hospital.
1946	Apr.	The establishment of Prefectural Medical College was approved (19 departments; fixed number of places for first year students: 80).
1951	Mar.	Prefectural Medical School was closed.
		The preparatory course of Prefectural Medical College was abolished (due to the Educational System Reform).
1952	Feb.	Kobe Medical College's establishment was approved.
		Prefectural Medical College Hospital was renamed Kobe Medical College Hospital.
	Apr.	Kobe Medical College's opening ceremony was held.
1953	Apr.	The Institute of Forensic Science, affiliated with Kobe Medical College, was renamed the Institute of Forensic Medicine.
		The Division of Physiology (II) and the Division of Psychiatry and Neurology were established.
		The research course was established (under the old education system).
1954	Apr.	The Division of Pathology (II) and the Division of Orthopedics were established.
1955	Jan.	The establishment of Pre-medical Courses at Hyogo Agricultural University and the Himeji Institute of Technology was approved.
		Kobe University became authorized in accreditation of academic degrees (under the old education system).
	Apr.	The Division of Anatomy (II) was established.
1957	Apr.	The Division of Hygiene and Preventive Medicine was closed. In its place, the Division of Hygiene and the Division of Public Health were established.
	Sep.	The Institute of Forensic Medicine was combined with other sections to form the Affiliated Research Institute of Kobe Prefectural Medical College.
1958	Mar.	The establishment of the graduate school and its doctoral course (PhD) was approved (under the new education system).
		The University main building, the new medical ward, the food service building, etc. were constructed. (ca. 8,392m2; 1,004 beds)
1959	May	The Health Science Course was introduced in the Higher School of Nursing affiliated with Kobe Medical College. Furthermore, it was subsequently promoted to the Prefectural Women's Institute of Welfare.
1960	May	The Research Institute was renamed the Research Institute of Growth Mechanisms.
1961	Mar.	Prefectural Medical College and its research course (under the

old education system) were closed.

1962	Apr.	The Division of Dermatology and Urology was closed. In its place, the Division of Dermatology and the Division of Urology were established.
	Jul.	The College Library was constructed (ca.1,462m2).
1963	Mar.	The Center for Experimental Animals was constructed (ca.729m2).
	Dec.	The Cabinet decided to promote Kobe Medical College to national status from FY 1964.
1964	Apr.	The Faculty of Medicine was established in Kobe University. In addition, Kobe Medical College's period of national status began.
		All programs of the pre-medical course, the first-year course, and 10 Divisions in Basic Medical Sciences were transferred.
1965	Jan.	The Division of Occupational Health was closed. The Division of Medical Zoology was established.
	Apr.	As steps for the 2nd fiscal year of promotion to national status, 3 Divisions in Basic Medical Sciences and 5 Divisions in Clinical Sciences were transferred.
1966	Apr.	As steps for the 3rd fiscal year of promotion to national status, 5 departments in Clinical Sciences were transferred.
1967	Apr.	The doctoral course was established in the Faculty of Medicine, the Graduate School of Medicine.
		As steps for 4th fiscal year of promotion to national status, all students of the graduate school, as well as 3 Departments in Clinical Sciences and the College Library were transferred.
	Jun.	In association with the promotion to national status, Kobe Medical College Hospital and the Prefectural Women's School of Welfare were renamed Kobe University Hospital and the School of Nursing affiliated with the School of Medicine, Kobe University, respectively.
		Clinical facilities: Internal Medicine I, II, Surgery I, II, Orthopedics, Obstetrics & Gynecology, Otolaryngology, Ophthalmology, Psychiatry & Neuroscience, Pediatrics, Radiology, Dermatology, Urology, Anesthesiology, Dentistry, Clinical laboratory, Surgical care, Pharmacy.
		The Department of Anesthesiology was established.
1968	Mar.	Kobe Medical College and its graduate school were closed after the completion of all transferrings.
	Apr.	The fixed number of places for first year students of the Faculty of Medicine, the School of Medicine increased to 100.
		The Internal Medicine (III) was established.
1969	Mar.	The Central Research Laboratory was constructed in the School of Medicine.
	Apr.	The Department of the Internal Medicine (III) and the Department of Neurosurgery were established.
		The School of Medical Technology affiliated with the School of Medicine was established. The fixed number of places for first year students: 20
		The Division of Neurosurgery was established.
1972	Apr.	The School of Public Health Laboratory Technology was reorganized into the School of Medical Technology.
1973	Mar.	The School of Public Health Laboratory Technology was closed.
		The Division of Biochemistry was renamed the Division of Biochemistry (I).
		The Division of Biochemistry (II) was established.
		The Department of Radiation Biophysics was established.
		The fixed number of places for first year students of the Faculty of Medicine, the School of Medicine increased to 120.
		The fixed number of places for first year doctoral course students was increased to 54.
		Institute for Experimental Animals affiliated with the School of Medicine was established.
	May	The closing of the tuberculosis ward was approved.
1975	Oct.	The Department of Dentistry was renamed the Department of

Oral & Maxillofacial Surgery.

1976	Feb.	The new School Building of Medical Sciences (the 1st term of work) was constructed.
1977	Mar.	The new School Building of Medical Sciences (the 2nd term of work) was constructed.
1978	Mar.	The school buildings of the School of Nursing affiliated with the School of Medicine and the School of Public Health Laboratory Techniques were constructed. (#10, 7-chome, Tomogaoka, Suma-ku.)
	Aug.	The School of Nursing and the School of Medical Technology were moved into the Myodani Campus.
1979	Mar.	The new School Building of Medical Sciences (the 3rd term of work) was constructed.
	Apr.	The International Center for Medical Research (ICMR) affiliated to the School of Medicine was established.
		The Division of Oral & Maxillofacial Surgery was established.
1980	Apr.	The Radioisotope facility was established.
		The joint-research facility was established.
1981	Oct.	The College of Medical Sciences affiliated with Kobe University was established in parallel inside the University.
1983	Apr.	The Medical Information Technology Center was established.
1984	Apr.	The School of Nursing affiliated with Kobe Medical College was closed.
1985	Apr.	The School of Medical Technology was closed.
		The Division of Clinical and Laboratory Medicine was established.
1988		The Division of Internal and Generic Medicine was established.
1989	Apr.	The fixed number of places for first year students of the Faculty of Medicine, the School of Medicine decreased to 100.
1991	Apr.	The Administration Department of the School of Medicine and that of the University Hospital were combined, and rearranged into the Administration Department of the School of Medicine (General Affairs Division, Planning and Administrative Division, Student Affairs Division, Medical Affairs Division).
		The Division of Geriatrics was established.
1994	Mar.	The Clinical Research Building (Currently, "Research Building A") was constructed.
	Oct.	The Faculty of Health Sciences affiliated with the School of Medicine was established. The fixed number of places for first year students: 160
		The Study of Nursing, the Study of Medical Technology, the Study of Physical Therapy, the Study of Occupational Therapy, and other common programs were implemented
1996	Apr.	The Division of Disaster and Emergency Medicine was established.
		The Division of Plastic Surgery was established.
	Jul.	The Administration Building (and the Library inside) was constructed.
1998	Mar.	The College of Medical Sciences affiliated with Kobe University was closed.
		The fixed number of places for first year students of the Faculty of Medicine, the School of Medicine decreased to 95.
	Jun.	It was determined that a new entrance system for Bachelors (transfer into the 3rd year) would be introduced as of 2000 (FY12 of the Heisei). The fixed number of places for first year students: 5.
		The Clinical Research Building was constructed.
		The school building of the Faculty of Health Science was constructed.
1999	Apr.	The Graduate School of Medicine ("Daigakuin Igaku-kenkyuka") was renamed "Daigakuin Igakukei-kenkyuka".
		The Faculty of Health Science (master's course) was established in the Graduate School of Medicine.
2000	Apr.	The Division of Synchrotron Radiation Research (Cooperative Programs) was established in the Department of Internal Medicine, Graduate School of Medicine.

The Shinryoku Hall was constructed.

	Apr.	The doctoral course was established in the Faculty of Health Sciences, the Graduate School of Medicine.
		Five major Departments (e.g. Dept. of Physiology) were rearranged into the Faculty of Medicine, the Graduate School of Medicine.
		The Division of Imaging Medicine and Ion Beam Therapy (Cooperative Graduate Programs) was founded in the Faculty of Medicine, the Graduate School of Medicine.
		Thirty-five Divisions of the Faculty of Medicine were closed, and rearranged into the four principal Departments.
2002	Apr.	The University Hospital (clinical divisions) was reorganized as follows: Clinical facilities: Development and Aging, General Therapeutics: Obstetrics and Gynecology, Pediatrics, Internal and Geriatric Medicine, Psychiatry and Neurology, Radiology, Anesthesiology. Internal Medicine: Department of Digestive Diseases, Cardiovascular Medicine, Respiratory Medicine, Medicine of Neurology, Department of Diabetes and Metabolism, Medicine of Endocrinology, Department of Kidney Diseases, Medicine of Hematology and Oncology, Clinical Immunology. Surgery: Hepato-Biliary-Pancreatic Surgery, Gastrointestinal Surgery, Cardio Vascular Surgery, Thoracic Surgery, Breast-Endocrine Surgery, Pediatric Surgery, Artificial Organ-transplant Surgery, Urology. Nerve, Feeling, and Movement Function: Neurosurgery, Orthopedic Surgery, Otorhinolaryngology-Head and Neck Surgery, Ophthalmology, Dermatology, Oral& Maxillofacial Surgery, Plastic Surgery. The Division of Developmental and Regenerative Medicine (Cooperative Graduate Programs) was established in the Graduate School of Medicine. The Division of Biomedical Sciences (master's course) was established in the Faculty of Medicine, the Graduate School of Medicine. The fixed number of places for first year students: 20
	Jun.	The Post Graduate Clinical Education Center was promoted to the official constitution under the Planning and Coordination Department.
2004	Apr.	Kobe University was transformed into the National University Corporation. The system of the Administration Office was reformed. The International Center for Medical Research was promoted to the International Center for Medical Research and Treatment. The Division of Clinical Evaluation of Pharmacotherapy and the Division of Evidence-Based Laboratory Medicine were established in the Faculty of Medicine, the Graduate School of Medicine (until March, 2009). Management Division was renamed Financial Management Division in the Administration Department of the School of Medicine.
	Jul.	The Division of Evidence-Based Laboratory Medicine (Sysmex) was established in the Graduate School of Medicine.
2005	Jun.	The Department of Hepato-Biliary-Pancreatic Surgery, the Department of Gastrointestinal Surgery, the Department of Breast-Endocrine Surgery, and the Department of Artificial Organ-transplant Surgery were unified, and then, divided into two Departments: The Department of Gastroenterological Surgery, and

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		The Department of Liver Surgery and Transplantation. (Hospital)
		The Department of Emergency Critical Care Medicine was established. (Hospital)
2006	Jan.	The Division of General Practice and Community Medicine was established in the Faculty of Medicine, the Graduate School of Medicine.
2007	Apr.	The Faculty of Medicine , the Graduate School of Medicine was reorganized as follows: Basic Medical Sciences: Dept. of Physiology and Cell Biology, Dept. of Biochemistry and Molecular Biology, Dept. of Pathology and Microbiology, Dept. of Social Medicine. Clinical Sciences: Dept. of Internal Medicine, Dept. of Internal related, Dept. of Surgery, Dept. of Surgery Related. Also, the University Hospital (clinical facilities) was reorganized as follows: Internal Medicine: Cardiovascular Medicine, Nephrology, Respiratory Medicine, Clinical Immunology, Gastroenterology, Diabetes and Endocrinology, Internal and Generic Medicine, Neurology, Oncology, Hematology. Internal Related: Radiology, Pediatrics, Dermatology, Psychiatry and Neurology. Surgery: Gastrointestinal Surgery, Hepato-Biliary-Pancreatic Surgery, Cardiovascular Surgery, Thoracic Surgery, Pediatric Surgery. Surgery Related: Orthopaedic Surgery, Neurosurgery, Ophthalmology, Otolaryngology-Head and Neck Surgery, Urology, Obstetrics and Gynecology, Plastic Surgery, Anesthesiology, Oral&Maxilofacial Surgery, Emergency and Critical Care Medicine. Central Clinical Facilities: Clinical Laboratory, Radiology Division, Blood Transfusion Division, Surgical Pathology Division, Perinatal Center, Emergency Division, Dept. of General Medicine, Intensive Care Division, Surgical Division, Rehabilitation Division, Nephrology & Dialysis Center, Coronary Care Unit, Dept. of Endoscopy, Dept. of Clinical Genetics, Dept. of Infection Control and Prevention, The International Patient Center, Mental Health Clinic for Child and Mother, Emergency and Intensive Care Center, Cancer Center, Dept. of Nutrition, Outpatient Chemotherapy Room. The Division of Ultrastructural Biology, the Division of Infection and Immunology, and the Section of Rehabilitation Science (Cooperative Graduate Programs) were established. The Division of Imaging and Nuclear Medicine (Cooperative Graduate Programs) was rearranged into two sections: The Section of Ion Beam Therapy, and The Section of Molecular Imaging.
	Oct.	The Department of Aesthetic Surgery was established. (Hospital)
2008	Apr.	The Graduate School of Medicine ("Daigakuin Igaku-kenkyuka") was renamed "Daigakuin Igaku-kenkyuka" again. The Faculty of Medicine, the Graduate School of Medicine was reorganized as follows: Dept. of Physiology and Cell Biology, Dept. of Biochemistry and Molecular Biology, Dept. of Pathology, Dept. of Microbiology and Infectious Diseases Dept. of Social Medicine, Dept. of Internal Medicine, Dept. of Internal Related, Dept. of Surgery, Dept. of Surgery Related. The Division of Infectious Disease Field Research (Cooperative

		Graduate Programs) and the Division of System Biology of Diseases were established in the Faculty of Medicine, the Graduate School of Medicine. The Section of Child Health and Development was established in the Faculty of Medicine, the Graduate School of Medicine. (until March 2013). The Integrated Center for Mass Spectrometry was established in the Faculty of Medicine, the Graduate School of Medicine. The Department of Breast Surgery was established. (Hospital) The Faculty of Health Science was established in the Graduate School of Medicine. Financial Management Division was reorganized into Financial Management Division and Hospital Management Planning Division in the Administration Department of the School of Medicine. Jun. The Division of Rheumatology was established in the Faculty of Medicine, the Graduate School of Medicine.(until March 2012) Aug. The Department of Infectious Diseases and the Department of Pathology Diagnostic were established. (Hospital) Oct. The Department of Radiation Oncology was established. (Hospital) The Section of Arrhythmia was established in the Faculty of Medicine, the Graduate School of Medicine. Nov. The Central Research Laboratory was renovated, and the endowed facility was constructed.
2009	Apr.	Institute for Experimental Animals affiliated with the School of Medicine was renamed Institute for Experimental Animals affiliated with the Graduate School of Medicine. The International Center for Medical Research and Treatment affiliated with the School of Medicine was reorganized into the Center for Infectious Diseases affiliated with the Graduate School of Medicine. The Division of Aesthetic Surgery was established in the Faculty of Medicine, the Graduate School of Medicine (until March 2012). The fixed number of places for first year students of the Faculty of Medicine, the School of Medicine increased to 100. Jun. The Department of Social Medicine was renamed the Department of Social/Community Medicine and Health Science. Oct. The Department of Internal and Geriatric Medicine and the Department of General Medicine were unified, and renamed the Department of General Internal Medicine. (Hospital) The Section of General Pediatrics was established in the Faculty of Medicine, the Graduate School of Medicine.
2010	Jan.	The Division of Medicine of Oncology was renamed the Division of Medicine of Oncology/Hepatology.
	Apr.	The Division of General Practice and Community Medicine was renamed the Division of Family & Community Medicine in the Faculty of Medicine, the Graduate School of Medicine. The Section of Pathological Brain Science, the Section of Pathological Molecular Cell Biology, and the Section of Advanced Therapeutic Target Discovery (Cooperative Graduate Programs) were established in the Faculty of Medicine, the Graduate School of Medicine. The fixed number of places for first year students of the Faculty of Medicine, the School of Medicine increased to 103. The entrance system for Bachelors (transfer into the 3rd year) was modified with the transfer into the 2nd year as of FY2010. The fixed number of places for first year students of the Division of Biomedical Sciences (master's course) of the Graduate School of Medicine increased to 25.
2011	Apr.	The Section of Drug Discovery and the Section of Regulatory Science (Cooperative Graduate Programs) were established in the Faculty of Medicine, the Graduate School of Medicine. The Translational Research Innovation Center was established in the Graduate School of Medicine. The fixed number of places for first year students of the Faculty of Medicine, the School of Medicine was increased to 105. The Research Support Division was established in the Administration Department of the School of Medicine.

2012	Mar.	The Post Graduate Clinical Education Center was rearranged into the Integrated Clinical Education Center.
	Apr.	The Division of Rehabilitation Medicine was established in the Faculty of Medicine, the Graduate School of Medicine. The Advanced Biomedical Imaging Research Center was established in the Graduate School of Medicine. The fixed number of places for first year students of the Faculty of Medicine, the School of Medicine was increased to 108. The Facilities Management Division was established in the Administration Department of the School of Medicine. May The Section of Advanced Medical Technology and Development for Urology was established in the Faculty of Medicine, the Graduate School of Medicine. Oct. The Section of Molecular and Metabolic Medicine was established in the Faculty of Medicine, the Graduate School of Medicine. The Center for Education of Global Leaders was established in the Graduate School of Medicine.
2013	Jan.	The Section of Pathogenetic Signaling was established in the Faculty of Medicine, the Graduate School of Medicine.
	Apr.	The Division of Pathology for Regional Communication was established in the Faculty of Medicine, the Graduate School of Medicine. The Division of Advanced Pediatric Medicine and the Division of Advanced Pediatric Surgery (Cooperative Graduate Programs) were established in the Faculty of Medicine, the Graduate School of Medicine. The Department of Rheumatology was closed. The Department of Clinical Immunology was reorganized into the Division of Rheumatology and Clinical Immunology. (Hospital) The Department of Physical Medicine and Rehabilitation was established (Hospital). The fixed number of places for first year students of the Faculty of Medicine, the School of Medicine was increased to 110. May The Center for Education and Research in Membrane Biology and Medicine was established in the Graduate School of Medicine. Jun. The Department of Palliative Medicine was established (Hospital).
2014	Jan.	Extension of Central Laboratories was constructed.
	Feb.	The RS Incubation Center for Medical Devices & Regenerative Medicine Products was established in the Graduate School of Medicine.
	Apr.	The Center for Advancement of Community Medicine was established in the School of Medicine. The Medical Innovation Center was established in the Graduate School of Medicine. The Section of Pathology Network was established in the Faculty of Medicine, the Graduate School of Medicine. The Respiratory Center was established (Hospital). The fixed number of places for first year students of the Faculty of Medicine, the School of Medicine was increased to 112.
	May	The Oral Management Center was established (Hospital).
2015	Apr.	The Section of Community Medicine and Career Development, and the Section of Developmental Pediatrics were established in the Faculty of Medicine, the Graduate School of Medicine. The Section of Exploratory and Advanced Search in Cardiology, and the Section of Advanced Research for Cardiovascular Surgery were established in the Faculty of Medicine, the Graduate School of Medicine. Jul. WHHLMI Rabbit Research and Bioresource Center was established in the Graduate School of Medicine. Nov. The Division of Minimally Invasive Surgery was established in the Faculty of Medicine, the Graduate School of Medicine.
2016	Apr.	The Center for Cell Signaling and Medical Innovation was established in the Graduate School of Medicine.
2017	Apr.	The International Clinical Cancer Research Center was established in the School of Medicine.

		The Tenure-Track Center was established in the Graduate School of Medicine. The Next Generation International Center was established in the Graduate School of Medicine. The Disaster Medical Center was established (Hospital) The fixed number of places for first year students of the Faculty of Medicine, the Graduate School of Medicine increased to 110. The Patient Service Division was established in the Administrative Office of the School of Medicine. Jun. The International Medical Communication Center was established. (Hospital) Jul. The Center for Hospitalization was closed, and the Center for Patient Support took over operation.
2018	Feb.	The Center for Research and Development of Medical Engineering was established. (Hospital) The Medical Device Innovation Platform was established in the School of Medicine. Apr. Creative Health Promotion,Spine Surgery,Innovative Emergency and Critical Care Medicine were established in the Faculty of Medicine, the Graduate School of Medicine. Oct. The Department of Radiology was renamed Diagnostic and Interventional Radiology. The Center for Endovascular Therapy was renamed Center for Interventional Radiology The Center for Palliative Care was established. (Hospital)
2019	Jan.	The Center for Information Analysis and Promotion was established.
	Mar.	The International Clinical Cancer Reserch Center was reorganized University Hospital.
	Apr.	The Clinical Anatomy Training Center was established in the School of Medicine. The Bio Resource Center was established.(ICCRC • Hospital) The Department of Medicine of Neurology was renamed Division of Neurology. Jun. The Pneumothorax and Cystic Lung Diseases Research Center was established.(ICCRC • Hospital)
	Jul.	The Emergency Division was renamed the Emergency and Critical Care Center.
	Aug.	The Division of AI and Digital Health Sciences was established in the Faculty of Medicine, the Graduate School of Medicine.
	Sep.	The Center for Clinical Genomics and Research was established. (Hospital)
	Nov.	The Office for AI and Digital Health Promotion was established. (ICCRC • Hospital)
2020	Apr.	The Section of Advanced Therapeutic Target Discovery (Cooperative Graduate Programs) were established in the Faculty of Medicine, the Graduate School of Medicine. Aug. The Department of Clinical Engineering was established. Nov. The Department of Clinical Facilities, the Department of Hospital Administration were reorganized into the Department of Hospital safety and management section, the Department of Medical Support and Administration Planning Section Central Clinical Facilities and Specialty the Department of Medical Care Section.
2021	Feb.	The Center for Mental Disorders was established in the Graduate School of Medicine.
	Apr.	The Precision and Tele Surgery Center was established in the Graduate School of Medicine. The Division of Joint Preservation & Reconstruct Surgery and The Division of Podiatric Medicine were established in the Faculty of Medicine, the Graduate School of Medicine. The Patient Service Division in the Administrative Office of the School of Medicine was renamed the Medical Support Division The International Patient Center was closed, and the International Medical Communication Center took over operation. The Children's Medical Center was established. (Hospital)

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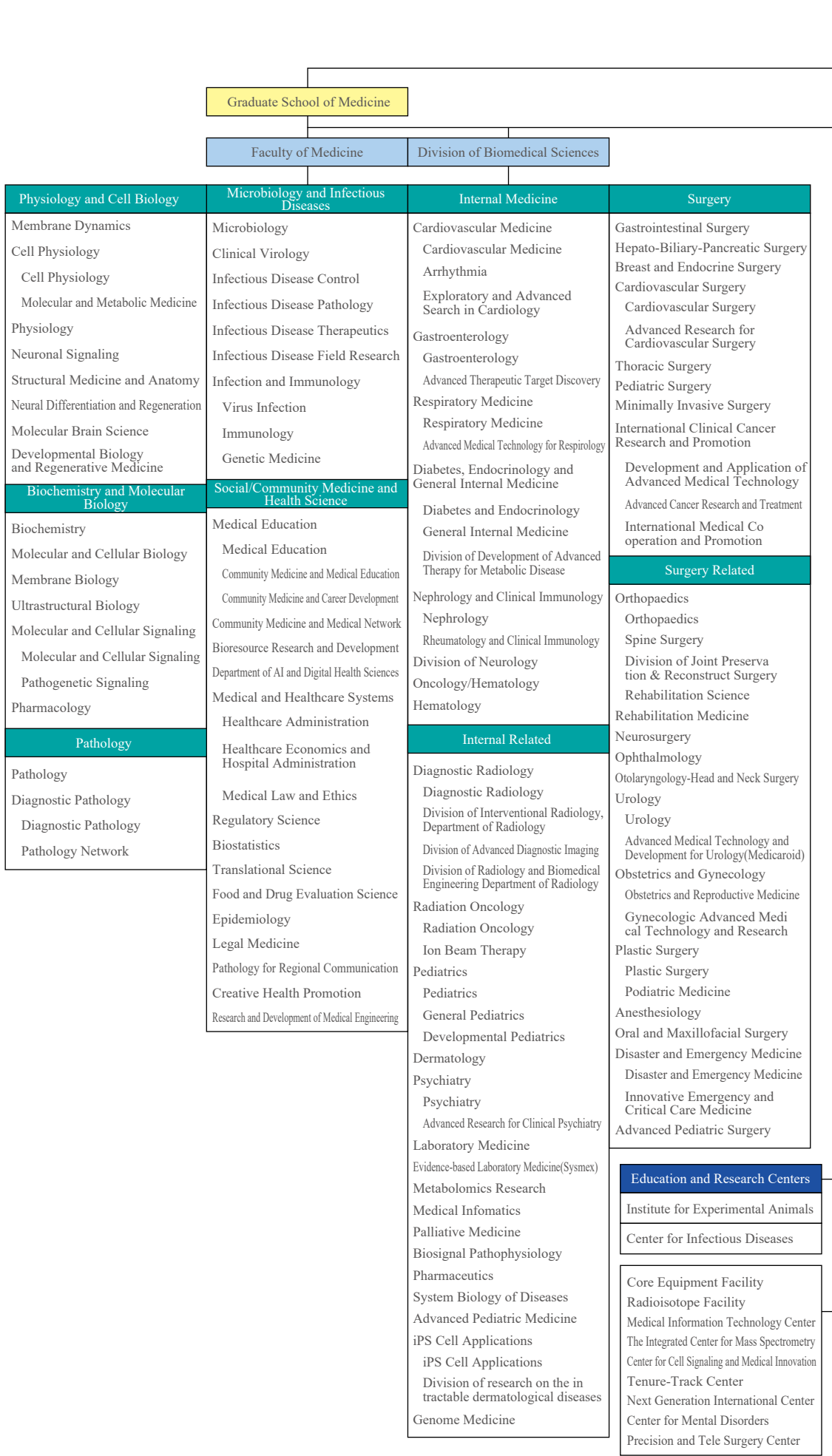
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Membrane Dynamics



Toshiaki Sakisaka, M.D., Ph.D.
Professor

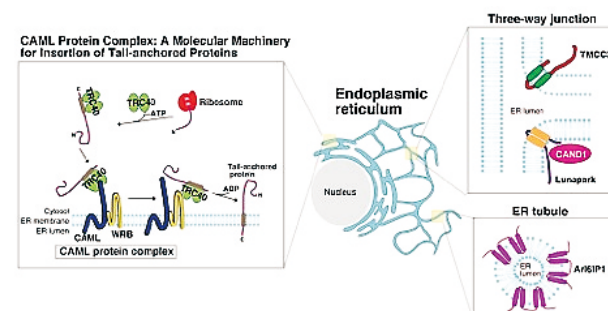
The Division of Membrane Dynamics, in terms of “Membrane rules the life”, aims to reveal biochemically various functions of membrane and thereby understand cellular function expressed by membrane and its homeostasis maintenance.

Building blocks of all diverged lives are cells, which are surrounded by membrane. Each of the cells encompasses various intracellular organelles, nearly all of which are enveloped by membrane. With the harmonized reactions by the groups of membrane protein localized in each organelle, the organelle membrane is shaped, exerting the organelle-specific functions. We hope to contribute our investigations to elucidate a series of membrane mechanisms including the localization of membrane proteins, the functions of membrane proteins, structures and machineries of organelles, toward understanding cytopoiesis.

In particular, our laboratory targets principally endoplasmic reticulum, considered as most important among organelles. Endoplasmic reticulum is the organelle forming a reticular network of membrane throughout the cytoplasm. Endoplasmic reticulum plays central roles in synthesis, sorting, and trafficking of secretory proteins and membrane proteins, quality control of proteins, synthesis of lipids, and restoration of calcium. It also works as a source of membrane, required in the formation of other organelles such as nucleus, the Golgi apparatus, peroxisome, and autophagosome. We currently attempt to elucidate the mechanisms that form endoplasmic reticulum applying three research themes as follows:

- 1) Molecular mechanisms underlying the tubular and sheet structures of endoplasmic reticulum
- 2) Machinery for the translocon-independent insertion of membrane protein into endoplasmic reticulum
- 3) Reconstitution of organelles using artificial membrane

As for the medical education, we partially hold the chairs of cell biology and biochemistry for the first and second year students of the Faculty of Medicine.



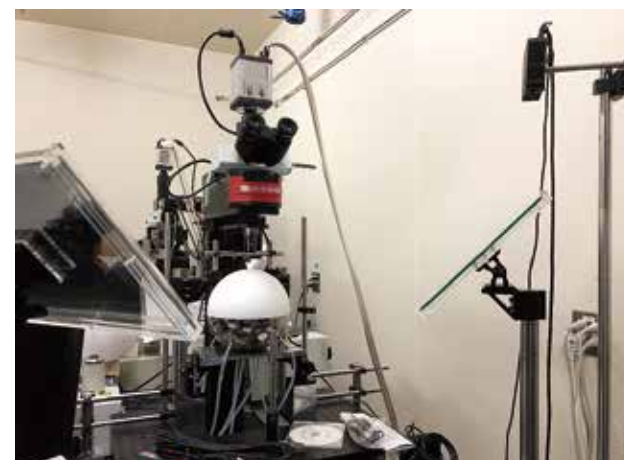
Physiology



Toru Takumi, M.D., Ph.D.
Professor

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Our goal is to understand our mind by our brain. To understand higher brain functions such as cognitive function, we take an approach to study mental disorders as abnormality of mental functions. Currently our project is integrative analysis of autism spectrum disorders (ASD), developmental disorders and psychiatric disorders. We also work on circadian rhythms in which gene and behavior are linked. Furthermore, we try to combine these two different projects. For example, we have used cutting-edge embryonic stem cell technologies to make model mice with human biological abnormalities, such as copy number variations (CNV), based on clinical data. The mice will be founders for forward genetics and targets for multi-dimensional approaches. More recently, we have also employed new genome editing techniques such as CRISPR/Cas to develop a next generation chromosome engineering method. This new technology enables us to generate whole libraries of human CNV as well as new mouse models. Through multi-faceted approaches including electrophysiology, imaging techniques and optogenetics, we are trying to understand the neural circuits involved in social behavior using a humanized mouse model of ASD. The imaging techniques include in vivo imaging of spines by using two-photon microscopy, in vivo Ca imaging by micro-endoscope and dynamic cortical imaging using virtual reality system, etc. At the cellular level, we are also interested in local translation in neuronal dendrites and spines. As mentioned, we plan to generate a whole cell library of human CNV by using a next generation chromosome engineering technique. The library will be useful for analyzing cellular phenotypes, and for a drug screening for ASD. We also develop organoids to see their phenotypes as well as different kinds of differentiated cell types. Needless to say, dry approaches including mathematical modeling, computer science, bioinformatics and information science, such as AI, are essential in all of the above fields, and are used to complement our wet lab work.



Cell Physiology



Yasuhiro Minami, M.D., Ph.D.
Professor



Cell Physiology

The Division of Cell Physiology conducts investigations aiming to elucidate “molecular mechanisms underlying morphogenesis and tissue-/organo-genesis” and “relationships between the disruption of these processes and pathological conditions such as cancer progression and/or inflammation” in mammals including humans. As a clue to unravel these molecular mechanisms, we focus on the roles of signal transduction elicited by Wnt protein and its cognate receptors, Ror-family receptor tyrosine kinases (Ror1, Ror2), which play important roles in the development processes and the onsets/progression of various diseases.

Our laboratory, in particular, conducts molecular functional and pathological analyses at cell, tissue, organ, and whole-body levels, using genetically modified mice or disease-model mice. And, through these studies, we expect to elucidate “the nature of flexibility and/or plasticity observed in living organism”, “principles operated in biological phenomena”, and “pathologies induced by disruptions of biological processes” at multiple hierarchical levels. On the basis of these analyses, we expect to obtain mechanistic bases applicable to the development of novel preventions, diagnoses and therapeutics.

Our ongoing research themes are as follows:

- 1) Analysis of signal transduction regulating cell migration and polarity during tissue-/organo-genesis and repair of damaged tissues (regeneration).
- 2) Analyses of the relevance between aberrations in signal transduction regulating cell migration and polarity and invasion and/or metastasis of cancer cells.
- 3) Analyses of signal transduction mechanisms which regulate the development, damage response, inflammation of the central nervous system.
- 4) Analyses of the epigenetic regulation involved in tissue damage response, cancer progression, and prolonged inflammation.
- 5) Pathological analyses of growth, invasion and metastasis of cancers, using disease-model mice.
- 6) Pathological analysis of tissue repair and inflammation using disease-model.
- 7) Elucidation of operating principles in biological phenomena, by employing multi-OMICS analyses, imaging analyses, and mathematical analyses.

Molecular and Metabolic Medicine<Endowed Chair>

1. Molecular mechanisms of cell signaling in insulin secretion

Pancreatic β -cells secrete insulin, the most important hormone that maintain blood glucose levels in normal range. Type 2 diabetes is characterized by impaired insulin secretion from pancreatic β -cells and impaired insulin action at target tissues. Insulin secretion from pancreatic β -cells is precisely regulated by various intracellular signals generated by hormonal and neuronal inputs. We aim to elucidate molecular mechanisms of signaling in insulin secretion by a variety of approaches including metabolomics, proteomics and general manipulation such as CRISPR/Cas9.

2. Mechanisms of the regulation of glucose metabolism using animal models.

Glucose is an essential energy source for living organisms. Glucose homeostasis is maintained by complex systems of intracellular and intercellular signals. The failure of these systems cause diabetes and hypoglycemia. We aim to investigate the mechanisms of glucose homeostasis in vivo using various animal models such as genetically modified mice and spontaneous diabetic rats and mice. These studies will provide basis for development of novel therapeutic strategies as well as clarification of the mechanisms of diabetes and hypoglycemia.

3. Mechanisms of aging of pancreatic islets

Aging is an important factor contributing to development of diabetes. However, the relationship between aging and pancreatic islet function is poorly understood. We aim to clarify the relationship by investigating the effect of aging on pancreatic hormone secretions, gene expressions (RNA seq), and metabolome of healthy mice and aging-promoted mouse models, and elucidate molecular mechanisms of aging of pancreatic islets and their roles in glucose metabolism.

4. Search for novel insulin-secreting compounds and their mechanisms of action in insulin secretion

We are exploring new compounds that exhibit glucose-dependent insulin secretion with novel mechanisms, by combining in-silico similarity search and chemical modifications. This study may provide a basis for development of novel antidiabetic drugs for unmet needs in diabetes treatment.

Structural Medicine and Anatomy



Ryo Nitta, M.D., Ph.D.
Professor

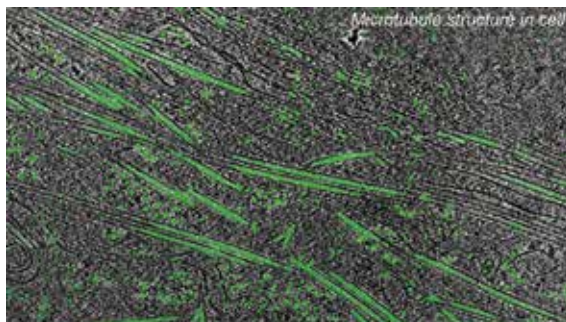
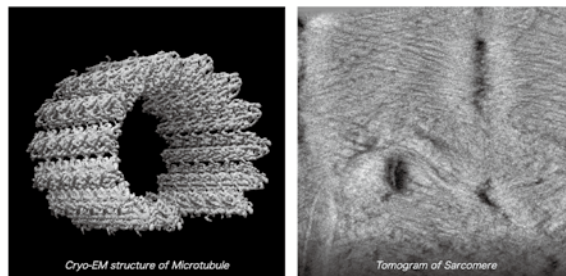
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Our research is based on the morphological analyses, the studies of shapes or structures of living organisms to elucidate these functions. Historically, morphology was started from the macroscopic anatomy, though we can precisely visualize molecular structures at near-atomic resolution to date. Our laboratory investigates fundamental functions in living cells by elucidating molecular structures or subcellular organelles using X-ray crystallography and cryo-electron microscopy. We currently investigate the key molecules related with a neuronal cell development, neurodegenerative diseases, and cardiomyopathies. Our current topics are listed below. We also welcome to start structural studies of new fundamental molecules in any other research areas you interested in. Let's enjoy nano-worlds of living organisms that no one has ever seen in the world!

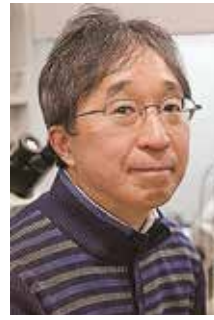
Current topics

- 1) Microtubule biology and medicine.
 - CAMSAP family proteins and Tau family proteins.
 - Molecular mechanisms of the axonal development.
 - Cryo-EM structural study of the cytoskeletal organization in cardiomyocytes
- 2) Molecular mechanisms of transcriptional regulation.
- 3) The systems of tissue stem cell maintenance: mechanisms underlying oncogenesis or aging, using mouse models and next-generation sequence.

Undergraduate and graduate students are always welcome to join our research!



Neural Differentiation and Regeneration



Hideki Enomoto, M.D., Ph.D.
Professor

We are interested in molecular mechanisms underlying the development of the nervous system. By using mice as a model organism and by functionally combining genetic, biochemical and molecular biological approaches, we investigate the behavior of molecules and cells that regulate neural development. We also investigate pathogenetic mechanisms underlying developmental disorders of the nervous system by generating and examining mouse models of such diseases. Our goal is to obtain molecular insights into development and pathology of the nervous system and to apply that knowledge in the development of novel strategies for the treatment of disorders of the nervous system. Our three major ongoing research themes are as follows:

1. To elucidate the physiological function of the GDNF Family Ligands and their receptors.

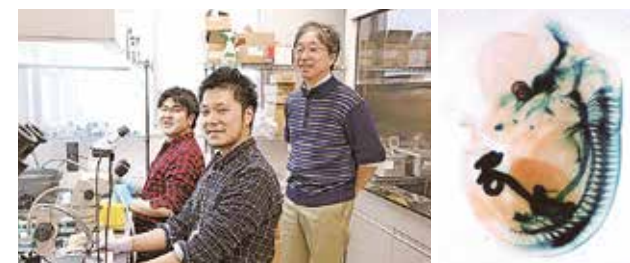
The GDNF Family Ligands and their receptors play essential roles in development of various neuronal populations in the central and peripheral nervous systems. We investigate how signaling mediated by these ligands influences neurons and their progenitors and regulates neural development.

2. To understand the mechanisms underlying the development of the enteric nervous system (ENS)

The ENS regulates the motility, secretion and blood flow of the gut, and is thus vital to the maintenance of animal life. One of the amazing features of the ENS is that it can exert its basic function without inputs from the brain, for which reason the ENS is often called 'the second brain.' We investigate the behavior of cells that governs a given step of the ENS development and explore the underlying molecular mechanisms.

3. To unravel the molecular mechanism underlying neurocristopathy

Neural crest cells are multipotent cells that can differentiate into various cell types including cells in the peripheral nervous system, pigment cells, cartilage and bone. Failure in development and differentiation of neural crest cells leads to a wide variety of diseases known in human as neurocristopathies. Through our research, we seek to gain a better understanding of the pathogenesis of neuroblastoma and Hirschsprung disease, two major developmental disorders in pediatric and pediatric surgery practices.



Biochemistry

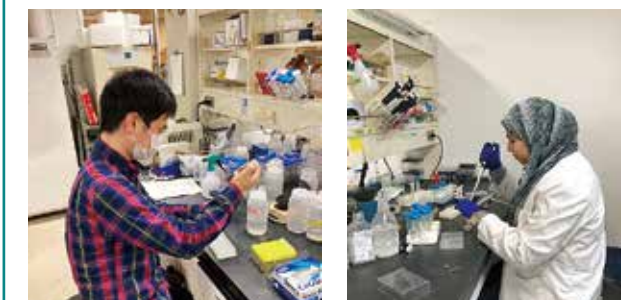


Shunichi Nakamura, M.D., Ph.D.
Professor

In Biochemistry division, we are currently investigating the mechanism of cellular signaling through lipid mediators. We focus on phosphatidic acid as a glycerophospholipid and sphingosine 1-phosphate (S1P) as a sphingolipid for the understanding of physiological mechanism underlying cell proliferation and differentiation as well as pathogenesis of cancers and neurodegenerative disorders. However, we place greater weight on sphingolipid research these days.

It is well known that S1P plays important roles as a lipid mediator in the regulation of cell proliferation, angiogenesis and immunity. In addition, we have recently reported that S1P causes glutamate release from hippocampal neurons and that S1P regulates maturation of exosomal multivesicular endosomes. We will contribute to the understanding of molecular mechanisms of memory and learning and pathogenesis of incurable diseases such as malignant transformation of cancer and neurodegenerative disorders including Parkinson's disease by making further advances in our sphingolipid research.

As for student education, we give lectures on biochemistry to the 2nd year medical students. We emphasize understanding biological phenomena in a molecular basis. We expect to the students to understand how we get chemical energy from foods through digestion and adsorption of them and to utilize the energy for our biological activities. In addition, we educate them on nutrition, vitamin and responses to environmental stress for the maintenance of human health.



Molecular and Cellular Biology



Akira Suzuki, M.D., Ph.D.
Professor

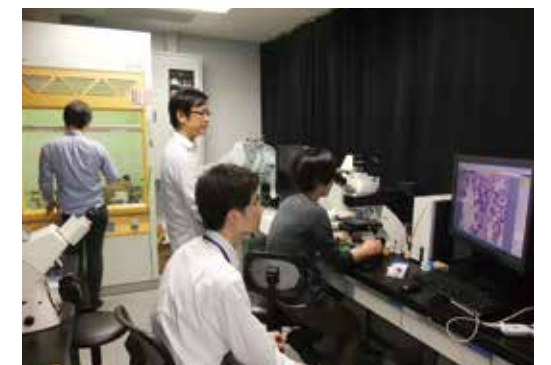
Cancer, which is still increasing world-wide, is the leading cause of death. Our studies specifically examine molecular mechanisms for the onset and development of cancer using various techniques from the fields of molecular biology, cellular biology, biochemistry, and embryonic engineering. Most oncogenes and cancer suppressor genes are known to be involved not only in the onset of cancer, but also in the onset of various other diseases including development and differentiation abnormalities that critically affect whole-body homeostasis. We have continued in vivo functional analyses of p53, PTEN/PI3K, and Hippo signaling pathways by generating knock-out mice. Results show that these mutant mice show various cancers and non-cancerous diseases, such as autoimmune disease, non-alcoholic steatohepatitis, and cardiac failure. These mutant mice have become attractive and powerful tools to analyze the diseases and to develop new therapeutic methods.

Our recent researches are summarized as follows:

- 1) Functions of Hippo signaling pathway
- 2) p53 regulation by nucleolar stress
- 3) Functions of PTEN/PI3K pathway in various tissues
- 4) Molecular target drug discovery for cancer

Recent Major Recent Publications from our lab are as follows

1. Nishio M, et al.
Dysregulated YAP1/TAZ and TGF- β signaling mediate hepatocarcinogenesis in Mob1a/1b-deficient mice.
Proc. Natl. Acad. Sci. USA. 113(1):E71-80, 2016
2. Hikasa H, et al.
Merlin/NF2-Lin28B-let-7 is a novel tumor-suppressive pathway that is cell density-dependent and Hippo-independent.
Cell Reports in press, 2016
3. Nishio M., et al.
Cancer susceptibility and embryonic lethality in Mob1a/1b double-mutant mice.
J. Clin. Invest. 122(12): 4505-18, 2012.
4. Sasaki M., et al.
Regulation of the MDM2-P53 pathway and tumor growth by PICT1 via nucleolar RPL11. *Nat. Med.* 17(8): 944-51, 2011.



Membrane Biology



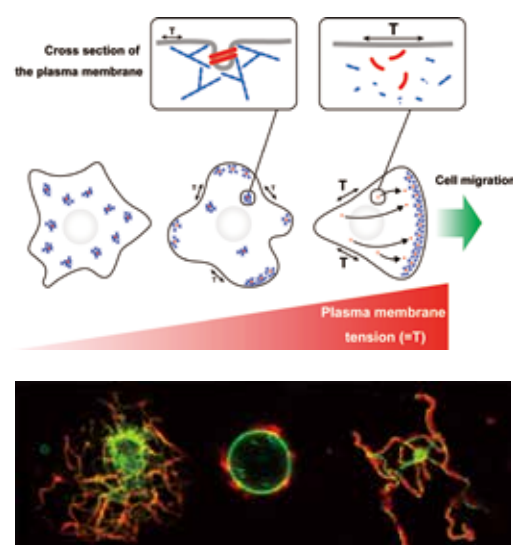
Toshiki Itoh, M.D., Ph.D.
Professor

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Subject 1 "Mechanism of cell motility by phospholipid signaling"
Phospholipids are important biological molecules involved in signal transduction at the plasma membrane, whose metabolic dysfunction can lead to a number of diseases. Among them, the generation of cancer cells characterized by uncontrolled proliferation, invasion, and metastasis are brought about by abnormal signal transduction through cell membranes, and dynamic changes in membrane morphology. Our laboratory studies the molecular mechanisms of cell motility and membrane traffic mediated by phospholipids that make up the cell membrane. We have clarified the mechanisms that control the directionality of cell movement driven by actin polymerization beneath the plasma membrane. In recent years, we particularly focus on a previously unrecognized parameter, membrane curvature, in order to understand the pathogenesis of severe disease caused by abnormalities in phospholipid signaling. Further, we aim to expand our research to drug discovery based on the regulatory mechanism of membrane morphogenesis.

Subject 2 "Functional analysis of protein kinases"

By focusing on the biological processes that involve protein phosphorylation and dephosphorylation, we have been studying the mechanism of intracellular signal transduction. Since our discovery of protein kinase N (PKN) family, we explore the possibility of the drug discovery target through studies on their structure and function. In particular, genetically modified mouse models are our main tools for the functional analysis of protein kinase C (PKC) and PKN at the physiological level. Our research reveals roles of protein kinases in cell motility, cell death, and stress response.



Molecular and Cellular Signaling



Takashi Matozaki, M.D., Ph.D.
Professor

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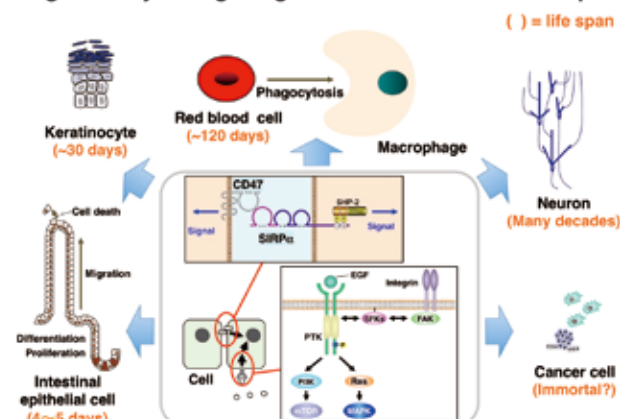
The division of Molecular and Cellular Signaling aims to elucidate novel signal transduction mechanisms inside or between cells, which are expected to be essential in many areas of life science. We identify the novel signaling molecules, and conduct analyses on their functions by the use of wide-ranged research methods such as in biochemical, molecular biological, cell biological, or cell technological ways.

In particular, we are interested in intracellular signaling pathways through protein tyrosine-phosphorylation. These signaling pathways are thought to play a pivotal role in the regulation of cellular functions which are the bases of biological phenomena such as cell proliferation, adhesion, movement, and metabolism, and higher biological functions including nervous and immune systems. We have recently found the CD47-SIRP α system, a novel cell-cell communication system, which is related to signaling pathways through protein tyrosine-phosphorylation. Further research on its physiological functions and pathological significance is currently being explored.

Furthermore, recently we are involved in studies on the regulation system of a cellular life span. It is apparently known that terminally differentiated and mature cells composing various tissues possess a distinct life span. We are investigating how the life span of terminally differentiated cells in tissues is regulated by internal and external factors, how it has a role in the maintenance of tissue homeostasis, and how the disruption of such regulation will be associated with the pathogenesis.

Our laboratory is eventually purposing the investigations whose results would effectively contribute to the diagnoses and treatments for various diseases such as carcinoma, neurological disorders, metabolic and endocrine disorders, arteriosclerosis, and autoimmune diseases, etc.

Regulation by cell signaling of cellular functions and life span

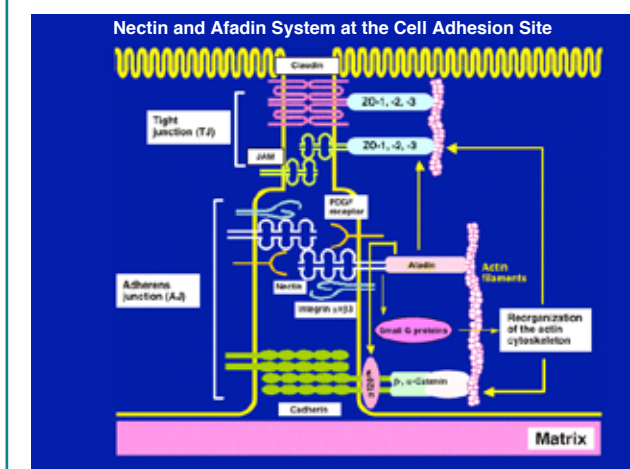


Pathogenetic Signaling



Yoshimi Takai, M.D., Ph.D.
Professor

The cellular signaling pathways and their crosstalk, which are crucial for cell movement, proliferation, adhesion, and polarization, strictly regulate normal ontogeny and organogenesis. Dysfunction of the signaling pathways results in a variety of pathological conditions, such as oncogenic transformation of cells, invasion and metastasis of cancer cells, neural disorders, and atherosclerosis. The goals of our laboratory are to identify key molecular events underlying pathogenesis of these disorders and to develop new therapies for them. Towards these ends, we deal with the following research themes: 1) roles of nectins and their related molecules on growth factor signaling; 2) molecular mechanisms to establish neural circuits and synapses; 3) pathogenesis of neuropsychiatric disorders such as dementia and schizophrenia; and 4) molecular mechanisms of dysfunction of cells by aging. To achieve the goals, we perform unique fundamental researches by thinking outside the box. Immediately after getting innovative results, we aim to apply them to translational research, clinical research, and moreover to drug development. Our laboratory locates at Kobe Biotechnology Research and Human Resource Development (BT) center on the corner of KOBE Biomedical Innovation Cluster (KBIC), a complex of research institutes, corporations, and organizations, in Port Island. Taking advantage of this location, we actively communicate with the researchers in the pharmaceutical companies as well as the public research institutes in KBIC and carry out collaborative studies with them to make outstanding discoveries. Through these research activities, we simultaneously make every effort to train young scientists and obtain patents in order to contribute to society.



Pharmacology



Tomoyuki Furuyashiki, M.D., Ph.D.
Professor

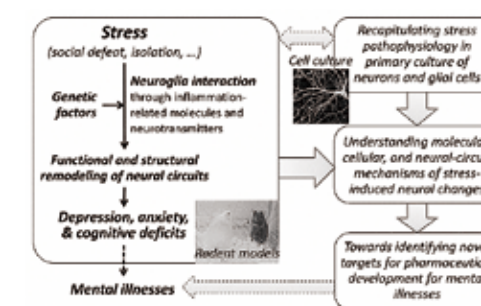
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'Pharmacology' is a discipline to elucidate the interactions between drugs and our bodies as well as molecular mechanisms underlying pathophysiology of diseases, contributing towards the developments of novel drugs and therapeutic strategies. Using multidisciplinary approaches, our laboratory aims to identify molecular, cellular and neural-circuit mechanisms which regulate cognitive and emotional functions as well as their deficits related to psychiatric disorders.

Based on clinical studies, it is established that physical and psychological stress in addition to genetic susceptibility plays a critical role in the onsets and progressions of psychiatric disorders. However, therapeutic strategy targeting stress has not been established, since its mechanism of action remains unclear. Using a rodent model of stress, we discovered that social stress induces structural and functional changes in the prefrontal cortex through dopaminergic projection and neuron-glia crosstalk, leading to emotional changes. We are currently pursuing molecular and cellular correlates of stress in the brain as well as functional alteration of a broader neural network underlying stress-related pathophysiology.

To be hypothesis-driven, our research employs multidisciplinary techniques from molecular, cellular, systems and behavioral neuroscience. Besides conventional techniques, we have introduced and developed cutting-edge technologies, such as fluorescent visualization of specific neuronal circuits, optogenetic and pharmacogenomic manipulation of neuronal activity, and molecular manipulation and transcriptome analysis with high spatiotemporal precision. In parallel, we attempt to establish cell-based assays with primary cultures exploitable for efficient drug discovery for psychiatric disorders.

In addition to the research activities, our division devotes every effort in our graduate programs to fostering advanced pharmacologists who wish to pursue basic and translational research; and in our undergraduate programs to fostering physicians and clinician scientists who can comprehend and think logically of pathophysiology and drug behaviors at molecular, cellular and systems levels.



Pathology

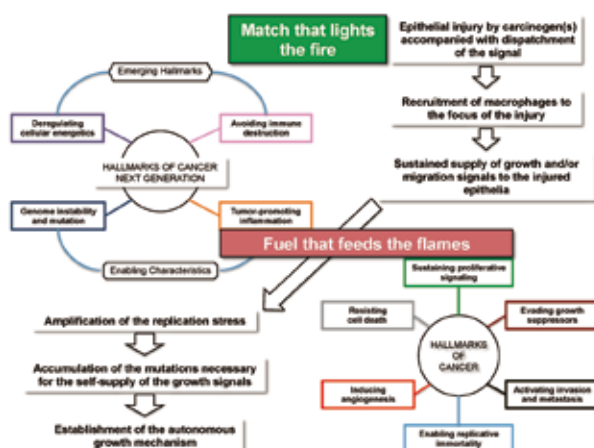


Hiroshi Yokozaki, M.D., Ph.D.
Professor

A disease causes a given morphological alteration to the human organ, tissue and cells through various molecular changes. Pathologists catch the "change of shape" with naked eye as well as under microscope and provide the final diagnosis of disease at clinical practice. We are trying to conduct our research to elucidate the mechanisms of the "change of shape" and to apply the results to diagnosis and treatment of alimentary tract cancers at Division of Pathology. We have reported the significance of cancer-stromal interactions between gastric or colorectal cancer and fibroblast or mesenchymal stem cells on the characteristic morphogenesis and acquisition or maintenance of cancer stem cells. We are now accumulating new scientific findings of the interaction of cancer cells and tumor-associated macrophages or cancer-associated fibroblasts on the carcinogenesis and progression of human esophageal squamous cell carcinomas.

We are in charge for the education of Pathology for 2nd to 3rd grade, and case presentation of autopsy cases at Union Lecture of 6th grade (upon request) of Medical Students. In addition, we are committed to the early research education throughout the course of Medical School with the students willing to work with us.

We are responsible for the conduction of Pathological Autopsy in the Kobe University Hospital with about 50 cases per year. We arrange Clinico-Pathological Conference (CPC) for every case and report the final diagnosis at least half a year after autopsy. We are also in charge for the instruction and evaluation of CPC Reports for the Early Phase Residents of the Hospital. We hold the additional post at the Division of Diagnostic Pathology in the University Hospital conducting the histopathological diagnosis of endoscopically resected alimentary tract cancers with the instruction of Residents at Diagnostic Pathology.



(Reproduced from Yokozaki H, Koma Y, Shigeki M, Nishio M. Cancer as a tissue: The significance of cancer-stromal interactions in the development, morphogenesis and progression of human upper digestive tract cancer. *Pathol Int* 2018; 68: 334-52. DOI: 10.1111/pin.12816)

Diagnostic Pathology



Tomoo Itoh, M.D., Ph.D.
Professor

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Our Department of Diagnostic Pathology is specialized in surgical pathology, contributed to pathological diagnosis and education in Kobe University Hospital. Many certificated pathologists belong to our department, most of them have subspecialty of various organs and disease, such as malignant lymphoma, liver, renal glomerular diseases, respiratory system, endocrine and soft tissue. All staffs perform highly advanced diagnoses and researches in each subspecialty. We also introduced molecular techniques for diagnostic purposes, such as mass spectrometer as well as FISH and PCR.

Our department might be one of the most competitive pathological laboratories in Japan, with many experienced pathologists and the state-of-the-art facility, providing fascinate pathological training programs in such favorable circumstances. The multidisciplinary conferences are routinely held with other clinical departments.

We have actively performed researches related to pathological technique such as immunostaining. Particularly, our study associated with development of multiplex immunohistochemistry are highly appreciated in Japan. Recently, we introduced remote pathological diagnosis system using whole slide imaging. Through this technology, we assist local pathologist in other distant hospitals, contributing to local medicine, as well as provide educative teleconferences. We annually organized educative seminars of pathological diagnosis and technique.

We can accept the trainee for surgical pathology. It requires the medical license of your country. Please feel free to contact us for details. We are sorry that we cannot provide you the scholarship in our institute.



Pathology Network <Endowed Chair>



Yoshinori Kodama, M.D., Ph.D.
Professor

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The Division of Pathology Network was established in 2014. We are not only involved in pathological diagnosis at the Kobe University Hospital, but also in education and research for medical students and residents. The main purposes of this division are the following three points.

(1) Construction of a pathological diagnosis network: We are aiming to build a diagnosis support system through a network by connecting regional hospitals with the Kobe University Hospital. We aim to develop pathology network technology, educate young pathologists through the network, and provide advanced pathology diagnosis technology. Currently, the Kita-Harima Medical Center has established a pathological diagnostic support system through the network for many cases of intraoperative rapid diagnosis and some biopsy materials, and we are aiming for further development in the future.

(2) Pathological research: We specialize in clinical pathological research and molecular biology research using tissue specimens. Especially in the field of brain tumors, we are working jointly with other institutions. We are conducting research in a translational stance with the aim of obtaining clinical trials that can be applied to pathological analysis, diagnosis, and treatment. We also aim to develop new pathological diagnosis technology that applies advanced technology such as the latest digital technology.

(3) Training of young pathologists: Training of young pathologists is an urgent issue because lack of pathologists is a serious problem. We will introduce an education system that utilizes our network in collaboration with regional hospitals. We aim to develop highly specialized pathologists who have some subspecialties and are internationally applicable.



Infectious Diseases Therapeutics



Kentaro Iwata, M.D., Ph.D., M.Sc., FACP, FIDSA
Professor

Division of Infectious Diseases Therapeutics was founded in 2008 and it has devoted to clinical studies related to various infectious diseases. These studies include but not limited to randomized controlled trials, retrospective case-control studies, case reports/series, descriptive qualitative studies, and theory building related to diagnosis/management of infectious diseases. Our area of interest in infectious diseases are very broad, which include avian/swine novel influenza, HIV/AIDS, tuberculosis, dengue fever, malaria and others.

Medical education is another area we are very interested in and we developed various educational tools and textbooks. We invented an educational program called HeatApp, which is a hybrid program of both problem based learning (PBL) and team based learning (TBL).

Our activities go beyond domestic and we work in various area in the world, including but not limited to Cambodia, Thailand, Kenya, the United States, and Peru, having cooperation with many institutions regarding clinical management, medical education, and research activities.

Division of Infectious Diseases deals with any kind of infections and we do take care of at both inpatient and outpatient settings. We set up an American style Infectious Diseases consultation services and do see various infections related to both medicine and surgery. We ourselves do have inpatient service and take care of various patients such as HIV/AIDS, tuberculosis, FUO (fever of unknown origin), or various imported infections such as malaria, dengue, or typhoid fever. We work with other divisions such as Division of General Medicine, or Critical Care closely, and take care of patients in holistic, and team based approach so that patients receive ideal care. We also work closely with Department of Infection Control, Department of Pharmacy, and Department of Laboratory Medicine, and take part in Infection Control, management of multi-resistant organisms, and our original Antimicrobial Stewardship named Big Gun.



Clinical Virology



Yasuko Mori, M.D., Ph.D.
Professor

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Division of Clinical Virology devotes to the studies related to viral infectious diseases, especially in those caused by human herpesviruses. We have been focusing on the analysis of viral gene functions, viral life cycle, viral-host interaction, and so on. Our final goal of these studies is to elucidate the mechanism of viral diseases and finally, contribute to developing the methods for prevention and treatment of these diseases. We are also developing vaccines based on Varicella vaccine, the only licensed live vaccine for prevention of human herpesvirus diseases. We have inserted alien antigen gene(s) into the viral genome to construct polyvalent varicella vaccine, as the result, the vaccine could protect people from the pathogens, in addition to varicella zoster virus. We have started to study about COVID-19 caused by SARS-CoV-2 to elucidate the infectious mechanism and the pathogenesis.

Besides viral researches, we also focus on the education. Both medical students and graduate students are studying in our division. Those students are not only trained with experiment skills, but also with how to design those experiments. We hope they could be skilled and knowledgeable young researchers or medical doctors enthusiastic at medical research.

We have been collaborating with laboratories from the other countries and foreign students and researchers are studying in our laboratory. We hope these activities would contribute not only to the progress of research, but also to others, such as cross-cultural communications.



Infectious Disease Control



Ikuo Shoji, M.D., Ph.D.
Professor

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The Division of Infectious Disease Control focuses on the research on viral infection and pathogenesis. Although viruses cannot proliferate by themselves, they utilize the host machinery, such as membranes, proteins, and nucleic acids, to efficiently proliferate in infected cells. The viruses often hijack host factors to avoid host immune system, establish persistent infection, and result in causing cancer. Our research aim is to understand molecular mechanisms of viral infection and pathogenesis caused by hepatitis C virus (HCV), hepatitis B virus (HBV), and human papillomavirus (HPV). We also conduct molecular epidemiology of Norovirus and Rotavirus in Indonesia. Our major ongoing research themes are as follows:

1. Molecular biology of HCV and HBV:

HCV is a positive-sense single-stranded RNA virus belonging to Flaviviridae family. HBV is a double stranded DNA virus belonging to Hepadnaviridae family. HCV and HBV infection often cause chronic hepatitis and liver cirrhosis, and finally develop hepatocellular carcinoma. We aim to elucidate molecular mechanisms of viral replication and pathogenesis caused by HCV and HBV.

2. Molecular biology of HPV:

Several specific types of HPVs are associated with human cervical cancer. The high risk group HPVs encode two oncoproteins E6 and E7, which target the tumor suppressor gene proteins p53 and pRB, respectively. The E6-promoted ubiquitylation of p53 is mediated by the cellular ubiquitin ligase E6AP in conjunction with E6. We are interested in a role of E6AP in carcinogenesis.

3. Development of novel small molecules for targeting ubiquitin-proteasome pathway:

We are trying to develop novel small molecule inhibitors for ubiquitin ligases and deubiquitylating enzymes.

4. Molecular epidemiology of viral gastroenteritis caused by Norovirus and Rotavirus in Indonesia:

We are currently investigating molecular epidemiology of Norovirus and Rotavirus in Indonesia in collaboration with Institute of Tropical Disease, Universitas Airlangga, Surabaya, and National Institute of Infectious Diseases, Tokyo.



Medical Education



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Professor

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The primary mission of the Section of Medical Education, founded in April 2014, is to function as a base of shaping the future medical education programs of the School of Medicine, Kobe University, and of expanding the plans into practical activities. We are to conduct the curriculum reform of the medical courses in seizing the occasion to focus on ECFMG certification and accreditation issues effective in 2023.

Secondly, as our appealing feature, we act together with the Integrated Clinical Education Center of the University Hospital and the Clinical Training and Simulation Center, organized for executing seamless and synthetic training programs on clinical medicine for the students before and after graduation. One of our foci on this matter is, therefore, to induce versatile simulated education programs for the improvement of student's comprehension, skill-up, and patient's safety. We set "clinical care", where we can carefully take up students' research questions emerged through their actual experiences in clinical sites. What is the best way of fostering students' ability to be competitive professionals in today's fast-evolving society of medicine? To this highly important, ubiquitous, and evasive question, we try to make our research activity itself capable to find this answer from, by weaving the steps - plan, do, and analysis - of our medical education research into the down-to-earth practices in clinical medicine.

Thirdly, also as our attractiveness, we move in concert with another Section of our Division of Medical Education, which was founded together with us. That Section of Community Medicine takes charge of the research and educational activities to foster human resources who will serve the leading roles in the future community medicine. The Division of Medical Education aims to function as a crossing or a knot of these two axes, and concurrently, to visualize and theorize of this crossing itself as our research target. Fourthly, as our laboratory's responsible activity, we are engaged in coordinating the education programs for fostering the inquisitive medical students and the supporting programs for those pursuing basic medicine. By promoting the students-organized periodical workshops and their interactions with younger researchers, we multi-directionally encourage the students aspiring to be basic scientists or clinician scientists.



Community Medicine and Medical Education



Masanobu Okayama, M.D., Ph.D.
Professor

The Section of Community Medicine and Medical Education was founded in 2014. We are charge in medical education concerning community medicine. With expecting improved and qualified community medicine, we now devote our effort to developing effective education on community medicine, researching on how to manage common health problems, suggesting for efficient delivery system of community medicine based on the analyses on medical resources, and so on.

As for the education on community medicine, we clarified that the clinical training is a key to strengthen student's motivation for providing community medicine or general practice. We further proved that the healthcare trainings especially with experiencing home medical care play efficient roles to accelerate their intention to community medicine. Then, the experience of home medical care in undergraduate might lead to provide community medicine in the future. In addition, we detected three factors: "preparing for the future", "community relationships", and "psychological effects" affected with a mechanism of developing motivation for providing community medicine. Regarding the management of common health problems, we verified that the patients with cold are only little affected by bathing. And, as for the primary care delivery system, we defined the distribution of the clinics across Japan, using geographical information system.

Concerning our education, we provide novel and challenging approaches, aiming at promoting students' motivation and rewarding experience and cultivating their sense of responsibility in community medicine. We develop our method with applying local activities and involving people. We also planned our new program, the lectures on healthcare in collaboration with diverse professionals.

Furthermore, our laboratory cooperates with the leading section in public health service of Hyogo Prefecture, participating in the government's policy making on community medicine. By this means, as a think-tank, we reflect the beneficial outcomes from our research/education activities on community medicine into the medical policies of our community.



Community Medicine and Career Development <Endowed Chair>



Tsuneaki Kenzaka, M.D., Ph.D.
Professor

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This division was established in 2015.

Based in the Community Medical Education Center of Hyogo Prefectural Tamba Medical Center, we mainly engage in the following activities while providing hospitals such as the Toyooka Public Hospital with support in medical care, education, and research:

- (1) Provision of medical care in the Tamba Medical Service Area and Tajima Medical Service Area
- (2) Support of lifelong training and education for healthcare providers in the Tamba Medical Service Area and Tajima Medical Service Area
- (3) Development of training programs for general internists and general physicians
- (4) Clinical research concerning quality improvement of community medical care and general medical care

We particularly focus on education, clinical guidance, and research support for physicians participating in the physician development program of Hyogo Prefecture, students and physicians intending to become general internists or general physicians.

In the model core curriculum of medical education, "community medicine" and "community based medical care clinical training" are compulsory subjects that medical students must take or take part in. As to postgraduate education, community medical care training is a compulsory subject in the clinical training system for junior residents. As for postgraduate education, community medical care training is a compulsory subject in the clinical training system for junior residents. We have developed and are currently operating these curricula and programs as well as a specialized training program for general medical care in the new specialist physician system.

Ever since the collapse of community medical care became a social issue, the "development of healthcare providers that communities need" has been strongly called for. That is, communities need healthcare providers who listen to various health-related concerns and problems of people in the community, respond to their needs and concerns appropriately, and provide attention broadly to their daily lives, while watching over and supporting these community-dwelling individuals.

The present status and issues in community medicine cannot be learned without experience gained on the front line. Our goal is to establish pre- and postgraduate education for community medicine, based in the Community Medical Education Center of Hyogo Prefectural Tamba Medical Center, as a national model. We also strive to cultivate healthcare providers who can provide people in the community with medical care while considering their daily lives and regional characteristics.



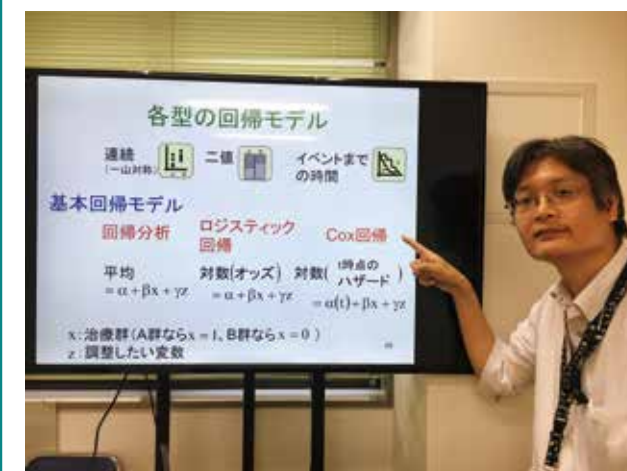
Biostatistics



Takashi Omori, Ph.D.
Professor

Biostatistics is a field of data science that focuses on data obtained from biology. When conducting new clinical research, we need consider how should the research design be designed to obtain research results with less bias and high precision, how many research subjects are needed, how to analyze obtained data and how to present the analysis results. To address these issues, knowledge of biostatistics is required. Biostatistics is a discipline that requires both theoretical and systematic techniques. Those involved in the practice of biostatistics need to have a good balance of these two aspects.

The Division of Biostatistics, Department of Social / Community Medicine and Health Science, Kobe University was established in 2015. Our research is to construct and evaluate biostatistical methodologies related to clinical research and alternatives to animal experiments. We also provide classes related to biostatistics at Kobe University School of Medicine and Graduate School of Medicine. Furthermore, we provide clinical research seminars related to biostatistics in collaboration with the Clinical & Translational Research Center Kobe University Hospital.



Translational Science

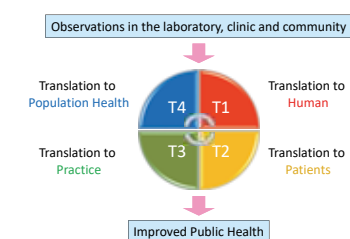


Yoji Nagai, M.D., Ph.D.
Professor

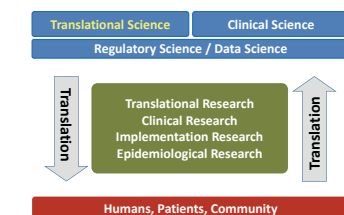
"Translational Science" is the field of investigation focused on understanding the scientific and operational principles underlying each step of the translational process. Translation is the process of turning observations in the laboratory, clinic and community into interventions that can improve the health of individuals and public. Thus, it includes not only the processes to apply basic research findings to humans, but also the processes to execute clinical trials, to extend the achievements in clinic and to transfer clinical observation to the population health. Each process must be implemented through ethically, legally and socially righteous methodologies, which are realized, for instance, by animal experiments, clinical trials and observational studies. Division of Translational Science is dedicated to the cultivation of scientific principles underpinning such translational processes, as well as to the facilitation of respective processes that lead to the improvement of medicine and public welfare.

Indeed, preclinical studies and clinical studies/trials are the key components in medical technology developments, whereby proactive initiatives of academic expertise are strongly expected. At the same time, the current medical technologies should be continuously evaluated and then optimized, through well designed implementation studies, with the risk for public health adequately controlled. The success is dependent not only on basic science and cutting edge medicine, but also on multidisciplinary science, including clinical science, regulatory science and data science. Thus, to comprehensively cope with all phases of translation, and to cover education for the next generation, Division of Translational Science was started in 2016.

Driving Force of Medical Innovation



Interface between Life Science and Humans



Bioresource Research and Development



Hiroshi Matsuoka, M.D., Ph.D.
Professor

In recent years, the momentum for creating evidence for the development of therapeutic agents, diagnostic agents, and medical devices by utilizing bioresources (human specimens with clinical information) is rapidly increasing all over the world. At Kobe University Hospital, we decided to combine human specimens and clinical information databases to create an efficient infrastructure that researchers and companies inside and outside Kobe University can easily utilize bioresources. April 2019 "Kobe University Hospital BioResource Center" was set up in the International Clinical Cancer Research Center of Kobe University Hospital (ICCRC). We have started joint research activities with researchers inside and outside the hospital using "human specimens" such as the acquisition of comprehensive cancer-related human antibodies. We are also contributing to the adoption of the Cabinet Office grant project by proposing research on an "ever-improving prediction model of prognosis on personalized precision surgery" using patient blood and surgical specimens. Based on these achievements, in order to promote research on cancer and dementia using human specimens and research on prediction model of prognosis on personalized precision surgery, etc., on April in 2nd year of Reiwa, the field of bioresource research and development was founded.

The field of bioresource research and development will promote the utilization of bioresources, proceed joint research inside and outside the hospital, help create 'Real-World Evidence' in ICCRC. We aim to make a significant contribution for Kobe University to play a leading role in Kobe Biomedical Innovation Cluster.

Artificial Intelligence and Digital Health Sciences <Endowed Chair>



Youichi Kurebayashi, DVM., Ph.D.
Professor

(Masato Fujisawa, M.D., Ph.D. Professor)

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Over the next decade, artificial intelligence (AI) is likely to significantly transform the basic biomedical research and clinical practice. Based on the premise, the Department of Artificial Intelligence and Digital Health Sciences (AIDiH) was newly established in July 2019 as an endowed chair sponsored by CMIC Holdings and Nihon UNISIS in Kobe University Graduate School of Medicine. The central mission of AIDiH is to harness the power of digital health and medical innovation by assessing, integrating, and maximizing the opportunities of cutting edge information sciences and artificial intelligence technologies. Currently, multiple collaborative projects are in progress to develop a trans-regional, broad personal health record (PHR), explore new algorithms for biomedical big data analysis, and develop new AI-empowered approaches to eliminate recent drug discovery slump in collaboration with various partners, including Hyogo prefectural government, Kobe city government and industry partners. AIDiH is also expanding its efforts to establish and operate the Office of AI and Digital Health Promotion in Kobe University International Clinical Cancer Research Center (ICCRC) to provide the field for clinical proof-of-concept study in response to rapidly increasing R&D activities to produce innovative digital health products and services. Many efforts have been made to be engaged in the cross-talking with the community and academia to share the perspectives on current issues associated with incorporation of AI and digital health systems into healthcare settings. In order to ensure successful project operation, close collaboration continues with the University of Hyogo, Tokushima University Graduate School of Medicine, National Institute of Biomedical, Health and Nutrition (NIBIOHN) and National Cerebral and Cardiovascular Center.



Food and Drug Evaluation Science



Norihiro Sakamoto,
M.D., Ph.D.(Medical Science), Ph.D.
(Information Science) Professor

In the field of medical research, investigations have been traditionally developed, mainly with targeting certain diseases, their mechanisms, or the treatment methods. In recent years, we came to face super-aging society, and heightened attention to the health span is increasing. Novel health management method, functional food, and dietary supplement for preventing from diseases or promoting good health, all these are strongly urged in addition to the prior and existing therapeutics. However, these health management methods, functional foods, and dietary supplements are so mild in their effects, in comparison with the existing therapies or medical drugs. Due to this fact, the long-term data collection from the large-scaled groups are often needed, though their evaluation methods have not been satisfactorily developed yet. The Division of Food and Drug Evaluation Science explores the issues on such frameworks for implementing scientific evaluation and assessment strategies.

Our ongoing main research themes are as follows:

- 1) Evaluation on the effects and elucidation of the action mechanism of functional food and dietary supplement, using animal model such as mice (This research is currently suspended)
- 2) Design and implementation of clinical studies for evaluating health management method, functional food, and dietary supplement.
- 3) System developments in data collection, analyses, and visualization for clinical studies
- 4) Research and development of the systems for collecting, analyzing, and visualizing big data concerning the issues on health care.

We are particularly targeting at two topics: a) Machine Learning and Deep Learning based Clinical Data Analysis System and b) Spiritual care for cancer patients and heart failure patients and the evaluation methods.



Epidemiology



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Our laboratory is engaged in the research on molecular epidemiology with tight collaboration with the Integrated Center for Mass Spectrometry. Our specific aim is epidemiological application of analytical chemistry and data science, which contribute to understanding biological phenomena and investigating the etiology and pathophysiology of diseases and the development of diagnostic methods and treatment strategies.

Comprehensive profiling of proteins and metabolites, namely proteome and metabolome, are closely related to biological physiology and pathophysiology. Specific proteins and metabolites may work as enzymes and substrates for energy production. Other metabolites may have distinct biological activities which can directly regulate cellular functions. Mass spectrometry and data integration with artificial intelligence have made possible unbiased, comprehensive, and sensitive analyses of such proteins and metabolites, and using this method, we aim to establish systems biology based on physiology-related and disease-related profiles of proteome and metabolome.

Specific research aim (1): Bioactive lipid mediators in inflammation and resolution.

Recently it has been revealed that bioactive lipid-derived small molecule metabolites, namely lipid mediators, play critical roles in maintenance of homeostasis, including inflammation and its resolution, tissue repair and regeneration, and brain functions. However, these lipid mediators are structurally unstable and biosynthesized only at nmol ~ pmol/L range on demand, exert stereoselective actions, and are degraded to inactive metabolites. To analyze these mediators quantitatively and comprehensively, advanced technologies are necessary for mass spectrometry and its preprocessing. We employ an automated system for solid phase extraction to extract lipid mediator-enriched fraction, and perform sophisticated quantitative, wide-targeted lipid mediator profiling with ultrasensitive liquid chromatography-mass spectrometry (LC/MS/MS). We have been conducting basic and clinical researches about bioactive lipid mediators especially those related to inflammation and its resolution.

Specific research aim (2): Distinct metabolism in cancer cells.

Whereas normal cells produce their energy, namely ATP, mostly through oxidative phosphorylation in mitochondria, cancer cells depend on distinct metabolism, aerobic glycolysis to produce their ATP (the Warburg effect). Our working hypothesis is that the distinct metabolism in cancer cells could confer their characteristics, such as motility and invasiveness. We mainly focus on hydrophilic metabolites, and employ gas-chromatography/mass spectrometry (GC/MS) system with in-house developed data-integration software.

Legal Medicine



Yasuhiro Ueno, M.D., Ph.D.
Professor

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The Division of Legal Medicine executes the research and education on human death. We mainly investigate into forensic pathology and forensic toxicology related to various causes of death (COD). Precisely, we are involved in the instrumental analyses on a variety of toxic agents or alcohols, the application of those methods to the COD diagnoses, and the pathological research on cardiac sudden death and death in abnormal environment, with immunohistological staining and laboratory markers, etc. Previously, we had successful results in the discovery of pathological indicator of death from cold and the establishment of rapid analytical method for mushroom toxins and agricultural chemicals sampled from human body, etc. We also submit actively the case reports of death from various causes, collecting the knowledge on human death.

Forensic autopsy cannot be separated from education and research in legal medicine. Forensic doctors and technicians are specially trained with accumulating knowledge and experiences in forensic autopsy, and improve themselves in autopsy skills and evaluation ability. Those benefits will improve the education and research in legal medicine. Furthermore, we are entrusted with executing forensic autopsy in unnatural death cases in Hyogo Prefecture. Developing our evaluation ability in forensic autopsy, we contribute to the society by clarifying COD in the spirit of "Quest for truth, based on the facts substantiated".

As for education, our division holds the chair of Legal Medicine in the programs of basic medicine. According to the system of inquests into the COD in Japan, and due to the insufficiency in number of expertise physician in legal medicine, postmortem examinations of deaths without any suspicious point are carried by general clinicians. The validation about suspiciousness in legal medicine is then to be delivered. Therefore, clinicians are required to possess adequate knowledge of legal medicine. Our laboratory thus provides education in legal medicine to the students, aiming at their acquisition of essential knowledge needed at postmortem examination of dead body.



Pathology for Regional Communication <Endowed Chair>



Tomoo Itoh, M.D., Ph.D.
Professor

The Division of Pathology for Regional Communication was established in the Department of Social/Community Medicine and Health Sciences, the Graduate School of Medicine, Kobe University on April 1st, 2013 as an endowed chair by Hyogo Prefecture. The installation was purposed to promote the research on regional communication in pathology, to familiarize those research results to the society, and to contribute our services to the improvement in pathological diagnoses of Hyogo prefectural hospitals.

1. Pathological diagnoses in Hyogo Prefecture

(1) Department of Diagnostic Pathology, Hyogo Cancer Center: Inside the Hyogo Cancer Center, the research institute of pathology for regional communication was established. It succeeded partially the responsible work of the Department of Diagnostic Pathology of the Center, and drives business improvements.

(2) Department of Diagnostic Pathology, Kobe University Hospital: Our laboratory members review the pathology of brain tumor and bone and soft tissue tumor together with pathologists of the Hospital, and improve diagnostic accuracy.

2. Fostering of surgical pathologists in Hyogo Prefecture

The number of surgical pathologists is insufficient in this country including Hyogo Prefecture. The Department of Diagnostic Pathology of the Hyogo Cancer Center, where our research team belongs, widely accept faculty students and residents on their practical trainings. We further provide educational opportunities of pathological diagnoses to younger pathologists, mainly in both departments of the Hyogo Cancer Center and the University Hospital.

3. Consultation service on pathological diagnoses in Hyogo Prefecture

In the Division of Pathology for Regional Communication, we deliver a consultation service on pathological diagnoses, mainly regarding bone and soft tissue tumor and brain tumor, to the pathological divisions of many hospitals in Hyogo Prefecture. We devote every effort to the accurate and appropriate cares for these rare cancers being conducted.



Creative Health Promotion <Endowed Chair>



Yoshikazu Tamori, M.D., Ph.D.
Professor

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The 100-year-life is realizing and the boundary between 'disease' and 'aging' is becoming unclear. In this milieu, we aim to extend the healthy life expectancy of citizens by creating a new medical field in the traditional medical care and to make the strategies for the new treatment so that more citizens can enjoy healthy lives. Diabetes, hypertension, and dyslipidemia, which are typical lifestyle-related diseases, are closely associated with heart disease and cerebrovascular disorder, which are the leading causes of death in Japanese. Obesity is very important as a basis for the development of these lifestyle-related diseases. One in three males and one in five females are obese in adult Japanese. Obesity is also associated with a wide range of diseases including cancer, dementia, and infectious diseases. However, if appropriate measures are taken, many lifestyle-related diseases such as obesity can be suppressed. Furthermore, in recent years, sarcopenia characterized by the decrease of muscle with aging, and frailty, the pathological condition in which physical and mental function decline, leading to a state requiring nursing care have been attracted the attention as important factors that shorten healthy life expectancy.

Based on this situation, Kobe City is promoting the "Health Creation City KOBE", a town development project that enables everyone to become healthy. We participate in the joint development and operation of the citizen's Personal Health Record system "MY CONDITION KOBE" with Kobe City. In addition, we plan to improve the consultation rate for specific health checkups as well as specific health guidance and support the Kobe City Data Health Plan which effectively prevents the aggravation of lifestyle-related diseases. In collaboration with Kobe City, we grasp the current situation of sarcopenia and frailty in Kobe and devise the effective interventional methods to these situations. We are actively developing various projects and research studies. From an academic perspective, we take a new approach to preventive medicine, which should be one of the two wheels along with therapeutic medicine.



Kobe University
Graduate School of Medicine/School of Medicine Logo

Cardiovascular Medicine



**Ken-ichi Hirata, M.D., Ph.D.
Professor**



Cardiovascular Medicine

The Division of Cardiovascular Medicine devotes to introduce leading-edge diagnoses and therapies for cardiovascular diseases. Concurrently, we strive for research, education, and clinical practice, aiming to unravel the causes of diseases and to develop novel diagnoses/therapies.

In basic research, we carry out ingenious investigations into the causes of atherosclerosis, heart failure, pulmonary hypertension, and dyslipidemia, and into the developments of novel diagnoses/therapies. In clinical research, we explore the researches on diagnostic imaging for coronary artery diseases; cardiomyopathy, valvular heart diseases, and cardiac functions, using echocardiography; the onset/offset machineries in atrial fibrillation; severe ventricular arrhythmia; cardiovascular diagnostic imaging (cardiac CT/MRI/radio isotope); the discovery of biomarkers for cardiovascular diseases. We also target across all cardiovascular diseases including pulmonary hypertension and cardiac rehabilitation. We present our research results in domestic/international conferences and publish our data in international journals.

In clinical service, we implement leading-edge therapies with catheterization for ischemic heart disease or cardiovascular interventions/devices for severe cardiac failure, valvular heart disease, structural heart disease, adult congenital heart disease, and pulmonary hypertension, etc. We try never to refuse any emergency outpatients with cardiac diseases to offer our care.

In education, we emphasize on fostering qualified clinician scientists through researches, and encourage them to study abroad, which brings chances of practice/research in topnotch environment. Many physicians actually pursue their esoteric themes there. We bring deep passion to educate the youth: faculty/graduate students and residents. Especially for younger physicians, we instruct sufficient humanity to think on the patient's behalf. We thus deliver not only advanced therapies, but also preventive medicine and general medicine. All constitutors of our lab including younger clinicians have their own dreams, achieve every targets, and develop themselves continuously toward their ambitions.

Arrhythmia<Endowed Chairs>

The Section of Arrhythmia was founded in the Division of Cardiovascular Medicine, the Department of Internal Medicine, Kobe University, for the purpose of establishing the base site in fostering arrhythmia-specified clinicians and other healthcare professionals, and in providing medical cares for arrhythmia. The said chair functions as a development center to introduce highly advanced arrhythmia therapies into clinical sites rapidly and widely. We foster arrhythmia-specified clinicians expertized in catheter ablation and implantations of cardioverter-defibrillator or pacemaker, and their supporting healthcare professionals. Our works are growing steadily. The numbers of catheter ablation and cardiovascular device implantation carried have been dramatically increasing since the said chair was established. Our laboratory has become one of leading facilities for arrhythmia treatment in our nation, not simply under Hyogo Prefecture.

The said chair puts emphasis on fostering graduate students as the chair belongs to the Graduate School of Medicine, in cooperated with the Section of Cardiovascular Medicine. To spread out highly advanced arrhythmia treatment, fostering fresh human resource is requisite. We instruct following items for cultivating their wider knowledge and advanced skills:

- (1) Improvement of diagnostic ability for arrhythmia
- (2) Acquisition of device-implanting skills and its management ability
- (3) Deep comprehension in electro physiologic assay and acquisition of catheter ablation skills

We conduct clinical studies on cutting-edge arrhythmia treatments as needed with our graduate students. For elucidating the mechanism of arrhythmia, we first unravel the onset mechanism in atrial fibrillation. We try to improve ourselves with applying catheter ablation, and also advance in clinical research on the defibrillating mechanism of ventricular fibrillation, contributing to the development of arrhythmia therapy.



Gastroenterology



**Yuzo Kodama, M.D., Ph.D.
Professor**

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The Division of Gastroenterology, as the Department of the University Hospital, devote to offering medical care, research, and education for various gastrointestinal diseases.

Providing high quality medical care is important for all clinicians. Our good Teamwork among medical staff enables the supply of individualized medical care for each patient.

We have world-class advanced technology of endoscopic diagnostic and therapeutic technology. We should diffuse advanced technologies overseas

To solve the problems in the current medical technology, we have been tackling medical research. Our focus is to investigate the pathophysiology of intractable diseases in gastroenterology, including digestive organ cancers, inflammatory bowel diseases, and fatty liver diseases.

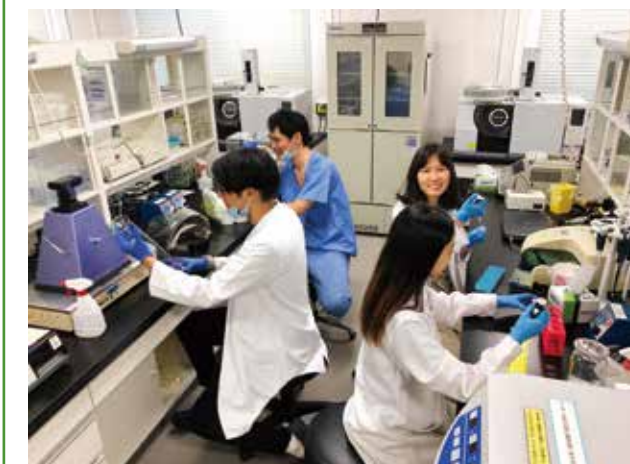
Education is a critical element. Our division will promote frontier medical sciences and bring up excellent physician-scientists who can lead the worldwide activities in the field of gastroenterology.

Performances in 2019:

Number of Outpatient: 29,960, Inpatient (admission): 1,260

Number of Inspections: Esophagogastroduodenoscopy: 7902, Colonoscopy: 2,828, Endoscopic retrograde cholangiopancreatography: 722, Endoscopic ultrasonography including Endoscopic ultrasound-fine needle aspiration: 1,002, Abdominal ultrasonography: 4,955, Liver biopsy 111, Liver tumor biopsy 64

Number of major treatments: Endoscopic submucosal dissection: 407, Endoscopic mucosal resection: 786, Radiofrequency ablation: 24, Chemotherapy (esophageal cancer, stomach cancer, colorectal cancer, pancreatic cancer): 55



Respiratory Medicine



**Yoshihiro Nishimura, M.D., Ph.D.
Professor**

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The Division of Respiratory Medicine is devoted to the wide-ranged clinical practices and investigations into various respiratory diseases. We mainly target bronchial asthma, and recently focus on ras and it's effector protein, phospholipase Cε. Moreover, we analyze the allergen of occupational asthma and the effect of suspended particular matter to asthma patients. Based on these study results, we are developing the novel treatment method for respiratory tract inflammation. As for clinical studies, we analyze biological data such as cough and nighttime oxygen saturation, and develop diagnostic aids.

In recent years, the number of persons with lung cancer has been increasing, and it has become one of major causes of death in Japan. To this end, we have launched the basic research on lung cancer in molecular and biological approach. In clinical research, we participate in multicenter collaborative studies to develop the treatment procedures in the area of clinical oncology for lung carcinoma.

The Department of Respiratory Medicine (of the University Hospital) is contributing medical cares for numerous diseases in the field of respiratory medicine. In particular, we coordinate the conferences on lung cancer therapy in collaborated with the Department of Thoracic Surgery, the Department of Radiology, the Department of Radiation Oncology, and the Department of Diagnostic Pathology. We there make efforts on constructing the optimum system for providing medical services. Further, we dedicate to widely offer the advanced clinical services for the patients with bronchial asthma, respiratory tract diseases such as COPD, diffuse pulmonary diseases such as interstitial pneumonia, sleep apnea syndrome, and respiratory infections, etc.



Diabetes and Endocrinology and General Internal Medicine



Wataru Ogawa, M.D., Ph.D.
Professor



Diabetes and Endocrinology

The Section of Diabetes and Endocrinology is engaged in the research and education on diabetes mellitus and endocrine diseases. In the area of diabetes mellitus, aiming to develop the improved therapy for type 2 diabetes mellitus, we have devoted our studies on the molecular mechanisms of insulin resistance and beta-cell dysfunction. We also expect to develop some approaches to the novel treatment procedures for obesity or obesity-related diseases through the research on functions of adipocytes and the research on energy metabolic regulation. As for our clinical research, we devote our efforts to the in-depth understanding the pathophysiology of type 2 diabetes mellitus with the use of a variety of techniques including glucose clamp or MR spectroscopy, and to the research on continuous subcutaneous insulin infusion and continuous glucose monitoring, based on the wealth of experience of our country's top-level clinicians.

In the field of endocrinology, investigations such as pathoetiology, pathological analysis, and drug discovery for hypothalamic and pituitary diseases are conducted as our major research themes, with applying the case-oriented and disease-oriented approaches. We are aiming to reward for patients by applying these results. We are currently involved in the themes: elucidation of the cause and pathology of pituitary tumor and its drug discovery, elucidation of the pathology in pituitary autoimmunity and proposal for a novel clinical entity, elucidations of pathogenesis and pathology in hypopituitarism, and the identification and functional analyses of novel hormones. Concerning medical education, we offer the wide-ranged instructions on "common endocrine diseases" such as thyroid diseases, osteoporosis, secondary hypertension, or adrenal tumor, and also, on comparatively rare conditions such as pituitary diseases or gonadal disorders. All will be practical for daily clinical practice, considering the significance and concept of endocrine system, which are necessary for understanding systemic homeostasis.

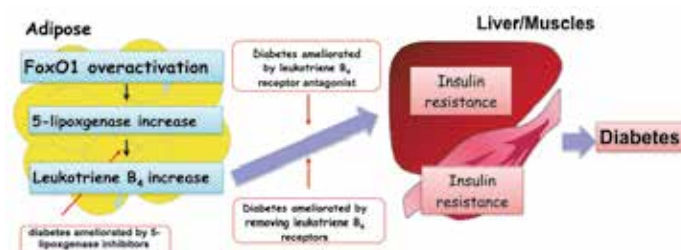


Division of Development of Advanced Therapy for Metabolic Disease

Disruption of metabolic homeostasis caused by obesity and overnutrition leads to various metabolic disorders such as type 2 diabetes and non-alcoholic fatty liver disease. There is a great social need for the development of new therapeutic agents for these diseases.

This section was established in July 2019 as a joint research course with NIPPON Boehringer Ingelheim Co., Ltd. and as a section of Division of Diabetes and Endocrinology, Department of Internal Medicine. Our purpose is to advance translational research that leads to drug discovery under an industry-academia collaborative system, based on the research findings related to metabolic regulation, including molecular mechanism of insulin action and pathology of obesity, which have been conducted by Division of Diabetes and Endocrinology.

Higher education to promote the acquisition of advanced knowledge and skills for people who are active as professionals in society is called recurrent education, and is considered to be one of the activities that the university should actively promote in the future. In addition to the conventional framework of human resource exchange, where researchers belonging to companies and universities interact with each other, we are also actively promoting recurrent education. We aim to develop human resources who can play an important role in a wide range of fields, including not only researchers who can play an active role in the pharmaceutical industry and academia, but also coordinator positions that can contribute to the construction of industry-academia cooperation systems and the promotion of open innovation. From fiscal 2020, we have been conducting graduate school education with complying a person who was in non-research position in a pharmaceutical company as a graduate student.



General Internal Medicine



Kazuhiko Sakaguchi, M.D., Ph.D.
Associate Professor
(Wataru Ogawa, M.D., Ph.D. Professor)

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In addition to consultations from sections both inside and outside Kobe University Hospital, the General Internal Medicine sections have also become involved in emergency medical care by constituting an emergency center with the emergency department. Based on the belief that "providing good medical care is good medical education", we are also making efforts to educate the next generation of medical staff, including medical students, residents, and senior residents in the actual medical field. Since we treat a wide variety of diseases, we are engaged in cross-sectional disorder clinical research such as thrombosis, nutritional intervention, and blood glucose fluctuations and their control. In the aspect of basic research, we are engaged in the elucidation of the pathogenic mechanism of type 1 diabetes mellitus, which is an organ-specific autoimmune disease, to develop the immunotherapy for preventing an onset or as a treatment. Our laboratory also participates in the nationwide research survey on Japanese patients with type 1 diabetes mellitus, which is projected by the Japan Diabetes Society and the National Center for Global Health and Medicine. Furthermore, revealing the relationship between dementia and lifestyle-related diseases, we research the age-related transition in body composition and chronic inflammation.



Neurology



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Our department specializes in treating a variety of neurological diseases. It covers not only rare and intractable neurodegenerative diseases such as Parkinson's disease and amyotrophic lateral sclerosis, but also common diseases such as stroke, dementia, and epilepsy, which are increasing in a super-aged society. We carry out a wide range of medical care, research, and education, from the disease of the brain, spinal cord to peripheral nerve and muscle diseases. In the 21st century, so called "the century of the brain," the causes of several degenerative diseases are being elucidated. Novel treatments for some intractable diseases have begun. In the clinical field, as a main university hospital in Hyogo prefecture, we aim to build a world-class medical treatment for dementia, epilepsy, and neurodegenerative disorder, while providing patient-first, safe and secure advanced medical care by all the expertise of every staff in collaboration with other related departments.

In the research, we target several neurological fields with aim to realize "the Cure of Neurological Disorders" as follows:

- 1) Epilepsy/Brain Physiology: Elucidating pathophysiology of epilepsy and underlying physiology of brain functions by applying systems neuroscience, unraveling pathophysiology of elderly-onset epilepsy in an interdisciplinary manner, and developing wearable EEG devices
- 2) Neuroimmunology: Elucidating control mechanisms of the systemic immune response in neuroinflammation and neurodegenerative processes for development of new therapeutic agents tailored to pathological conditions
- 3) Dementia: Promoting early diagnosis and treatment of dementia in collaboration with the Dementia Kobe Model: initiatives to promote a dementia friendly community in Kobe city
- 4) Neuromuscular diseases: Developing new technologies and devices for electrodiagnosis
- 5) Parkinson's disease and related disorders: Elucidating molecular genetics/pathology of sporadic/hereditary neurodegenerative diseases and performing neuroimaging studies

In the education, we are committed to develop young generations by promoting ICT-based training and online seminars on top of hands-on trainings for medical students and neurology residents including those in affiliated hospitals.



Nephrology



Shinichi Nishi, M.D., Ph.D.
Professor



Nephrology

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The Section of Nephrology practices the treatments of chronic kidney disease (CKD) and complications of chronic dialysis as our major clinical, education, and research targets.

As our clinical work, we are responsible for the treatments of glomerulonephritis, diabetic nephropathy, congenital and autoimmune diseases, and complications of CKD. Additionally we are charged with dialysis treatments and the support of kidney transplantation in blood purification center.

Our department conducts clinical and basic researches in parallel. As clinical researches, we have performed the intervention with phosphate absorption agents and angiotensin receptor blockers for cardiovascular diseases in CKD patients. From the biochemical analysis, we elucidated that the efficacy of these agents were the rolls of inhibitors of increased oxidant stress in CKD condition. For the patients with Fabry diseases, we have continued the enzyme replacement treatments (EMT). In the clinical course, we reported the protective effects for the progression of cardio-renal syndrome by EMT in the patients with Fabry disease.

In the basic researches, we aim to clarify the mechanism of progression of cardiovascular diseases in CKD patients. With animal models presenting CKD condition, we found a tight relationship between oxidant stress acceleration and the disorders of renin-aldosterone system, vitamin D metabolism, and bone remodeling hormone metabolism in CKD models. Recently we are going to investigate the efficacy of Chinese herb as an inhibitor of CKD progression. Until now we have reported that Astragalus, one of Chinese herb elements, inhibited the decline of renal function through the suppress of increased oxidant stress.

Concerning the education, we make our motto, an empathetic education. According to our motto, we actively educate medical students, residents, and postgraduate students in the enjoyable environment.

Rheumatology and Clinical Immunology

The Section of Rheumatology and Clinical Immunology is engaged in both basic and clinical researches on rheumatic diseases.

In our basic research, we mainly investigate into the pathological analyses of rheumatic diseases, aiming to develop new treatment methods and discover novel markers. We analyze pathological findings in animal models or the patient specimen from the immunological perspective. We currently carry forward the following projects:

1. Research on immune cell dynamics in arthritis-model mice
2. Research on novel treatment method with arthritis-model mice or fibrosis-model mice
3. Research on metabolism in immune cells in patients with rheumatic diseases through metabolome analyses
4. Research on cytokines and alarmins in inflammatory conditions



At the University Hospital, we devote our services as an expertise in the Department of Rheumatology and Clinical Immunology. In clinical research, we perform the retrospective studies of our patients, and present the results in public. We have reported the issues on lupus nephritis, giant cell arthritis, glucocorticoid-induced osteoporosis, myositis, Behcet's disease, and IgG4-related diseases in academic journals and conferences. Based on these retrospective studies, we now consider about executing prospective studies hereafter. We have just launched our cohort study of the patients with rheumatoid arthritis in 2014. We will accumulate the cases and cooperate with other medical institutions to promote clinical researches.

Medical Oncology / Hematology



Hironobu Minami, M.D., Ph.D.
Professor

We are a very unique laboratory who contributes to both of basic and clinical researches on various solid cancers and hematologic malignancies, in close conjunction with the Department of Medical Oncology / Hematology in Kobe University Hospital, where many professionals expertized in the methodologies of clinical trials assemble. Medical research delivers its significance only by application to clinic, and the fruit obtained in basic research must be evaluated appropriately in clinical trials before being launched in daily clinics. We are devoted to clinical and basic research to solve clinical questions out of our clinical sites where we provide drug therapies for any sort of cancers, whether hematological or solid.

Tumor Agnostic Developmental Therapeutics of Molecularly Targeted Drugs

Molecular target drugs are the main stream of developmental therapeutics in oncology, and they are effective irrespective of tumor types harboring the same driver genes. Taking advantage of our clinical practice in all sort of cancer types, we are executing early-stage clinical studies including first-in-human studies as well as confirmatory late-stage trials in patients with solid cancers or hematological malignancies. We also conduct clinical research on anticancer drugs already available for clinical practice in order to augment efficacy and diminish toxicities.

Developmental Therapeutics of Immuno-Oncology

Immune check-point inhibitors, another main stream of developmental therapeutics in oncology, may yield cures of advanced malignancies, but only in some patients. We perform translational research to identify biomarkers for efficacy or toxicity in multidirectional approach, including kinetics of immune cells, microbiome, HLA, and clinical pharmacology.

Clinical Research on Hematopoietic Stem Cell Transplantation

We devote to improve clinical outcome of refractory hematological diseases by clinical research on hematopoietic stem cell transplantation as well as basic research on hematopoietic stem cells

Back Translational Research

Our division engaged in basic research to elucidate pathological mechanism and improve the efficacy of drugs already launched in clinical applications. Through these back translational research, questions emerged out clinical practice and studies can be solved in laboratory.

Clinical Pharmacokinetics and Pharmacodynamics of Anticancer Drugs

As one of the most exquisite laboratories of pharmacokinetic research on anti-cancer drugs in Japan, we actively conduct clinical pharmacology research including pharmacokinetics and pharmacodynamics



Kobe University Hospital Logo

Diagnostic Radiology

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The Department of Diagnostic and Interventional Radiology is mainly engaged in the research on diagnostic imaging and interventional radiology (IVR).



Takamichi Murakami, M.D., Ph.D. Professor

Diagnostic Radiology

Since we have mainly conducted clinical researches on diagnostic imaging, intimate cooperation with related clinical divisions is vital. Our research teams are, therefore, subdivided into organ specific topics; such as neuro, cardiovascular, thoracic, gastrointestinal, genitourinary, musculoskeletal imaging. Substantial number of world-leading state-of-art imaging scanners are installed in the department of Radiology, Kobe university hospital. For example, we have four state-of-art dual-energy CT scanners in CT suit, including dual-source CT and area-detector CT, gemstone-detector CT while in MRI suit, we have three state-of-art 3.0-T scanners and two 1.5T-scanners. Furthermore, in our 3D-laboratory, several types of workstations are installed and we can provide cutting-edge image processing and three-dimensional imaging reconstruction, as well as 3D-printing. Accordingly, we conduct the researches not only on morphological imaging, but also on world-leading diagnosis and therapy-assist functional imaging with CT &/or MRI. In the RI suit, many cutting-edge unique systems are installed; such as SSD-based cardiac-SPECT, SPECT/CT, PET/CT, and PET/MRI system. We perform studies on diagnostic imaging, as well as investigation for new drugs. In addition, as a cyclotron is installed in our hospital, we have planned to conduct more clinical trials and reviews on new diagnostic agents.

Advanced Diagnostic Medical Imaging

This department established in July 2019 is a joint research department with GE healthcare for the purpose of developing human resources for advanced research and innovation creation. We aim to develop new diagnostic imaging technology for tumors and cardiovascular diseases, which are the leading causes of death in Japan. In addition to this, this department is open to human resources other than doctors and aims to collaborate on research with people from various backgrounds.



Koji Sugimoto, M.D., Ph.D. Professor

Diagnostic and Interventional Radiology

Interventional Radiology (IVR) is a relatively new therapeutic field which plays a part of minimally invasive therapy. We principally carry out basic and clinical researches, mainly developing novel therapies for various malignant tumors and exploring novel endovascular repair methods for aortae and peripheral vessels. Currently, clinical researches regarding endovascular treatment for aortic aneurysm, aortic dissection, and critical limb ischemia are in progress. Simultaneously, our department conducts some basic researches for endovascular

treatment including development of new endovascular devices and efficacy and safety of various new embolic materials. One of our missions is to develop a new less invasive and safer treatment using basic technology efficiently transferred to clinical field.



Masatoshi Hori, M.D., Ph.D. Professor

Radiology and Biomedical Engineering

This joint research section was established in 2020 with the aim of conducting industry-academia collaborative research with Canon Medical Systems Co., Ltd. to develop advanced diagnostic imaging technology. The performance of medical imaging has improved remarkably in recent years, and the amount of information, spatial resolution, temporal resolution, and accuracy of medical images have improved significantly. In particular, ultra-high-resolution CT can collect a huge amount of information at high speed. In order to process such

information efficiently and utilize it in clinical medicine, radiology and engineering (machine learning, artificial intelligence, image engineering, information science, material science, etc.) should be closely linked, and in cooperation with industry. Through these pursuits, we aim to improve diagnostic ability and treatment results for various diseases, contribute to the development of medicine and public welfare, and promote industrial development with new technologies.



Pediatrics

Pediatrics

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Kazumoto Iijima, M.D., Ph.D. Professor

The Division of Pediatrics, Kobe University Graduate School of Medicine is engaged in a variety of investigations into child and newborn infant. Major targets of our laboratory are kidney diseases, newborn infant diseases, nervous and muscular diseases, metabolic and endocrine diseases, hematological tumor, malformation syndromes, and infectious diseases, etc. Then, a wide range of research activities, principally as investigation into the development of new therapy for refractory diseases or molecular genetic research unraveling etiology and pathology, are performed. Our laboratory actively transmits those results not only inside Japan, but also towards all the world.

As one of our recent topics, an investigator-initiated clinical trial of Rituximab treatment for childhood-onset refractory nephrotic syndrome has achieved significant result. The full study report has been published in The Lancet, which has yielded a big reward that the application of Rituximab has increased and spread in the therapy for refractory nephrotic syndrome. Beyond that, many other research and developments in novel therapies including another investigator-initiated clinical trial of molecular target therapy for Duchenne muscular dystrophy is attempted in progress. These studies are originally patient-oriented, developed from the clinical questions arisen through numbers of our cares for the patients. Therefore, those results have the characteristics of directly leading to clarify pathogenesis and pathological conditions or to develop novel therapies for refractory diseases.

The Division of Pediatrics, Kobe University Graduate School of Medicine is associated with many related facilities notable for their abundance of case reports, such as Hyogo Prefectural Kobe Children's Hospital and other regional core hospitals. In a tight cooperation with these facilities, a qualified education and training programs can be offered for medical students and residents. Since the Fiscal Year 25 of the Heisei, we welcome Hyogo Prefectural Kobe Children's Hospital as our cooperative graduate school, and more efficient pediatricians have been accepted into our graduate programs. We make efforts, in such ways, to foster medical researchers who will bear our country's future in pediatric science.



Kandai Nodu, M.D., Ph.D. Professor

General Pediatrics <Endowed Chair>

Pediatric Acute Diseases

The majority of pediatric care is for children with acute illness. The mission of this field is to apply the latest knowledge and research technology to daily pediatric medical care and promote advanced education, research and medical care on pediatric acute illness. Also, we aim to return the results to regional medical care and disseminating new knowledge nationwide and to contribute to the promotion of pediatric emergency medical care nationwide. The Kobe Children's Acute Illness Center, which was established in 2010, has a research institute for the Department of Child Acute Illness. We are conducting clinical and basic research on acute illness in children by fusing the clinical practice and know-how of research and advanced medical care at Kobe University.

Division of Integrated Child Health

In April 2019, a new division for research on child abuse and developmental disabilities was newly established. Child abuse has become one of the largest issue of children's health as various diseases have been overcome. This division aimed early detection of child abuse, development of effective abuse prevention programs, and systematic research on child abuse.



Hiroaki Nagase, M.D., Ph.D. Professor

Developmental Pediatrics <Endowed Chair>

In Japan, neonatal mortality has decreased due to advances in perinatal care, but high-risk deliveries have increased with late marriage and advances in reproductive medicine, and cerebral palsy (CP) and intellectual disability (ID) have increased. In addition, the number of developmental disorders, such as autism spectrum disorder (ASD) and attention deficit/hyperactivity disorder (ADHD) have increased remarkably among children without the perinatal risk. Developmental issue is the most common pediatric practice today. The mission of this division is to conduct

systematic research on developmental disorders and to develop diagnostics and treatments based on scientific evidence.



Radiation Oncology



Ryohei Sasaki, M.D., Ph.D.
Professor

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The Division Radiation Oncology expands original research fields, especially translational researches integrating clinical radiation oncology, medical physics, and basic radiation research. Recently, radiation oncology has developed in its accuracy, and the therapeutic methods have developed into less-invasive and robust. Two treatment technologies: Intensity Modulated Radiotherapy (IMRT) and Stereotactic Radiotherapy (SRT) are main streams. Especially, our university has been known one of the high-volume centers in Japan using both methods for head and neck malignancies. Next, we have developed a novel treatment strategies using bioabsorbable spacer, called space-making radiation therapy. With the bioabsorbable spacer, curative treatment regimens could be possibly performed in patients who are declared to be only palliative policy. Kobe University has been recognized as a world leader of this strategy. With IMRT, dose intensity can be adapted intricately according to the shape of focal area. It is capable to decrease the dose level for the neighboring organs of focal area to suppress adverse effects, and to increase the dose level for focal area. SRT is a radiotherapy requiring a high dose radiation in a brief time with converging beams in multi-angles. It is employed mainly for isolated or a few lesions in lungs, liver, or brain. We have been developing image-guided brachytherapy using magnetic resonance imaging. And, we also develop therapies with using particle therapies. Our policy is to cure every curable disease with less invasive methods, and we challenge to explore novel strategies against incurable diseases. To achieve them, multidisciplinary team must be necessary, and all members should be one team against "cancer."



Dermatology



Chikako Nishigori, M.D., Ph.D.
Professor

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"Skin" is the largest organ in human body. The mission of our Division is to explore a variety of life phenomena around the "skin" and their disruptions resulting in skin diseases. "Dermatology" has grown up to be a mature interdisciplinary system covering molecular biology and genetics. Skin diseases are expressed in a fairly expanded area, and in varied ways as induced or modified forms: inflammatory diseases such as allergy, skin neoplasm, and skin diseases caused by environmental factors including the sunlight.

With capturing a correlation between clinical findings in front of our eyes and histopathological diagnosis, we can pursue well what molecules of the skin cells is targeted, and why those symptoms have induced. It might be an attractive feature of our science that we can make diagnosis and select an appropriate therapy through grasping these molecular pathogenesis based on the skin manifestations and histological findings perceived by our own naked eyes. We actually provide 120 clinical services for outpatients and 28 cares for inpatients per day. Therefore, for the students, we can set a favorable environment for raising their ability high and full-spectrum in clinical skills through the wide variety of case analyses.

Since research activities are absolutely pivotal in comprehending pathogenesis, we currently investigate into skin malignant tumor, skin allergy diseases and photobiology, etc. In particular, to view all life phenomena from the molecular level, we proactively push forward the collaborative studies with other divisions in basic medicine of our University, which have ever achieved numerous excellent results and traditionally well-known, especially for signal transduction. Thus, we enhance our approach in molecular biological view, and focus on developing therapies based on pathogenesis.

In the field of therapeutic research, we focus on the translational research through the cross talk of basic research and clinical science: an translational research on skin malignant tumor including malignant melanoma is under investigation and as a "mecca of photo-medicine", we strive for basic and clinical researches on photobiology, expecting our activities feedback the benefits to the patients.

To all energetic young doctors who aspire to be a "Physician Scientist", we are welcoming you! Why don't you close on the secrets of "Skin" together?



Psychiatry



Ichiro Sora, M.D., Ph.D.
Professor

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The Division of Psychiatry is constituted of the specialized groups: Molecular Psychiatry group, Child and Adolescent Psychiatry group, Geriatric Psychiatry group, General Clinical Research group.

Molecular Psychiatry Group studies molecular pathophysiology of mental disorders. Methodologies of molecular genetics are used for our research on schizophrenia or suicidal behavior. Recently, stem cell technologies are also applied for our biological models of mental disorders.

Child and Adolescent Psychiatry Group studies diagnosis and therapies for developmental disorder such as autism spectrum disorder through the neuropsychological field. Another significant research area includes posttraumatic stress disorder (PTSD) in children as many children developed the disorder after they were exposed to the Hanshin Awaji great earthquake disaster that devastated our community.

Geriatric Psychiatry Group mainly studies dementia, such as Alzheimer's disease. Many clinical trials for the development of new therapeutics of dementia have been conducted in our department. Recently we study dementia using the latest equipment such as Positron emission tomography (PET).

Clinical Research Group conducts research on the effectiveness of rehabilitation in acute phase of schizophrenia in accordance with clinical cases.

Clinical training of residents and medical students is emphasized in our division. Special training programs of psychiatry are arranged to teach biological and psychological aspects of mental disorders in an aim to offer suitable medical cares for patients.



Laboratory Medicine



Yoshihiro Nishimura, M.D., Ph.D.
Professor

Laboratory Medicine is applied to a variety of purposes including multiphasic screening and epidemiological studies, as well as clinical services from routine practice through advanced medical treatment. The employed laboratory tests corresponding to changing times and progress in medicine has been rapidly transformed. The role of our science is to analyze and integrate examinations scientifically to follow their respective objectives, and to further develop novel screening tests. Our research activities are carried forward with these two perspectives in mind.

Our Division contributes to surveys conducted with the data obtained in our field, the Department of Clinical Laboratory at Kobe University Hospital, as well as to basic research for developing novel screening tests. In our Hospital, a diverse range of disease cases have accumulated, and patients come here seeking consultations, and high-quality medical aid. The staff of our Division pursue intense studies in close collaboration with the professionals of each clinical department for updated and optimal screenings, provided in the Department of Clinical Laboratory at our Hospital. Thus far, we have delivered significant achievements through many collaborative studies with the Departments of Rheumatology and Clinical Immunology, Cardiovascular Medicine, Gastroenterology, Diabetes and Endocrinology, Nephrology, Pediatrics, Obstetrics and Gynecology, Dermatology, Medical Oncology/Hematology, Neurosurgery, Orthopedic Surgery, and Breast Surgery.

Recently, we are focusing on gene-related testing, and considerable achievements have been obtained in genetic diagnosis for congenital thrombosis and in molecular diagnosis for hematopoietic tumors. On another front, the development of novel screenings, we strive for pathological diagnosis with microRNA for rheumatoid arthritis, a rapid test with mass spectrograph for drug-resistant bacteria, metabolome pathological analysis for collagen diseases, genetic diagnosis for myeloid muscular atrophy, and the discovery of molecular markers for malignant melanoma. Our Division further advances the development of tests, contributing to active investigations into drug discovery with microRNA for Rheumatoid Arthritis. Our division also push forward the basic research in collaboration with NIH to establish newly developed therapy for autoimmune diseases and arteriosclerosis.



Evidence-based Laboratory Medicine (Sysmex) <Endowed Chairs>



Ryuji Toh, M.D., Ph.D. Associate Professor
(Ken-ichi Hirata, M.D., Ph.D. Professor)

The Division of Evidence-based Laboratory Medicine was established in 2004, under the principle, "Our mission is to develop collaboratively the novel assessment method practically useful and to elucidate scientifically the effectiveness of assessment".

For the development of medicine, improvements in clinical assessment are requisite. And today, in our society where the finely precise and personalized medicine is also required, the establishment of assessment method and the identification of biomarkers, through which the risks of diseases can be detected rapidly and easily stratified, are the highlighted issues, fairly needed not only for the disease control but also with the viewpoint of medical economy.

Our laboratory strives for the discovery of novel biomarkers and the development of clinical assessments with targeting cancers and lifestyle-related diseases which account for the majority of cause of death in Japan. Recently, we have discovered the novel candidate marker for cardiac failure through the analysis of blood metabolite profile using gas chromatography-mass spectroscopy. Then, to seek its diagnostic meaning, we are validating what pathological conditions are reflected there, turning back from bedside to bench.

In clinical practice regarding high-density lipoprotein (HDL), the measurement of contained cholesterol is the only existing effective method to evaluate HDL. We are trying to develop novel functional assessment with a perspective of lipoprotein particles. Furthermore, we verify the clinical significances on the existing assessment methods through collecting data from the prospective clinical trials and in clinical epidemiology. We explore the suitable methods for use, with also concerning the medical economic effects, and the novel indexes which further clarify risks by combining the existing method with others.



Metabolomics Research



Masaru Yoshida M.D., Ph.D. Associate Professor

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Division of Metabolomics Research was founded in April, 2010, for the purpose of establishment of 'Metabolomics' technology, which is to analyze a variety of metabolites comprehensively, and furthermore application of 'Metabolomics' technology to human research. Metabolomics, which is one of omics technology, is new 'ome science' positioned as one of the post-genomic sciences, and is considered as potent technology to elucidate the functions of unknown genes and so on, and application of metabolomics to life science, medical science and clinical practice is expected.

Omics is the technology to investigate the alterations in biological molecules for evaluation of life phenomenon totally, and genomics, which is the comprehensive analysis of genes, and proteomics, which the comprehensive analysis of proteins, are widely known as omics. Metabolomics targets the metabolome that is entire metabolites existed in the body. By using metabolomics, we probably can understand the invisible and close life phenomenon, and metabolomics must be applicable to investigation of the pathological conditions, the side effects of medicines and so on.

In Division of Metabolomics Research, we work in research and development for practical application of metabolomics involved in life science, organic chemistry, analytical chemistry and information science in collaboration with researchers of various research fields such as faculty of agriculture, engineering, nutrition, pharmaceutical sciences. We advance the metabolite profiling evaluation and the high-resolution character analysis by collecting and integrating the metabolome information in food, cell, experimental animal and human samples, and also step up efforts on the novel biomarker discovery study for ultra-early disease diagnosis, toxicity prediction and therapeutic effect prediction and the other studies, leading to application of our findings to the clinical practice.



Medical Infomatics



Eiichi Maeda, M.D., Ph.D. Professor

In recent years, a great deal of information has been collected and stored in the form of digital information in the medical field. This information is expected to improve the quality, safety and efficiency of medical care, provide feedback to patients, improve patient services, and contribute to clinical research and education.

However, the data handled in the medical field varies widely in terms of source, timing, and phenotype, and it is not always possible to create a system that organically manages the data and enables its efficient use. In addition, the use of electronic information in clinical research and regional medical cooperation must be further strengthened. It is also important to establish an infrastructure to manage these information safely and to utilize it in times of disaster, while taking privacy into consideration. The main theme of our department is to take a practical approach to these problems through the development of various systems with the medical information department of the hospital.

On the other hand, the revised Personal Information Protection Law has strengthened the protection of personal information and expanded the scope of protected information. The Act and the guidelines and guidelines created by the ministries and agencies, the standards and certification system that are useful for personal information protection, and the concepts and techniques of medical information handling and information security are required. We are also working to develop human resources with an understanding of information systems and data protection related to medicine and health.

In addition, we are also engaged in a wide range of research integrating clinical medicine, experimental medicine, and computer science, including research on the accessibility of medical information provision, molecular simulation, and the analysis of Chinese medicine (acupuncture and moxibustion) cures using informatics/experimental medicine, in a group led by Associate Professor Takaoka.

Palliative Medicine



Yoshiyuki Kizawa, M.D., Ph.D. Professor
(Hironobu Minami, M.D., Ph.D. Professor)

Palliative medicine is a multidisciplinary approach to specialized medical care for people with serious illness. It focuses on providing patients with relief from the symptoms, pain, physical stress, and mental stress of a serious illness—whatever the diagnosis. In short, The speciality of palliative care is the "management of suffering" and "Death and Dying" for the patient and families who faced life threatening illness/condition.

In Kobe university, the department of Palliative Medicine was established in 2012. We provided palliative care mainly for cancer patients and their families from the time of diagnosis, not only for in the terminal stage but also in any place and at any stage of diseases depends on their suffering. In addition, not only in cancer care, heart disease, is also actively involved in palliative care of the respiratory disease, non-cancer diseases including neuromuscular disease.

In the research, we do research activities for improving QOL of patients and their families such as; 1) Multi-center, large-scale observational study on symptom management in end-of-life care, 2) study on the establishment of the provision system of effective palliative care, 3) research on Advance Care Capital planning, 4) study on the establishment of evaluation methods of the various distressing symptoms including pain, 5) study of decision-making in end-of-life care including withdraw/withhold life sustaining treatment life sustaining treatment.

In the education of graduate school, we educate the student who can contribute to cancer care in the community as a specialist in palliative medicine. We required at least 2 years on the job training for specialist palliative care including inpatient consultation of the university hospital, inpatient hospice palliative care units and palliative home care clinics (more than 6 months training is recommended in each setting).



Pharmaceutics



**Ikuko Yano, Ph.D.
Professor**

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The Division of Pharmaceutics along with Department of Pharmacy in Kobe University Hospital deals with the research and education field tightly linked to the pharmacist activities. Our mission is to provide education and to conduct researches for the appropriate use of medication. We render our programs not only to the medical students, but also to the students of the Faculty of Health Science and outside pharmacy school students.

We especially focus on the pharmacokinetic research. Pharmacokinetics is a science to elucidate drug behaviors from drug's entry into the body through its having effect on. Pharmacokinetic and pharmacodynamic information for the dosage adjustment in the special population, such as pediatric or aged patients and patients with liver or renal dysfunction, is limited. Therefore, we conduct modeling and simulation approaches such as population pharmacokinetic/ pharmacodynamic analysis using drug concentrations and/or drug response data in the clinical settings, in order to feedback scientific optimal dosage regimens to these patients.

We are also engaged in the research related to the mechanisms of development of Parkinson's disease and establishment of a novel therapeutic strategy, and the research related to the mechanisms of various adverse events induced by molecular targeting anti-cancer drugs and establishment of a mechanism-based prophylactic strategy.

We hope that the development of our researches results in the optimization and individualization of medication use.



iPS Cell Applications



**Takashi Aoi, M.D., Ph.D.
Professor**

The Division of iPS Cell Applications was established in April 2013. "induced Pluripotent Stem (iPS)" signifies a cell line generated from somatic cells by introducing a small number of factors under a specific culture condition. It is considered that iPS cells could become a powerful tool in many medical fields, such as drug discovery, pathogenesis research, and regenerative medicine, etc. due to its capability in infinite proliferation inside laboratory and in differentiation into the various kinds of cells all for constructing human body. Therefore, Kobe University opened our "Division of iPS Cell Applications" as a base site for promoting research and development in iPS cell-applied medicine.

Our laboratory aims to truly utilize iPS cells for clinical medicine. To accomplish this mission, we promote an approach for integral development of two main pillars: "Improving infrastructure in research and development" and "Fostering human resources".

Our laboratory has conducted many collaborative researches with other clinical divisions, aiming at another comprehension for novel disease mechanisms and the drug discovery based on this understanding. They are executed and controlled under two teaching staffs expertized with numerous experiences in iPS cells research. The graduate students from various divisions as well as postdocs pursue those researches with acquiring the methodology themselves in parallel.

We have been targeting the diseases in various organs such as digestive organs, respiratory organs, nerve, skin and male and female reproductive systems and so on.

. And, we have been constructing wide-ranged technological infrastructures, corresponded to the research needs emerged in various clinical fields. Furthermore, we expand the investigations linked to the innovative development in cancer therapy focusing on cancer stem cells by utilizing artificially induced cancer stem cell-like cells, patient-derived cancer cells and organoids derived from the both types of cells.



Gastrointestinal Surgery



Yoshihiro Kakeji, M.D., Ph.D.
Professor

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The Division of Gastro-intestinal Surgery conducts clinical and basic researches on overall gastrointestinal tracts mainly in esophagus, stomach, and the large intestine.

Since 2005, we have treated approx. 500 cases of esophagus carcinoma, approx. 800 of gastric carcinoma, and approx. 1100 of colorectal carcinoma. From these accumulated huge data, we extract new clinical questions and work to solve them.

We actively introduce laparoscopic minimum invasive surgery and robot-assisted surgery, and are working on verifying their utilities. To extend the possibility of our leading-edge therapies, we are developing new image analyzing technology and surgery supporting system by using Computer Assisted Surgery (CAS).

As for multimodal therapy, we closely collaborate with the Department of Radiology and the Department of Medical Oncology and Hematology, and aggressively innovate chemoradiotherapy for rectal carcinoma and preoperative chemotherapy for gastric carcinoma. We are verifying the results and investigating to develop a more effective treatment. We also participate in many nationwide research groups and multicenter collaborations.

In basic research, we deal with gastro intestinal surgery and related areas: Researches with iPS cells, Development of tumor immunotherapy, and Induction of cancer stem cells, with varied approaches, in our own accord or with other basic research divisions.

As for education for the students and residents, we offer an environment where they can study intriguingly, designing the integrated programs from systematic lecture, bedside observation through actual practice. We aim to foster them to be "individuals who autonomously learn and mature."

We work with other departments of surgery, coordinating "hands-on seminars" and workshops to train basic surgical skills. Through seminars, participants' questions and levels in proficiency are clarified and linked to create more sophisticated programs. We also welcome overseas students, which gives significant chances for laboratory members and residents to cultivate their global senses.



Hepato-Biliary-Pancreatic Surgery



Takumi Fukumoto, M.D., Ph.D.
Professor

After the restructuring of department of Surgery, the division of Hepato-Biliary-Pancreatic Surgery was established in 2007. Our division performs more than 400 surgical operations per year including organ transplantations, surgical resections for hepato-biliary-pancreatic cancers and original treatments for advanced cancer using unique techniques.

1. Kobe treatment strategy for hepato-biliary-pancreatic diseases
We have offered highly sophisticated and original surgical care, in the hepato-biliary-pancreatic diseases. We have proposed innovative strategies for advanced hepatocellular carcinoma in combination with currently existing and our original modalities, such as percutaneous isolated hepatic perfusion (PIHP) and Space-making particle therapy (SMPT). We also introduce laparoscopic surgeries proactively in hepato-biliary-pancreatic field, including complex hepatectomies and pancreatectomies. For pancreatic cancer, we perform highly difficult and radical operation such as vascular resection to get curability. We also pursue resectability by conversion surgery with particle radiotherapy and strong chemotherapy. Many clinical trials are ongoing to establish future standard in the field of hepato-biliary-pancreatic surgery. For biliary cancer, developing new drug and new protocol of adjuvant chemotherapy from Kobe is performed to better clinical outcome.

2. Transplantation

We have performed 91 living donor and 22 deceased donor liver transplantations, and 12 deceased donor pancreas transplantations until April 2020, with excellent postoperative clinical course. In addition, our basic research on islet transplantation in mouse model facilitates advances in the outcome in human islet transplantation with type 1 diabetes.

3. Innovative medical equipment and technology

Our division have spent the past two decade developing innovative medical equipment and technologies in the field of surgery, oncology, and transplantation. SMPT with surgical spacer placement and particle therapy are developed to treat primarily intractable malignant tumor in abdominal and pelvic cavities. PIHP are developed for unresectable hepatocellular carcinoma. Until now, more than 400 patients with refractory cancers were treated by either SMPT or PIHP. In addition, our division develops many surgical instruments and technologies such as absorbable magnesium ally clip for operation, absorbable spacer for SMPT and real-time biliary navigation technique to contribute to safer and higher quality of hepato-biliary-pancreatic surgery.



Breast and Endocrine Surgery



Hirokazu Tanino, M.D., Ph.D.
Project Professor
(Takumi Fukumoto, M.D., Ph.D. Professor)

In 2017, Dr. Tanino was appointed as a Associate Professor, and since August 2018 he has been serving as Vice President of the International Clinical Cancer Research Center (ICCRC) and Professor. From 2017, the number of faculties of our department are 2, it is not changed. The number of members of our department has increased from one graduate student and zero doctors to two graduate students and four doctors, and the number of members at the Kobe University Breast Surgery has increased from 23 to 40. Breast surgery is mainly performed in ICCRC, and Dr. Baba is in charge. At a main hospital of Kobe University, Dr. Kunihsa is in charge of surgery for patients with complications and drug therapy of breast cancer, as the head of the department. Dr. Miki specializes in teaching medical students, international students, residents, and specialists. In 2017, there were 78 cases of primary breast cancer surgery, but in the half year until June 2020, there were XX cases.

We are doing collaborating research of the early diagnosis of breast cancer using microwave mammography and tears (TearExo), and the development of radiosensitizer. Centered on research on triple-negative breast cancer, we are conducting multicenter clinical trials, and have started joint research on new drug development with companies. Since April 2020, Dr. Inubushi, PhD has been in charge of research, supervising graduate school.

In our department, each division is responsible for excellent breast cancer treatment, early detection and development of new treatments, and training of the next generation of medical personnel, and we are working together to form an organizational structure that enhances the collective power. Not only from the latter term training, but also from doctors who have studied in other hospitals and departments, we aim to unite and provide excellent medical care.



Cardiovascular Surgery



Kenji Okada, M.D., Ph.D.
Professor

The history of cardiovascular surgery goes back only about 60 years. The passion and effort of our predecessors' earnest hopes to cure the sick patients have continued over half a century, and they have brought us stable surgical outcomes in the present day. Their aspirations at that time was the same level of passion as that of the pioneers who had dreamt of landing rockets on the moon. Cardiac surgery, which entailed many risks in the past, has improved greatly through support from a variety of developments in the field of technology. The establishment of cardiopulmonary bypass, the development of cardioplegia which can stop the heart safely, improvements of organ safety including cerebral protection, the establishment of heart transplantation, the development of a more refined mechanical heart, and the establishment of the safety method of cardiac surgery for premature infants, the introduction of minimally invasive surgery such as endovascular stent graft repair ... these technical advances are all remarkable.

Our Division of Cardiovascular Surgery is devoted to not only the clinical research but also the basic research to achieve the further improvement of our current outcomes. The basic research as well as the clinical research should be reflected in practical clinical results and should be contributed to society. We aim to elucidate unclear pathologies in clinical sites and to develop cutting-edge medical technologies such as medical engineering, tissue-engineering, and organ/tissue transplantation. We hope to improve our surgical outcomes, and that this will lead to higher QOL for patients in the long-term.

To this end, to achieve this goal, the passion is vital in young people. We welcome as many young people as possible who are interested in our division.

Our research themes:

Basic research

- 1) Spinal cord ischemia with a mouse model of spinal cord ischemia-reperfusion injury
- 2) Onset mechanism of aortic dissection using a mouse model of aortic dissection
- 3) In vivo hydrodynamic analysis of aortic root component and pulmonary artery conduit using simulation circuit

Clinical research

- 1) Morphological analysis of aortic root with 3D holographic display
- 2) Development of artificial intelligence diagnosis software of aortic dissection
- 3) Morphological analysis of aortic wall in aortic dissection with SPring-8 (Super Photon ring-8 GeV)
- 4) Multicenter clinical study on acute aortic dissection
- 5) Preoperative respiratory rehabilitation on cardiac and aortic surgery



Thoracic surgery



**Yoshimasa Maniwa, M.D., Ph.D. FCCP
Professor**

The Division of Thoracic Surgery was established on December 1st, 2012 with the chair professor assigned, and started in aiming at the progress both in basic/clinical research and clinical practice.

Concerning clinical practice, number of surgeries under general anesthesia is constantly increased. Especially, the degree of increase in cases with primary lung cancer is remarkable. Reflecting the acceleration of aging in the society, such increase will be definitely broadened in the future. Also, our laboratory is engaged in arthroscopic surgery for various respiratory diseases. For instance, the proportion of the patients with primary lung cancer suitable for arthroscopic surgery for its complete resection in all patients and conducting surgeries have been increasing up to 90 %. It shows a rise of therapeutic use. In this way, we take advantage of the development and introduction of minimally invasive operation, which will decrease the burden on patients, to one of our pillars in clinical practice and research activities. As well as improving minimally invasive operation, establishing multimodal therapy for malignant diseases is also our big mission. We are seeking best medicine for patients, based on accurate pathological observations and with combining anticancer agents, radiotherapy, and surgery, through the conferences on pulmonary medicine running over the years.

Our division develops the research based on clinical insights. Particularly, with aiming to solve the problems of lung cancer therapy, we carry out studies with clinical data and samples. In patients with early lung cancer, not a few relapse have been observed after the complete resection. We expect to discover molecular biological index which will sort the high-risk group of relapse, and link it to the discovery of molecular target for postoperative adjunctive therapy to prevent relapse. Currently, we are focusing on several neoplasm genes and proteins from the viewpoint of the formation of wetting and/or metastasis in early cancer. An immediate feedback onto the clinical sites cannot be expected, however, we willingly contribute our efforts even though a little to the future of lung cancer therapy.



Pediatric Surgery



**Yuko Bito, M.D., Ph. D.
Associate Professor
(Takumi Fukumoto, M.D., Ph. D. Professor)**

The Division of Pediatric Surgery was established in April 2007. Since then, we contribute to providing pediatric surgical care, adopting widely varying viewpoints. Our Division aims to make progress in both basic/clinical research and clinical practice. Clinically, we work together five hospitals certified by the Japanese Society of Pediatric Surgery and specialized training for pediatric surgery allows us to gain a great deal of clinical experience.

Regarding research, we study pediatric surgical diseases from both basic science and clinical medicine, and pursue research themes through industry-academia/medical engineering collaboration and surgical education. We consider that it is important to nurture researchers who can pursue research, and have established a research environment. We provide graduate school students with opportunities to think on their own in a variety of situations, and provide guidance to improve their scientific thinking.

The research currently underway is as follows;

1. Immune response study of surgical invasion in preterm mouse peritonitis model
2. Studies on the effects of synbiotics on lower respiratory tract infections
3. Analysis of mechanism of esophageal atresia/stenosis in children and development of management
4. Gene analysis of intestinal peristalsis disease in children
5. Elucidation of onset mechanism of congenital hepatobiliary disease and development of treatment
6. Development of new diagnostic imaging and new treatment method for pediatric airway stenosis
7. Development of a surgical education system using 8K images
8. Development of surgical training equipment



International Clinical Cancer Research and Promotion

International Medical cooperation and Promotion



**Tetsuo Ajiki, M.D., Ph.D.
Professor
(Director, International Clinical Cancer Research Center)**

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This division was newly opened at April, 2017. The division consists of 4 sections (International Clinical Cancer Research and Promotion Section, Development and Application of Advanced Medical Technology Section, Advanced Cancer Research and Treatment Section, and International Medical Cooperation and Promotion Section). The main mission of the division is to develop the advanced surgical technology, including new laparoscopic surgical procedures or robotic surgical technology, and to promote research of new diagnostic markers and innovative surgical treatment strategy for variable cancers. These researches will be done at International Clinical Cancer Research Center (ICCRC) at Port Island in Kobe city. We will also do researches regarding practice of international medical cooperation with KOBE Biomedical Innovation Cluster (KBIC). Kobe Future Medical Plan started at April, 2020.



Development and Application of Advanced Medical Technology <Endowed Chair>



**Raizo Yamaguchi, M.D., Ph.D.
Professor**

Advanced Cancer Research and Treatment



**Hirokazu Tanino, M.D., Ph.D.
Professor**



Minimally Invasive Surgery

<Endowed Chair>



Masahiro Kido, M.D., Ph.D.
Professor
(Yoshihiro Kakeji, M.D., Ph.D. Professor)

The division of Minimally Invasive Surgery was founded in 2015. We aim to conduct the clinical research and to develop the new medical devices in the minimal invasive surgery, and to standardize the minimally invasive surgery to local medical institutions.

In gastroenterological surgery, the introduction of laparoscopic surgery is widespread with the rise of medical devices. We are actively involved in the spread of safety education of laparoscopic surgery by holding the training seminars several times a year with the division of gastrointestinal surgery and the division of hepato-biliary-pancreatic surgery. We are also actively engaged in the development of new devices in laparoscopic surgery.

In cardiovascular and thoracic surgery, we actively introduce thoracoscopic minimum invasive surgery, endovascular aortic aneurysm and peripheral vascular repair, and hybrid procedures, and are working on verifying their utilities. To extend the possibility of our leading-edge therapies, we are searching the criteria of patients selection for treatment options to obtain the best outcomes. In basic research, we deal with cardiovascular and thoracic surgery and related areas: Researches with physiology of aortic root, development of valve prosthesis material, and induction of small caliber vascular conduits, with varied approaches, in our own accord or with other basic research divisions.

Four staff members are deployed in this division. We are going to strengthen the skill and improve the quality of the minimally invasive surgery, and spread the information to the world from Kobe.



Neurosurgery



Takashi Sasayama, M.D., Ph.D.
Professor

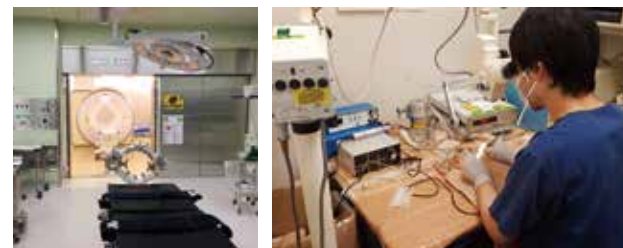
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The Division of Neurosurgery is engaged widely in surgical therapy through to basic research in central nervous system diseases such as cerebrovascular disease, brain tumor, head injury, functional disorder, and spine/spinal cord diseases.

In order to improve patient's QOL, we try in the clinical field to establish diagnostic imaging techniques, multimodal therapy for malignant brain tumor, to improve treatment techniques of neurovascular intervention, and of deep brain stimulation. Algorithm of the optimum treatment procedure of patients with carotid stenosis were currently developed in our laboratory through clinical studies combining carotid echo, MRI, and cerebral blood flow measurement. Expecting the application to surgical education, we are also developing the method of constructing 3-dimensional real head model with brain and vasculature from precise MRI data.

In the University Hospital, 3.0T (super-high-magnetic-field) surgical MRI system was introduced in 2015, and the pioneering clinical research on minimally invasive surgery is ongoing to preserve brain function while removing tumor completely. Further developments are expected in the continuous study with this intraoperative MRI on drawing of neural pathways with tractography and the research on tumor-specific tracers. We also enhance basic research towards the discovery of novel biomarkers and the developments of new therapy, through mass spectroscopy or molecular analyses of clinical samples from the patients with malignant brain tumor or ischemic cardiovascular disease or animal models. Our laboratory has achieved many results in the researches of molecular targeting therapy for malignant brain tumor, analysis on microRNA, the analysis on interleukin of malignant lymphoma, and the metabolic analysis of ischemic cerebrovascular disease.

Grounded in our fundamental policy "Bedside to bench, bench to bedside", we dedicate effort to connect the integration of the research with the clinical information and samples obtained from our clinical sites and the studies using cultured cells or animal models to the improvements in diagnoses and therapies for nervous system diseases and to the resolution of various problems emerged in our clinical sites.



Ophthalmology



Makoto Nakamura, M.D., Ph.D.
Professor

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The Division of Ophthalmology provides a leading-edge medical service that utilizes recent innovative imaging technologies and conducts a minimally invasive vitreous and glaucoma surgery.

In glaucoma and neuro-ophthalmology clinic, we evaluate the structure-function relationship using optical coherence tomography (OCT) and automated visual field tests including microperimetry. We are also working on a novel skin-electrical stimulation treatment for Leber's hereditary optic neuropathy (LHON).

In vitreo-retinal clinic, we have found usefulness of en face slab OCT imaging as a novel modality for the assessment of diabetic retinal neurodegeneration because it can detect subtle changes of nerve fiber reflectivity. Our animal experimental data suggest that this changes might reflect extracellular matrix remodelling and nerve fiber loss within the inner retina. We have also presented three-dimensional fluorescein angiography-guided pars plana vitrectomy as a novel approach that fully utilizes the advantages of digital assisted vitrectomy and a promising option for the treatment of ischemic retinal diseases. Furthermore, we are achieving excellent surgical outcomes for intractable macular edema and retinal detachment.

Regarding age-related macular degeneration and central serous chorioretinopathy, we have elucidated by genome-wide association studies that a specific genetic background is associated with favourable response to anti-vascular endothelial growth factor therapy and/or photodynamic therapy.

Our laboratory works include a study for the role of aquaporin 9, a transporter of energy substrate lactate, in optic nerve degeneration and a study for drug screening for LHON using patient-derived induced pluripotent stem cells.

The residency training program in Ophthalmology is designed to encourage resident physicians to obtain basic skills to practice competently in diagnosis and management of ocular diseases.



Otolaryngology-Head and Neck Surgery



Ken-ichi Nibu, M.D., Ph.D.
Professor

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The Division of Otolaryngology-Head and Neck Surgery covers various areas and diseases such as neuro-otology diseases including sensorineural hearing loss, vestibular disorder, and facial paralysis, inflammatory or functional disorders at middle ear, nose/paranasal sinus, oral cavity, pharynx, or larynx, and head and neck tumor.

Our laboratory is involved in fairly extensive range of areas from the primary cares for common cold, otitis media, epistaxis, allergic rhinitis, or dizziness and vertigo, that most of ordinary people often experience to have, through the highly-specific cares such as hearing improvement surgery, endoscopic surgery for nose/paranasal sinus disease, voice improvement surgery, and head and neck carcinoma.

Another attractive feature of our division is that we care for the diseases which directly influences onto the patient's quality of life. Concerning the existing and future aging society on a global scale, the functions of sensory organs and locomotorium, mastication/swallowing, and voice/language functions are indispensable for our qualified lives. We deal with three of five senses which link to each sensory function, that is, to hear (audition), to smell (olfaction), and to taste (gustation), and the sense of balance (equilibrium) which is essential for walking. We provide medical cares for the disorders in swallowing function, which is necessary to take delicious things, and cares for the disorders in voice/language functions, which are to enjoy conversation with family and friends. Therefore, the Division of Otolaryngology-Head and Neck Surgery might be said a clinical department which plays a pivotal role for assuring patient's quality of life.

As for our research activities, we devote to the researches according to clinical cares, such as the development of head and neck carcinoma therapy with a patient's quality of life fully considered, and the development of diagnosis and therapy for dysphagia, etc., Further, we make efforts in studies on genes of head and neck carcinoma, regeneration of olfactory epithelium, mechanism of olfactory perception, and sensorineural hearing loss, etc.



Orthopaedic Surgery



Ryosuke Kuroda, M.D., Ph.D.
Professor



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Orthopaedic Surgery

The Department of Orthopaedic Surgery of Kobe University was founded in 1954. Hence, we provide medical cares in various viewpoints. Our division consists of many physicians, each expertise in diseases such as Spine, Sports Medicine/Joint preservation, Joint reconstruction/Arthroplasty, Upper extremity, Musculoskeletal tumor, Trauma, and Rheumatism. All are proactively engaged in clinical practice, education, and research in their areas.

In clinical practice, the expert physicians offer the medical cares with the highest standards in their areas. We expect to improve our treatments with applying state-of-the-art diagnostic devices and therapeutic instruments.

Regarding research, we are involved in basic and clinical researches of the expertise area. We put our strength into establishing novel therapy in orthopaedic field and regenerative medicine using iPS cells and some other stem cells. Further, we explore basic researches towards novel drug discovery for each disease, elucidate characteristic pathologies of those, and develop diagnostic science and novel surgical technique. As part of our translational research, we conduct clinical studies/trials upon our basic research results. We present our results and new perception through academic conferences and journals not only inside Japan but also over the world.

Recently, the effectiveness of therapy with pseud-arthritis for bone fracture with peripheral blood stem cells and of the cartilage regenerative medicine applying autologous chondrocyte (cartilage cells) implantation are validated through the multicenter clinical trial with Translation Research Center for Medical Innovation (TRI).

In education, we make efforts to foster the physicians who provide the best cares for the patients. For faculty students, we give the programs targeting students' comprehension of each pathology of disease through to therapy at actual clinical site, instructed by expertise physicians of each area. For graduate students, we train them to become experts who expand the activities in international communities. We implement the study-abroad program through which the graduates receive good opportunities in developing their research abroad such as the United States and European countries.

Spine Surgery <Endowed Chair>

The Division of Spine Surgery, Department of Orthopaedic Surgery of Kobe University, was established in 2018 with the financial support of Surgical Spine, Inc. Our division aims to educate spine surgeons and to develop basic and clinical research in the spine surgery field.

In the clinical field, we treat comprehensive spinal disorders, including congenital anomalies and spinal tumors. We positively employ new techniques and facilities to provide the latest treatments. We also organize the Cancer Board, consisting of various doctors, oncologists, radiologists, and orthopedic surgeons, to perform multidisciplinary treatments for bone/spinal metastases, which are a growing problem in an aging society.

In the research field, we were previously involved in basic research into intervertebral disc (IVD) degeneration. We developed an in vivo/ex vivo animal model reflecting human IVD degeneration and will put our strength into regenerative medicine in the future. We also developed a sustained-release anti-cancer drug and a new non-metal spinal implant, reducing the artifact around the metal spinal implant. We are now preparing to produce a brand-new local therapy for spinal metastases.

We also put our strength into medical education for medical students and residents. To train spine surgeons with the ability to diagnose complicated pathomechanisms and the surgical skills to treat spinal disorders, we educate lecturers of Diagnostics and practical training, allowing surgeons to perform the surgical technique of inserting a pedicle screw using a porcine spine. We train graduate students to become experts who expand their activities in international communities. We have a study-abroad program through which graduates receive excellent opportunities to develop their research abroad, such as in the United States.



Rehabilitation Medicine <Endowed Chairs>



Yoshitada Sakai, M.D., Ph.D.
Professor

The Division of Rehabilitation Medicine was founded in 2012. The rehabilitation medicine we specialize in is wide-ranged. We devote effort to the clinical researches on rehabilitations for musculoskeletal disorder, sports injury, cerebrovascular accident (CVA), neuro muscular disease, cardiac macroangiopathy, and carcinoma. We actively work for the rehabilitation for cancer patients, which has recently come to be focused along with the remarkable increasing of the affected and publish our results in many reports.

In basic research, we investigate into the influences of the transcuteaneous application of carbon dioxide, a sort of physical medicines, and its effects on muscle, flesh, nerve, and bone. We started to collaborate with the Section of Orthopaedics in clinical trials for post poliomyelitis syndrome and lower limb fracture. We further collaborate with the Faculty of Engineering of our University and the School of Engineering, the University of Hyogo for the researches on rehabilitation evaluation and therapeutic instruments. We also collaborate with some pediatric medical and welfare institutions and some recovery-phase rehabilitation hospitals.

The Department of Physical Medicine and Rehabilitation of the University Hospital mainly provide rehabilitation service for the in-patients. As for musculoskeletal disorder, we actively perform our program for the patient replaced artificial joint or after sports injury, collaborated with the Division of Orthopaedics. Furthermore, we opened cardiac rehabilitation room in 2014, to dedicate cardiac rehabilitation services together with the Division of Cardiovascular Medicine and the Division of Cardiovascular Surgery. And, we offer guidance on prosthesis and daily lives for patients with rheumatoid arthritis, xeroderma pigmentosum, a rare disease, or nervous diseases from the rehabilitation expertise' viewpoint. Concerning the rehabilitation for patients with carcinoma, we currently develop leading-edge therapies based on our enormous number of cases in various disease types. We are willing to work out for improving cancer patients' ADL (activities of daily living) and QOL (quality of life), with attending cancer boards on bone metastasis or conferences on palliative care.



Oral and Maxillofacial Surgery



Masaya Akashi, M.D., Ph.D.
Professor

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The department of Oral and Maxillofacial Surgery in Kobe University Graduate School of Medicine focuses on the researches about tumor, cyst, injury, infection, and congenital anomaly in the oral and maxillofacial regions. We endeavor to develop novel techniques of diagnosis and treatment including reconstructive surgery, temporomandibular diseases, dental implant, and laser therapy. Specifically, our department has reported the numerous researches as follows: the risk factors of oral cancer metastasis and perioperative complications, the etiology of osteoradionecrosis of the jaws, the usefulness of perioperative oral interventions for patients with hematological malignancy, cardiovascular diseases, and esophageal or lung cancers, the dental implant insertion into the transferred bone flap, the temporomandibular osteoarthritis, and the potential role of the novel imaging technique (four-dimensional computed tomography) in the oral and maxillofacial regions. As basic medical researches, we conduct the following projects: the role of vascular and lymphatic endothelial cells in the wound healing, the effect of carbon dioxide, and the plasma metabolomics analysis. Our department tries to cultivate clinical scientists who have sufficient experience of clinical and basic medical research and can conduct translational researches.



Urology



Masato Fujisawa, M.D., Ph.D.
Professor



Urology

The Division of Urology dedicates to medical care for diseases of urinary tract and male reproductive system, mainly applying surgical techniques. Our division was established in 1962, spinning off from the Division of Dermatology and Urology, and has satisfactorily developed until today under Prof. Johgetsu, Prof. Ishigami, Prof. Kamidono, and the present, chair, Prof. Fujisawa.

In clinical practice, we have achieved many excellent results in a wide variety of areas, including neobladder creation after radical cystectomy, various approaches of laparoscopic surgeries, and kidney transplantation, through our huge efforts of developing and popularizing highly-sophisticated advanced surgeries. Our latest venture is putting together the whole our team to the development of robot-assisted surgery, and we were promoted to an impregnable position as a top-leading educational institution of this field in Japan. Furthermore, in December 2020, we introduced the first domestically produced surgical robot (hinotori) that our department cooperated in the development, and the first surgery was also successful. Further than surgeries, we offer advanced medical care such as drug therapy for malignant tumor, male infertility and urinary tract infection, upon our background with one of the largest number of clinical cases in Japan. Our efforts and results are now appreciated in the highest regard.

In research activities, our laboratory mainly targets malignant tumor, andrology, renal transplantation, and infectious diseases, but focuses on most areas of urology, including voiding function, sexual function and clinical anatomy. Recently, we achieved the inhibitory effects of PD-L1 expression on growth and sensitivity to molecular-targeted drugs, directed differentiation of human induced pluripotent stem (IPS) cells into mature stratified bladder urothelium, and further development of medical device in collaboration with the Faculty of Engineering. We have actively presented the findings on our research in many international conferences and published them in the top scientific journals.

Concerning our educational programs, we elaborately coordinate the programs in order-made manner to suit faculty students, residents, graduate students, and younger physicians, aiming to find and foster fully qualified human resources as an urologist and a person.



Advanced Medical Technology and Development for Urology <Endowed Chair>

Recently, medical equipment and the surgical technique in endoscopic and laparoscopic surgery have been remarkable developed, and its usefulness is increasingly growing. The mission of Advanced Medical Technology and Development for Urology is firstly, to function as a central core of research, and secondly, to improve the techniques of minimally invasive surgical therapy such as laparoscopic surgery for urologic diseases, and thirdly, to cultivate and educate human resources.

It is indispensable for the development of urology to advance the surgical skills and medical technology, so we focus on the industry-university joint research to make improvement and development of medical equipment. Now we are developing a domestic system for robotic surgery and bioabsorbable metallic devices.

It is important to found a training system and develop human resources specialized in endoscopic surgery. The training of laparoscopic surgery to animals and education with surgical simulator have implemented in this division. Additionally, in the clinical setting, to carry out the program that can be acquired advanced technology in steps, and to operate with surgical technique evaluated by supervisor, which contribute to obtain the endoscopic surgical skill certification. In the future, taking advantage of the rich experience of urological endoscopic therapy, as education center, we cooperate with local hospitals to improve the level of regional medical technology.



Obstetrics and Gynecology



Hideto Yamada, M.D., Ph.D.
Professor

Obstetrics and Reproductive medicine

Our motto is "Brightly, joyfully, consistently, and definitely toward a goal". The Department of Obstetrics & Gynecology supports women throughout their lifelong journey from puberty through childbearing age to menopause and beyond. We are committed to educating health care providers and investigators and conducting research to advance knowledge in our field in addition to providing quality health care services. Our objective is to discover and develop groundbreaking medicine for the treatment-resistant diseases in obstetrics and gynecology by linking the findings from clinical and basic research. Our program (operated together with Gynecological advanced medicine field) combines exceptional clinical training in reproductive immunology, high-risk obstetrics, gynecologic oncology, and women's health care with a wide array of opportunities in basic science, clinical and translational research. We collaborate and cooperate with overseas (Stanford university, Pittsburgh university) and domestic (Molecular and Cellular Signaling, Clinical Virology, System Neuroscience, Immunology Frontier Research Center) laboratories.

- Our ongoing research themes are as follows:
- Prevention/therapy for fetomaternal infection caused by Cytomegalovirus or Toxoplasma
 - Pathophysiological mechanisms of recurrent pregnancy loss and quest for the cures
 - Natural immunity during conception and fetal development
 - Lipid dynamics in placenta and villi
 - Pathophysiological mechanisms of antiphospholipid syndrome and the management of pregnancy with antiphospholipid syndrome
 - Development of novel diagnostic methods for autoimmune diseases by using measurements of autoantibodies against MHC classII / misfolded protein complexes
 - Creating a novel scoring system for Prediction of adherent placenta with placenta previa
 - Mechanisms responsible for excessive trophoblast invasion into the myometrium in adherent placenta.
 - Coagulation and hemostasis in perinatal and perioperative periods
 - A novel therapy for congenital abnormality of the genitalia
 - Co-Lab Research themes with Gynecological advanced medicine
 - Fertility preservation in women with gynecological cancer
 - Quest for a novel tumor suppressor in endometrial cancer
 - Clinical efficacy of effusion cytology and histology for gynecologic malignancies



Yoshito Terai, M.D., Ph.D.
Professor

Gynecologic Advanced Medical Technology and Research

The Department of Gynecologic Advanced Medical Technology and Research, in cooperation with the Department of Obstetrics and Reproductive Medicine, conducts a wide range of medical care, research, and education on gynecological diseases, and promotes and develops minimally invasive surgery including robot-assisted surgery.

In the clinical field, in addition to gynecological oncology, various gynecologic disease such as congenital genital abnormalities, infectious diseases, hormone secretion abnormalities and menopausal disorders. We also have a medical care system to provide advanced medical care that is less invasive, safer, and more reliable curativeness treatment for the young and the elderly patients. With the aim of functional preservation and minimally invasiveness in gynecologic tumors such as uterine myomas, endometriosis, and ovarian tumors, cervical cancer, endometrial cancer, and ovarian cancer, the gynecological oncologist with license of the laparoscopic surgery perform the minimally invasive surgery and robot-assisted surgery for the patients with gynecologic tumors. For advanced cancer, we perform extended surgery cooperated with general surgery and renal urology. And, we use the new molecular targeting drugs and gene diagnosis, and we also treat anticancer drugs and radiation for the advanced cancer patients. We are actively joining the nationwide clinical research studies, and are striving to provide the introduction of new treatments as soon as possible. In addition, we perform the conization for cervical intraepithelial lesion for one-night surgery at ICCRC.

In the field of basic research, we are focusing on the regulation of the invasion and metastasis of gynecologic cancer and the micro-environment of the gynecologic cancer cooperated with basic laboratories in Kobe University Graduate School of Medicine.

In terms of education, it is important to learn about the current evidence and limits through case study meetings, gynecological review, pathology conferences, and radiation conferences. Furthermore, we will actively hold laparoscopic surgery Surgical Training using cadavar and laparoscopic surgery training seminars using pigs so that we can become the leading medical center for robotic surgery in the field of gynecology. We are



endeavoring to instruct and nurture young doctors by focusing on the acquiring gynecologic oncologists and certified endoscopic surgeons.

Plastic Surgery



**Hiroto Terashi, M.D., Ph.D.
Professor**

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The Division of Plastic Surgery was established in 1997. Subsequently, the section handling cosmetic surgery was established in 2007, as the first clinical department in Japanese national universities. Our division is engaged in clinical/basic research in the areas of reconstructive surgery, wound healing and aesthetic medicine, etc.

In the field of reconstructive surgery, we perform reconstruction of function and tissue defect after resection of malignant tumor or trauma. We are contributing to the improvement of life prognosis and postoperative QOL by supporting the surgery of each department. In terms of research, we are conducting research on the development of blood vessels and nerve tissues as regenerative materials, a molecular biological approach to elucidating the pathology of vascular malformation, and physiology of microvessels.

In the wound healing, we act as a coordinator of multidisciplinary treatment for intractable wounds. For example, in the treatment of chronic wounds associated with lifestyle-related diseases such as the diabetes foot ulcer, how to prevent the amputation of lower limb or how to minimize the part to be amputated is not only the issue of patients' whole-body image, but also directly related to the preservation of their walking function and their subsequent exercise therapy and indirectly linked to the patients' vital prognosis. Therefore, we are engaged in medical and educational activities regardless of professions or departments. We are also conducting basis research on the functional response of the largest organ, the skin, to environmental stimuli, especially in light reception.

In the aesthetic surgery, we aim to develop correct aesthetic medicine based on science, and provide safe treatment and information. We also actively support the treatment of various complications arise during self-pay care fee treatment.

Through such research and clinical practice, we educate not only the related physicians, but also the healthcare professionals. We aim to contribute back to regional medicine and human race by fostering human resources.



Anesthesiology



**Satoshi Mizobuchi, M.D., Ph.D.
Professor**

The aim of anesthesia is to protect organisms from surgical stress. Since such a stress induces physiological changes in various organs of patient, our research targets all organs and their bio transformations.

While anesthetized body loses homeostasis, there is a limited stimulus except for surgical stress. During providing anesthesia, we can find the dynamic influence of surgical stress to the human body in real time, so we can observe patients' physiological changes and a consequence of treatment in a very short period. One of our objectives is to elucidate the mechanisms of such bio transformations through basic researches and clinical research.

We are intended to elucidate the impact of surgical stress to the living organism from the viewpoints both of clinical and basic research, expecting to improve perioperative management. We further investigate in the intensive care medicine, and the pain medicine. We expect to assess the pathology of these patients in both cellular and clinical aspects.

To be more precise, we are engaged in the research on the influence of intraoperative fluid administration on postoperative organ failure, the perioperative glycemic control in the diabetes mellitus patients, and the research to assess the factors associated with the risk of the postoperative delirium and the acute kidney injury. In pain medicine, we are progressing research on the therapy for refractory pain and epidemiological research on the cognitive function of the patients with refractory pain.



Disaster and Emergency Medicine



**Jouji Kotani, M.D., Ph.D.
Professor**

Disaster and Emergency Medicine

Our division was established as the first research center for disaster medicine in Japan after the Great Hanshin-Awaji Earthquake 1994. Our division is engaged in education and research of medical students and residents, especially on emergency medical care for patients with severe injuries. Research is actively proceeded in Innovative Emergency and Critical Care Medicine which has been established in our division by Hyogo Prefecture. In addition, we have dispatched doctors and nurses to the scene of accidents by helicopter to provide medical care from the scene. In the event of a disaster or a major accident, DMATs are dispatched to the scene of the disaster, etc. The department implements lifesaving activities in cooperation with fire departments and other institutions to train emergency physicians with an international perspective.

The division has strengthened cooperation with the Division of General Internal Medicine since September 2017. In addition, in 2018, the division began seconding doctors of the Department of Surgery related to our division to strengthen its treatment system. Two, six and seven new emergency physicians and emergency specialists in 2018, 2019 and 2020, respectively, joined to our division. Finally, the establishment of an Emergency and Critical Care center was approved by Hyogo Prefecture in July 2019.

The annual number of ambulances increased from 2,100 in 2018 to 2,800 in 2019. The number of surgeries, mainly on orthopedic trauma, gradually increased to 10-15 cases per month after the establishment of the Emergency and Critical Care Center. The new ward including 4 beds specialized for emergency and critically ill patients will be launched in July, 2020. As a core emergency medical institution in Kobe City, our division is training the next generation of emergency medical personnel.



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Innovative Emergency and Critical Care Medicine <Endowed Chair>

Innovative Emergency and Critical Care Medicine, Kobe University Graduate School of Medicine, has been established by the Hyogo Prefecture. It is an endowed chair of the Kobe University Hospital and Hyogo Prefectural Hospitals. Our research and education centers are located at Kobe University Hospital and Hyogo Prefectural Hospitals. Conducting research on the regional collaborative emergency medical system based on clinical research, and providing a wide range of advanced medical care, education and research.

Main Activities

Establishment of a center for emergency medicine in Hyogo Prefecture and recruitment of emergency physicians
This course aims to consolidate emergency medical care in regional medical facilities, mainly in the Hyogo Prefectural Hospitals, to create a larger. The aim is to form an emergency archive.

Research on medical science and effective emergency system in the community

Our department conducts research on the community-based emergency medical system and conducts a wide range of advanced medical treatment, education and research. The Department of Disaster and Emergency Medicine is conducting various basic and clinical studies.



Developmental Biology and Regenerative Medicine

Takashi Tsuji, Ph.D. Visiting Professor
RIKEN Center for Biosystems Dynamics Research,
Laboratory for Organ Regeneration, Team Leader

This division is one of Affiliated Graduate Programs with RIKEN Center for Biosystems Dynamics Research (BDR) at Kobe. BDR is an international research institute that aims to investigate basic researches including animal life-cycles, scales and temporal dynamics based on developmental biology. The research projects of the affiliated laboratories are as follows:

- 1) **Laboratory for Developmental Epigenetics** aims to understand the mechanism and significance of the changes in higher-order organization of the chromosomes during early embryonic development by applying state-of-the-art technologies, such as Hi-C.
- 2) **Laboratory for Organ Regeneration** studies on the mechanisms of organogenesis and morphogenesis, and aim to develop novel technologies for organ regenerative therapies.
- 3) **Laboratory for Physiological Genetics** investigates fundamental mechanisms about response to disruption of homeostasis, such as injury and cancer, amenable to reverse genetics, imaging and optogenetics.
- 4) **Laboratory for Comparative Connectomics** studies dynamics of neural circuits during life stage transition by using mouse genetics and viral manipulation tools.

Ultrastructural Biology

Takashi Kumasaka, Ph.D. Visiting Professor
Director, Protein Crystal Analysis Division,
Japan Synchrotron Radiation Research Institute

Naoto Yagi, Ph.D. Visiting Professor
Coordinator, Spectroscopy and Imaging Division,
Japan Synchrotron Radiation Research Institute

SPring-8, the world's largest third-generation synchrotron radiation facility, provides the most powerful synchrotron radiation currently available. Its ultra-brilliant X-rays give researchers exciting opportunities for advanced research in broad fields of science and technology. In life science, the research targets and analytical methods are distributed as follows; protein structures (macromolecular crystallography or solution scattering), molecular structure and function of proteins and lipids under physiological conditions, particularly in vivo (X-ray scattering), fine structures of lung and bone (high-resolution X-ray computer tomography), imaging of respiratory and circulatory organs (X-ray refraction contrast imaging), and element mapping in cells (X-ray fluorescence). SPring-8 is operated and maintained by Japan Synchrotron Radiation Research Institute (JASRI), which has established affiliated graduate program relationship with Kobe University Graduate School of Medicine since April in 2000. We are contributing to development of the above X-ray methods and their applications in medicine.

Infectious Disease Field Research

Masatsugu Chikahira, DVM., Ph.D.
Professor
Visiting Professor

Hyogo Prefectural Institute of Public Health Science,
Infectious Disease Research Division

Infectious Disease Research Division of Hyogo Prefectural Institute of Public Health performs the laboratory diagnoses about the various microbes to neutralize the health hazard caused by the infectious diseases. For example, we engaged in disclosing the first-female AIDS patient in Japan at 1987, elucidation of the infection source and route about collective occurrence of fulminant hepatitis B patient attributed to hemodialysis in 1999, incursion survey about the novel influenza in 2009, and so on. We currently contribute to the control measures of novel coronavirus by the laboratory diagnosis with PCR method, which has not shown the sign of control. Our study is grounded on the legal-based survey and prepare for the coming public health problems in the future by analysis of the pathogenic factor and genetic character of etiological agents.

Virus Infection

Yumiko Imai, Ph.D. Visiting Professor
Director of Vaccine and Adjuvant Research Center,
Project Leader of the Laboratory of Regulation for
Intractable Infectious Diseases of National Institute
of Biomedical Innovation, Health and Nutrition
(NIBIOHN)

Infectious Diseases/Immunology The Department of Infectious Diseases and Viruses was established in April 2017 as a collaborative graduate school with the National Institute for Medical Science, Health and Nutrition. In recent years, H5N1 and H7N9 avian influenza, coronavirus-induced SARS and MARS, and respiratory virus infections such as the new coronavirus (2019-nCoV) that recently occurred in the first year of Reiwa are becoming social problems. These viral infections may become severe and fatal, especially in the elderly and in humans with diabetes, chronic respiratory disease, cardiovascular disease, malignant tumor, etc. Severely ill humans will receive treatment such as artificial respiration in the intensive care unit (ICU), but effective treatment methods leading to lifesaving have not been established. In this department, we focus on virus-host interaction, especially host nuclear system, and combine techniques such as immunology, virology, chromosomal research, RNA research, mouse genetics, information biology, and chemical biology. Therefore, I am studying the formation mechanism of severe pathological conditions of viral infections in humans.

Infection and Immunology (Immunology)

Jun Kunisawa, Ph.D. Visiting Professor
Director of Vaccine and Adjuvant Research Center,
Leader of Vaccine Materials Project,
National Institutes of Biomedical
Innovation,Health and Nutrition(NIBIOHN)

The aims of this laboratory are to understand the host immunity controlled by the gut environment such as commensal bacteria and diets and to apply the basic findings to the development of vaccines, medicines, and functional foods. We further established protein-engineering- and antibody-based technologies for the vaccine design and diagnostics to various pathogens, especially food poisoning one. We also identified unique molecules derived from commensal and pathogenic bacteria for the antigen delivery and adjuvant. As dietary materials, we have particularly focused on oils and vitamins both basic and translational researches. Our multi-omics analysis allowed the investigation of their immunological functions and the consequent identification of biologically active metabolites for the control of allergic and inflammatory diseases. These researches will lead to provide cutting-edge information for human health and diseases and to develop prospective vaccines, medicines, and functional foods.

Regulatory Science

Mami Ho, M.D., Ph.D. Visiting Professor
Pharmaceuticals and Medical Devices Agency (PMDA)
Senior Scientist for Clinical Medicine Office of Medical Devices

Mitsue Hirota, Ph.D.Visiting Professor
Pharmaceuticals and Medical Devices Agency (PMDA)
Director Office of Generic Drugs

Japan promotes the development of innovative medical supplies and medical devices for becoming the leader of the biomedical industry in the world. With such a background, it is required that medical university should tackle "regulatory science" aiming at investigating about regulations for pharmaceuticals. In this division, it aims human resource development having the knowledge of regulatory science in cooperation with Pharmaceuticals and Medical Devices Agency.

- (1) Knowledge acquisition about regulation required in order to promote the research and development in medical supplies, medical device.
- (2) Research which contributes to optimization of test method required for regulatory approval of new medical supplies, medical devices, etc.
- (3) Research which contributes to standardization of the criterion of judgment of approval reviews for new medical supplies and medical devices, etc.
- (4) Research which contributes to construction of more effective safety measures for medical supplies, medical devices, etc.

Exploratory and Advanced Search in Cardiology

Hiroya Kawai, M.D.,Visiting Professor
Vice President and Director of Cardiology, Hyogo
Brain and Heart Center at Himeji

The Section of Exploratory and Advanced Search in Cardiology shares in the academic mission to achieve excellence in patient care, research and teaching. The Section provides its clinical cardiology and cardiovascular research and training program which is based on the site of the Hyogo Brain and Heart Center at Himeji. The center encompasses the diverse research and clinical activities of Kobe University Graduate School of Medicine and provides graduate students with a full spectrum of clinical cardiovascular care and great opportunities for research and training. The patients in the center represent a wide variety of common and rare cardiovascular diseases and provide graduate students with important experiences to all areas of clinical cardiology. Graduate students will develop their basic and clinical knowledge, procedural skills, clinical judgment, professionalism and interpersonal skills required as a specialist in cardiovascular diseases and academic cardiologist who will become a next generation leader.

Advanced Therapeutic Target discovery

Toshio Imai,Ph.D. Visiting Professor
President&CEO,Chief Scientific Officer,KAN
Research Institute,Inc.

In Advanced Therapeutic Target discovery<Cooperative Graduate Program>, we will continue to create opportunities to connect people of diverse ideas and backgrounds to discover new therapeutic concepts and seeds of novel drugs through academia-industry partnerships with KAN Research Institute, Inc. Organelles and cells consist of protein that are translated from DNA—the blueprint of life—and function as the cornerstone of life. Based on the knowledge of homeostatic mechanisms in organisms, we focus on living cells to reveal the mechanisms about disturbance of homeostasis, a key factor in disease development and pathologic conditions. This unique “Integrative Cell Biology for Medicine” research is conducted by integrating the knowledge of key fundamental sciences such as immunology, neurobiology, and cancer biology, which is our most competitive advantage in that it enables us to apply the knowledge and technologies of one area to others and to observe one pathological condition from different disciplinary perspectives.

History

Organizational Chart

Research Fields

Cooperative Graduate Program

Education and Research Centers and Library

Neuroscience Network in Kobe

Kobe Future Medical Plan

Facts & Figures

Directions and Transortation

Ion Beam Therapy

Tomoaki Okimoto, M.D. , Ph.D.
Visiting Professor

Director, Hyogo Ion Beam Medical Center

In this department, we are conducting educational and research activities focusing on particle beam therapy at the Prefectural Particle Beam Medical Center in Tatsuno City, Hyogo Prefecture. The Prefectural Particle Radiation Medical Center was established in 2001 as the world's first facility capable of performing two types of particle beam therapy, proton beam therapy and heavy particle beam therapy, and accumulated more than 9,000 treated cases by March 2019. I came. In particular, with the aim of improving the treatment results for “refractory cancer”, we are actively engaged in the treatment of bone and soft tissue sarcoma, head and neck cancer, liver cancer, bile duct cancer, pancreatic cancer, lung cancer, etc. We are conducting research aiming to improve treatment results while providing treatment. In 2017, based on the track record at the prefectural particle beam medical center, we opened the attached Kobe Proton Beam Center as the first proton beam treatment facility focusing on pediatric cancer nationwide in Port City, Kobe City. It is the most pediatric proton therapy facility in Japan.

Advanced Research for Clinical Psychiatry

Kiwamu Tanaka Visiting Professor
Hyogo prefecture – Hyogo Mental Health Center, Director

We conduct the clinical research based on clinical work in Hyogo prefecture - Hyogo Mental Health Center and the basic research collaborating with the Department of Psychiatry. Our course includes; (1) research for trauma and abuse in children and adolescents, (2) advanced research for alcoholism treatment, (3) clinical research for psychiatric emergency, (4) research for severe behavioral disorder (challenging behavior) in autism spectrum disorder with intellectual disability. We assess the symptoms of these psychiatric disorders and focus on the neurobiologically characterized endophenotypes to investigate the biological mechanism of the psychiatric disorders. We require to work passionately on the clinical psychiatry to cultivate the intension for research and to complete the academic degree.

System Biology of Diseases

Akihiko Taguchi,Ph.D.
Visiting Professor

**Department of Regenerative Medical Research
Institute of Biomedical Research and Innovation
Foundation for Biomedical Research and Innovation at Kobe
Professor**

Foundation for Biomedical Research and Innovation has established affiliated graduate program relationship with Kobe University Graduate School of Medicine since April in 2020. We have demonstrated that the neuronal regeneration after stroke can be achieved by therapeutic angiogenesis using hematopoietic stem cell. Our clinical trial of autologous hematopoietic stem cell transplantation for stroke patients showed favorable trends in acceleration of functional recovery. Furthermore, we have recently figured out the mechanism of how hematopoietic stem cell activates angiogenesis at ischemic tissue. As shown in the figure, transplanted hematopoietic stem cells transfer small molecules, such as glucose, to endothelial cells via gap junction followed by activated Hif-1 α and suppressed autophagy at endothelial cells. Based on these findings, R&D projects of novel therapy for stroke and dementia are ongoing.

Advanced Pediatric Medical Science

Nakao Hideto, M.D., Ph.D.Professer
Visiting Professor
Director, Hyogo Prefectural Kobe Children’s Hospital

Kosaka Yoshiyuki M.D., Ph.D.Professer
Visiting Professor
**Vice -principal,
Hyogo Prefectural Kobe Children’s Hospital**

Hyogo Prefectural Kobe Children's Hospital, established in 1970 as the second pediatric facility in Japan, is a highly advanced pediatric medical center to encompass the four areas of pediatric emergency/critical, perinatal maternal, oncologic, and cardiac medical center. Kobe Children's Hospital, compromising one of the Kobe Biomedical Innovation Cluster, has established a cooperation system of graduate schools with Kobe University Graduate School of medicine since 2013. The Clinical Research Center in Kobe Children’s Hospital consists of 3 divisions: Pediatric Advanced Medical Research Division, Pediatric Advanced Surgery Division, and Clinical Research Support Division. By mutual cooperation from members of various divisions, its medical research activities are organized and promoted. Our activities are not only facilitating translational researches in the pediatric fields for the development of novel pathophysiology and of medical technology but also training physicians with research minds.

Rehabilitation Science

Yasushi Hashimoto, M.D., Ph.D.
Visiting Professor

**Hyogo Prefectural Central
Rehabilitation Hospital,Director**

Division of Rehabilitation Science has carried out various clinical practice and research towards the end of improvement and compensation of function for elderly and people with disabilities. We are currently conducting the research focusing on Robotics in the rehabilitation field. Leading examples are, micro-processor controlled prosthesis for lower limb amputee, myoelectric prosthesis (hand) for upper limb amputee, Robot suit HALOR for spinal cord injury patients with incomplete paralysis, and Robotic Stride Assistance System for patient undergoing total hip arthroplasty. These are all new and innovative challenge in Japan. These works can not be done without consisting the team approach system with multiple professions. Our goal is to provide a platform for the rehabilitation method and new technology (including Robotics) to the human being who needs its beneficals.

Advanced Pediatric Surgery

Yoshifumi Sugita, M.D., Ph.D. Visiting Professor
**Chief Medical Officer and Chief of Urology,
Hyogo Prefectural Kobe Children's Hospital**

Yoshihiro Ohshima, M.D., Ph.D.Visiting Professor
**Vice President and Director of The Center for Pediatric Cardiology,
Hyogo Prefectural Kobe Children’s Hospital**

Shinichi Satsuma, M.D., Ph.D. Visiting Professor
**Vice President and Chief of Orthopaedic Surgery,
Hyogo Prefectural Kobe Children's Hospital**

Reconstructive surgery for the congenital urogenital anomaly is the main issue in the Department of Pediatric Urology. Research on voiding function after urethroplasty, reduced port surgery, and biomarkers in congenital hydronephrosis is ongoing. Our division is an expertise surgical unit of the Center for Pediatric Cardiology. We especially strive for developing novel surgical treatment strategies and operative procedures for high risk neonate. In clinical research, we focus on artificial heart/lung and their biogenic reaction. In basic research, we conduct three-dimensional analyses with applying synchrotron radiation-based X-ray phase-contrast tomography in SPring-8. In the Department of Pediatric Orthopaedic Surgery, we have been devoted to various congenital musculoskeletal disorders. We have studied clinically the new methods or strategies of treatment especially on DDH and congenital clubfoot. We have also researched basically the epidemiology or pathology about some congenital diseases.

At the collaborative graduate school, the university and research institutes have signed a collaborative agreement, and researchers from other institutions are invited as visiting faculty members to conduct education and research that goes beyond the conventional framework.

Institute for Experimental Animals

Institute for Experimental Animals is an animal center for supporting researches of biomedical science and life science using laboratory animals. Technical services of this institute are available to all researchers belonging to Kobe University. This institute was established in 1963, and after two times of relocations, moved to Research Building-D. This building is four stories high, and total floor space is 4,092 square meters. In this institute, laboratory animals such as mice, rats, rabbits, dogs, pigs are raised in appropriate environment for each species.

The mission of our institute is set forth in "Regulations of Institute for Experimental Animals, Kobe University Graduate School of Medicine, Article 2" as "The said Institute for Experimental Animals is, for the purpose of executing animal studies fully concerned with scientific basis and animal welfare, aimed to breed laboratory animals in well-prepared environment with a centralized control system and perform medical education and researches of laboratory animals and animal studies." Our institute plays a pivotal role for supporting the researches of biomedical science and life science through 1) appropriate rearing management of laboratory animals, 2) improvements of the system with which proper animal studies can be conducted, 3) fostering the staffs involved in animal studies, and 4) experimental support using reproductive and developmental biotechnology. Because the genetically modified mice are becoming the tool which are indispensable to a biomedical science and life science in late years, we are devoting to expanding the above fourth support especially for mice from 2019.

Our team consists of a director, an associate professor, 4 technical personnel, 16 adjunct staffs, and other expert staffs. Our ongoing activities are as follows:

- 1) Appropriate rearing management of laboratory animals
With maintaining hygienic condition to avoid infectious diseases and taking into account animal's physiologic, physical, and behavioral needs, we devote to the appropriate care of animals, following basic policies '3Rs' of animal welfare (Reduction: of the number of laboratory animals for use, Replacement: to alternative way from animal study, and Refinement: of the study procedure)
- 2) Improving the implementation system of the animal studies
We strive for collecting latest information about domestic and international movements which are related to the animal experiment corresponding enough to the animal welfare and the associated legal issues, and support activities of the institutional animals care and use committee for using animals in studies.
- 3) Fostering the staffs involved in animal studies
We devote our efforts to provide education and information on adequate use of animals in studies through delivering lectures and workshops on using animals in studies.
- 4) Experimental support using reproductive and developmental biotechnology
Our ongoing technical services are as follows
 - a) Cryopreservation of sperm and embryos, for strain preservation of the genetically modified animals.
 - b) Rederivation of the genetically modified animals, from cryopreserved sperm or embryos.
 - c) Large scale production of the genetically modified animals in necessary numbers, through in vitro fertilization and subsequent embryo transplantation.
 - d) Production of the genetically modified animals with specific pathogen free level, through in vitro fertilization and subsequent embryo transplantation.
 - e) Creation of novel genetically modified animals with genome editing techniques.



Yuka Morioka, Ph.D.
Associate Professor
(Director: Akira Suzuki, M.D., Ph.D. Professor)



Center for Infectious Diseases (CID)

Overview

The International Center for Medical Research (ICMR), the precursor of the Center for Infectious Diseases, an affiliated institute of the Graduate School of Medicine at Kobe University was established based upon the background achievements in medical research international exchange between our School/Graduate School of Medicine and the research institutes in Asian Countries, corresponding to the proposition by the Council of Science of the Ministry of Education, Science, Sports and Culture in 1999. It has succeeded in its mission to act in the following roles: as a "Center of Research and Learning in Asia" (proposed in the 1999 policy report by the Council of Science of the Ministry of Education, Science, Sports and Culture); an example of "New Developments in Science and Technology Policy: Responding to National and Societal Needs"; and as the "Education and Research Core for Various Fields of Infectious Diseases and Tropical Diseases" (proposed in the "Council for Medicine and Medical Services in the 21st Century: the 4th Report").

Since its establishment, the Center has been devoted to leading-edge advanced medicine, and to contributing to meeting global needs. We aim to execute domestic and international, multi-disciplinary research on infectious diseases, to study for the development of diagnosis, therapy, and prevention of infectious diseases, and to carry out further international deployment of infectious disease investigations, having been reorganized and renamed the International Center for Medical Research and Treatment (ICMRT), and the Center for Infectious Diseases for the further improvements. Meanwhile, through our activities including the Core Universities Academic Exchange Programs in ASIA: A big collaborative project (1993 to 2002) which was conducted by the Japan Society for the Promotion of Science (JSPS), we widely operate international collaborative research with ASEAN countries including Indonesia. Based upon these achievements, we performed the Construction Project of International Collaborative Research Core in Indonesia (2007 to 2009), and the Research Project on Helicobacter pylori Infection in Asian Countries (2006 to 2009), part of a larger project, Founding Research Centers for Emerging and Reemerging Infectious Diseases, under the auspices of the Ministry of Education, Culture, Sports, Science and Technology, Japan, as well as the Project for Strengthening of Malaria Control in Solomon Islands under the auspices of JICA, (2006 to 2009).

Furthermore, we were engaged in national policy projects such as the Japan Initiative for Global Research Network on Infectious Diseases (J-GRID), Kobe-Indonesia Collaborative Research Center, and the Science and Technology Research Partnership for Sustainable Development (SATREPS). Regarding the project "Collaborative Research on Emerging and Re-emerging Infectious Diseases in Indonesia", our cooperative activities with Airlangga University in Indonesia will be carried out from April 2015, supported by the Japan Agency for Medical Research and Development (AMED).

Research Fields and Areas

- 1. Core research fields (Basic)
Clinical Virology, Infectious Disease Control, Infectious Disease Pathology
- 2. Dual research fields (Clinical)
Infectious Disease Therapeutics
- 3. Cooperative Graduate Programs
Infectious Disease Field Research, Infection and Immunology

Concepts for the Future

- 1. In the Kobe area, we aim to carry on the tradition of research activities of our Center, which has promoted international collaborative studies with Asian countries. To develop it further, we will strengthen our research and education system in Asia.
- 2. We expect to further develop the Kobe-Indonesia Collaborative Research Center for Emerging and Reemerging Infectious Diseases (in the Institute of Tropical Disease, Airlangga University), already established in Indonesia.
- 3. We aim to expand the prominence of the power of synthesis and quality assurance, and to be recognized as a destination for the world, so saying, "Visit Kobe University, if any inquiry in infectious diseases arises". We also seek to become a center of infectious disease research domestically and internationally in the future.
- 4. We expect to strongly develop a system of cross-sectional collaborative research.



Director:
Yasuko Mori, M.D., Ph.D.
Professor



Airlangga University Institute of Tropical Disease

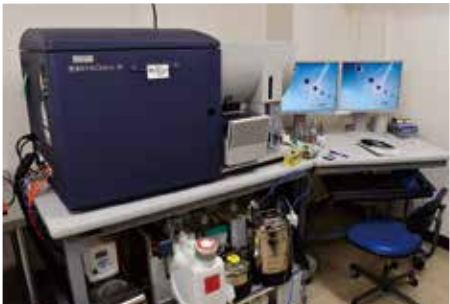
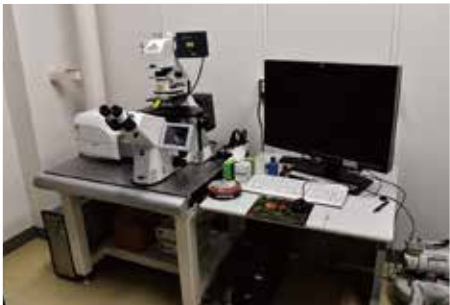
Core Equipment Facility

Objective

Medical and biological sciences are an academic discipline to examine biological phenomena and their abnormalities at multiple hierarchical levels from molecular, cellular, tissue-organ, and whole body levels, and are related to various diseases including malignant tumors, metabolic diseases, mental and neurological disorders, cardiovascular diseases, allergic and autoimmune diseases, and infections. Remarkable progress in medical and biological sciences in these decades has been realized through the development of experimental technologies and apparatuses. Now advanced techniques and precision apparatuses are indispensable to perform qualified medical and biological researches. In the post-genomic era, a style of research has dramatically changed from technology-based single-discipline approaches to hypothesis-driven multidisciplinary approaches which integrate various technologies. Furthermore, since the development of experimental apparatuses has been accelerated every year, researchers need to keenly survey emerging technologies and to actively and continuously introduce new technologies and apparatuses, if necessary. Given such research environments, it becomes nearly impractical for each principal investigator to independently set up all the apparatuses for her/his research. The Joint Research Facility maintains a broad range of state-of-art experimental apparatuses necessary to perform cutting-edge medical and biological sciences for shared use, and provides scientists with the information regarding new experimental technologies. Through these activities, the Joint Research Facility aims to promote medical and biological researches in Kobe University as well as other universities and research facilities.

Overview

To meet a broad spectrum of needs from multiple disciplines, the Joint Research Facility has a variety of precision experimental apparatuses, such as those for capillary DNA sequencing, NMR, X-ray diffraction, chemiluminescence image acquisition, real-time PCR, confocal and multi-photon microscopies, laser-captured microdissection, imaging cytometer, flow cytometer and cell sorter, multi-mode acquisitions for multi-well plates, X-ray irradiation and others. The Facility maintains and continuously upgrades these apparatuses, so that multiple users employ these apparatuses for their researches with minimal time and effort. The Facility arranges training courses including lectures and hands-on training on a regular basis, so that the users can learn the features and correct usages of experimental apparatuses according to their interests as well as the most updated information about the technologies using these apparatuses. Based on opinions and requests from the users as well as the information collected by the Facility, the Facility evaluates the current values of existing apparatuses, and renews them or introduces new apparatuses, if necessary. Besides the advanced apparatuses, the Joint Research Facility also maintains conventional laboratory apparatuses, such as those for ultrapure water production, liquid nitrogen generation, spectral photometer, high-speed centrifuge and ultracentrifuge, autoclave, deep freezer and others, by which the Facility can support newly appointed faculties to set up their researches smoothly.



Director:
Akira Suzuki, M.D., Ph.D.
Professor

Kayoko Nokihara
Assistant Staff



The Integrated Center for Mass Spectrometry

Objective

The Integrated Center for Mass Spectrometry was established in 2008. Our specific aim is biomedical application of mass spectrometry, which contributes to understanding biological phenomena and investigating the etiology and pathophysiology of diseases and the development of diagnostic methods and treatment strategies. Our center is strategically located at the graduate school of medicine, so that the Center can have close collaborative relationships not only with basic research groups in our graduate school, but also with clinical research groups in our university hospital. Comprehensive profiling of proteins and metabolites, namely proteome and metabolome, are closely related to biological physiology and pathophysiology. Specific proteins and metabolites may work as enzymes and substrates for energy production. Other metabolites may have distinct biological activities which can directly regulate cellular functions. Mass spectrometry has made possible unbiased, comprehensive, and sensitive analyses of such proteins and metabolites, and using this method, we aim to establish systems biology based on physiology-related and disease-related profiles of proteome and metabolome. The Center has been a core facility for mass spectrometry dedicated to medical and biological sciences, and has been studying on a wide range of basic and clinical medical research fields, including cancer, atherosclerosis, metabolic disorders, lifestyle diseases, and neurological disorders. The Center not only performs its own researches, but also provides contract mass spectrometry analyses for researchers inside and outside our university on a collaborative basis.

Overview

Specific research aim (1): Bioactive lipid mediators in inflammation and resolution.

Recently it has been revealed that bioactive lipid-derived small molecule metabolites, namely lipid mediators, play critical roles in maintenance of homeostasis, including inflammation and its resolution, tissue repair and regeneration, and brain functions. However, these lipid mediators are structurally unstable and biosynthesized only at nmol ~ pmol/L range on demand, exert stereoselective actions, and are degraded to inactive metabolites. To analyze these mediators quantitatively and comprehensively, advanced technologies are necessary for mass spectrometry and its preprocessing. We employ an automated system for solid phase extraction to extract lipid mediator-enriched fraction, and perform sophisticated quantitative, wide-targeted lipid mediator profiling with ultrasensitive liquid chromatography-mass spectrometry (LC/MS/MS). We have been conducting basic and clinical researches about bioactive lipid mediators especially those related to inflammation and its resolution.

Specific research aim (2): Distinct metabolism in cancer cells.

Whereas normal cells produce their energy, namely ATP, mostly through oxidative phosphorylation in mitochondria, cancer cells depend on distinct metabolism, aerobic glycolysis to produce their ATP (the Warburg effect). Our working hypothesis is that the distinct metabolism in cancer cells could confer their characteristics, such as motility and invasiveness. We mainly focus on hydrophilic metabolites, and employ gas-chromatography/mass spectrometry (GC/MS) system with in-house developed data-integration software.

Contract analysis:

The Center has seven apparatuses composed of three different kinds of mass spectrometry, and performs contract analyses for diverse medical research fields. Regarding proteome analyses (Drs. Ken-ichi Yoshino and Naoya Hatano), the Centers provide the sensitive protein identification service and the analysis for post transcriptional modifications of a target protein using LC/MS/MS system. Regarding metabolome analyses (Dr. Masakazu Shinohara), we perform wide-targeted, semi-quantitative GC/MS analysis for hydrophilic metabolites and quantitative GC/MS analysis for fatty acids. Wide-targeted lipid mediator profiling with liquid chromatography-mass spectrometry (LC/MS/MS) is also provided to analyze bioactive small molecules derived from arachidonic, eicosapentaenoic, and docosahexaenoic acids.

Website

<http://www.med.kobe-u.ac.jp/icms/icms/index.html>

Contact information

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Research fellow, Naoya Hatano
Research technician, Naomi Hayasaka
Research technician, Noriko Kimura
Research technician, Kaori Tanaka



Center for Cell Signaling and Medical Innovation (CSMI)

We have newly opened our core facility, the "Kobe University-Research Center for Cell Signaling Medical Innovation (CSMI)" on April 1, 2016 by integrating and developing our previous facilities, called 'Center for Education and Research in Membrane Biology Medicine' and 'Medical Innovation Center'. The CSMI is aiming to further deepen our medical research for cell signaling, on the basis of our excellent research career and infrastructure for basic medical research in this field. The CSMI is going to promote systematically the medical innovations such as drug discovery, clinical diagnostic drugs, and the development of medical devices, by incorporating the findings obtained by the basic research (Seeds) into the joint research cooperating with the Center for Clinical Research, Kobe University Hospital, other facilities of our University (including Graduate School of Health Sciences and of Science Technology and Innovation, and Biosignal Research Center) or external research institutes (including RIKEN) and enterprises.

The CSMI promotes advanced medical research on 6 areas, i.e. "Cancer", "Metabolic Syndrome", "Mental Disorder/ Mental Health", "Immune Disorder/ Inflammation", "Drug Discovery" and "Regenerative Medicine", and accelerates collaboration between them. Through these research activities, we are going to discover novel signaling pathways and to elucidate etiology and pathology of various diseases caused by the aberration of signaling molecules. We are also aiming to identify the "Seeds" for drug discovery, to develop super-early diagnosis and innovative therapeutic methods, and to establish disease prevention approaches and methods in order to provide a safe and secure social environment.

The CSMI is also going to establish "Global Research Organization for Identification of New Therapeutic Targets and Drug Discovery" through our international cooperation with "Institute for Targeted Therapies (IT2)", a newly established institute in University of Washington, Seattle, U.S.A. and Nordic Center for Molecular Medicine (NCMM) in University of Oslo, Norway. This Global Organization will be expected to promote our international medical researches on cell signaling and drug discovery, leading to social and international contributions in medicine and medical cares, and to contribute the training of young researchers with a global perspective for the next generation.

As a part of the activities of the CSMI, we have held the international joint symposium with University of Washington and University of Oslo (IT2 and NCMM) and joint symposium with RIKEN (BDR) to promote close cooperation and collaborative research, and have disseminated the obtained findings and information in Japan and overseas.



Director:
Yasuhiro Minami, M.D., Ph.D.
Professor



Next Generation International Center (NIC)

Objective

Kobe University School of Medicine and Graduate School of Medicine aim to nurture professional physicians and medical researchers who can internationally contribute to medicine and the medical sciences. Therefore, the Next Generation International Center (NIC) was established in 2017 in order to promote international exchange more actively. NIC aims to contribute to qualitative improvement of medical education and research environment by supporting international exchange of medical students, researchers, and faculty members of Kobe University Medical School and Graduate School of Medicine.

- Outline of activities**
1. Regarding the formulation of basic policy of international exchange
 2. Regarding the academic exchange agreements
 3. Exchange students
 4. Acceptance of international students
 5. Exchange researchers
 6. Other things about the operation of the center

- Activities**
1. Conclude memorandum of understanding between universities and agreement for student exchange.
 2. Accept guests' courtesy visits.
 3. Coordinate elective program for the medical school students.
 4. Coordinate elective programs for the overseas students from partner universities.
 5. Support the international research exchange.



Director:
Prof. Ikuo Shoji, MD, PhD.

- Vice Director:**
- Prof. Seiji Kawano, MD, PhD.
 - Prof. Toshiaki Sakisaka, MD, PhD.
 - Prof. Yoshihiro Kakeji, MD, PhD.
 - Prof. Yasuhiro Minami, MD, PhD.
 - Prof. Tomoyuki Furuyashiki, MD, PhD.
 - Prof. Yuzo Kodama, MD, PhD.
 - Prof. Yasuko Mori, MD, PhD.
 - Prof. Hideki Enomoto, MD, PhD.
 - Prof. Masakazu Shinohara, MD, PhD.
 - Prof. Yoshihiro Nishimura, MD, PhD.
 - Prof. Ryohei Sasaki, MD, PhD.
 - Prof. Ryosuke Kuroda, MD, PhD.
 - Prof. Masanori Kameoka, PhD.

Library for Medical Sciences, Kobe University Library

Outline

The Library for Medical Sciences, Kobe University Library is located in the Administration Building which is located on the south side of Kobe University Hospital. The library occupies three floors from the basement to the second level of the building. Kobe University Library consists of a General Library and 9 subject-specific branches. Among them, our Library functions as a special library for medical sciences, holding 154,955 books and 3,046 journals. The number of visitors exceeds 97,979 annually (as of March 31, 2020).

History

The development of library is one of the pivotal factors in enhancing our university. What makes the Library notable both in quantity and quality today began during the

construction of the Library of Kobe Medical College more than 50 years ago. In 1961, with the purpose and pledge of establishing the "Ideal Library for Medical Science", a \$100,000 donation was made from the China Medical Board of New York, and construction started, being completed on July 7, 1962. While the size of the library was not great, the advanced features, rare at the time, such as centralization of books and journals previously stocked in the laboratories and the open shelf system were introduced. The library stood out as a building with state-of-the-art functions and a characteristic façade. Later, the Library collection became enriched with a large quantity of donated books from the China Medical Board of New York and the Japanisch-Deutsche Gesellschaft. On March 31, 1965, following the promotion of Kobe Medical College to national status, the library was reorganized into a branch library of Kobe University Library. The existing building was newly constructed as a combined facility (administration building) with the School of Medicine in October 1996. On April 1, 2004, associated with the national universities' conversion into independent corporate entities, the library was transformed and relaunched as the Library for Medical Sciences, Kobe University Library.

Library collection

Our library collection includes mainly academic journals on the medical sciences and has recently begun digitalization of academic information with a focus on services of digital documents. The Library has subscriptions to approximately 75 major e-journals in the medical sciences. We also provide links to approximately 36,000 e-journals included in the packages (Elsevier, Wiley-Blackwell, Springer, Oxford, Cambridge, Nature, etc.) that Kobe University Library subscribes to. All University constituent members can exclusively get free access from their laboratories and homes. The Library is enriched with databases such as "Web of Science" to get article information and "UpToDate" to support clinical practices using Evidence Based Medicine. The rising price of e-journals and the financial condition of the university present a growing challenge. With the kind consideration and support of the School of Medicine, the Graduate School of Medicine, and University Hospital, we underwrite their research and clinical services.

User service

Concerning user access, our Library has implemented the special service of 24-hour opening since 1997, which greatly contributes to research and learning support for our members. Our Library is devoted to maintaining a secure environment, introducing the Library ID Card system at the entrance since 1999, first among the branch libraries of our University. The Library is equipped with 17 Information Science and Technology Center terminals for students, and 5 library PCs for searching the books and journals. As for reading rooms, we provide a bright and relaxed place for learning, and many students use the rooms until midnight especially before periodic exams or the national exam for medical practitioners.

Conclusion

While keeping true to the original concept of our facility, "the library open for all visitors" in the future, not only for our University's constituent members such as medical students, residents, and physicians of the University Hospital, but also more widely for people in the medical business and medical experts, we expect to improve as a community-based library of medical science resources. We welcome your visit to our Library.



Director:
Hideki Enomoto M.D., Ph.D.
Professor



Neuroscience Network

In 2014, Kobe University Graduate School of Medicine founded a neuroscience study group called the Neuroscience Network in Kobe (NSN in Kobe) to promote and encourage its neuroscience studies. Basic and clinical neuroscientists at Kobe University have regularly got together in this study group and have strengthened their neuroscience studies through extensive discussions and multidisciplinary interactions. This study group aims to integrate and develop cell signaling and neuroscience studies that have been fostered at Kobe University. It also attempts to create a new trend of neuroscience and contribute to top-level neuroscience studies as well as those applicable for therapeutic and drug developments through regular and active exchanges with experts from outside. To achieve these aims, the NSN in Kobe has annually held the Neuroscience Network in Kobe Symposia. We have invited internationally leading scientists as guest speakers in these symposia and exchanged with them cutting edge knowledge of neuroscience and the opinions on its applications for drug development. Thus, these symposia pave the way for facilitating neuroscience studies and providing their future perspectives.

Chairperson	Ichiro Sora (Division of Psychiatry, Kobe University Graduate School of Medicine)
Organizers	Hideki Enomoto (Division of Neural Differentiation and Regeneration, <i>ibid.</i>) Tomoyuki Furuyashiki (Division of Pharmacology, <i>ibid.</i>) Riki Matsumoto (Division of Neurology, <i>ibid.</i>) Takashi Sasayama (Division of Neurosurgery, <i>ibid.</i>) Toru Takumi (Division of Physiology, <i>ibid.</i>) (alphabetical order)
Co-organizers	Mitsuharu Endo (Division of Cell Physiology, <i>ibid.</i>) Yoji Murata (Division of Molecular and Cellular Signaling, <i>ibid.</i>) Yoshihisa Tachibana (Division of System Neuroscience, <i>ibid.</i>) (alphabetical order)

Summary of the past symposia (Affiliations are at the time of symposia)

The 1st symposium "From Molecules to Diseases – Neuroscience researches linking benches and clinics" (Fri, February 6, 2015)
Fumio Matsuzaki (RIKEN), Hideki Enomoto (Kobe Univ), Takeshi Imai (RIKEN),
Haruhiko Bito (Univ Tokyo), Dai Watanabe (Kyoto Univ), Tomoyuki Furuyashiki (Kobe Univ),
Mariko Taniguchi-Ikeda (Kobe Univ), Toru Takumi (RIKEN), Hiroyuki Nawa (Niigata Univ)

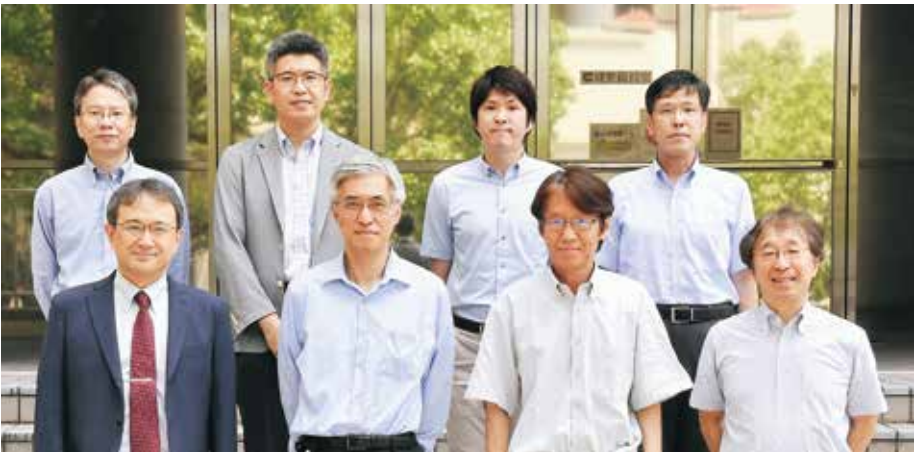
The 2nd symposium "Molecular network perspectives of higher brain functions and their deficits" (Fri, February 19, 2016)
Mineko Kengaku (Kyoto Univ), Michisuke Yuzaki (Keio Univ),
Masaki Fukata (Natl Inst Physiol Sci), Naoaki Saito (Kobe Univ),
Koji Yamanaka (Nagoya Univ), Tetsuya Suhara (Natl Inst Radiol Sci)

The 3rd symposium "Glial physiology and pathology" (Friday, February 17, 2017)
Shigenobu Kanba (Kyushu Univ), Hiroaki Wake (Kobe Univ), Ko Matsui (Tohoku Univ),
Schuichi Koizumi (Yamanashi Univ), Rieko Muramatsu (Osaka Univ), Takeshi Ikeuchi (Niigata Univ)

The 4th symposium "Ever-changing brain" (Friday, February 16, 2018)
Masanobu Kano (Univ Tokyo), Yoko Yazaki-Sugiyama (OIST),
Hidenori Yamasue (Hamamatsu Univ Med), Hisatomo Kowa (Kobe Univ),
Taisuke Tomita (Univ Tokyo), Tetsuaki Arai (Tsukuba Univ)

The 5th symposium "Toward links between microscopic structures and neuroscience" (Friday, February 15, 2019)
Shuya Fukai (Univ Tokyo), Takayuki Uchihashi (Nagoya Univ), Ryo Nitta (Kobe Univ),
Yoshiyuki Kubota (Natl Inst Physiol Sci), Yuki Sugiura (Keio Univ), Takeshi Imai (Kyushu Univ)

The 6th symposium "Neural circuit functions of higher brain functions and dysfunctions in human" (Friday, February 21, 2020)
Kenji Maeda (Otsuka Pharmaceuticals), Yukio Nishimura (Tokyo Met Inst Med Sci),
Atsushi Nambu (Natl Inst Physiol Sci), Takuya Hayashi (RIKEN),
Keiichi Kitajo (Natl Inst Physiol Sci), Takashi Hanakawa (Kyoto Univ), Riki Matsumoto (Kobe Univ)



Kobe Vison for the Healthcare of Tomorrow

In April 2020, the Cabinet Office approved the local university/regional industry revitalization grant business on the development of robotic assisted surgical system in Japan that Kobe City applied for. This grant business consists of four R&D projects and one human resource development project. Kobe University Hospital's International Clinical Cancer Research Center (ICCRC) is in charge of the main researchers and persons responsible for each project. Kobe University is required to actively participate in the Kobe Vison for the Healthcare of Tomorrow, and is expected to contribute to the development of Kobe City and the local economy.

The promotion meeting is presided over by the mayor of Kobe, Kobe University is in charge of core researchers and managers of each business, and start-up companies in Kobe participate.

○reference
Kobe Vison for the Healthcare of Tomorrow (Kobe City HP)
https://www.city.kobe.lg.jp/documents/37664/pamphlet_english.pdf



Development and Application of
Advanced Medical Technology Section
Raizo Yamaguchi, M.D., Ph.D.



surgical robot (hinotori)



International Clinical Cancer Research Center (ICCRC)

Number of Academic Staff:

(As of May. 1, 2020)

Category		Graduate School of Medicine	School of Medicine	
		Faculty of Medicine	University Hospital	International Clinical Cancer Reserch Center
Teaching Staff	Professor	34	7	1
	Associate Professor	29	8	—
	Lecturer	18	28	—
	Assistant Professor	44	54	—
	Research Assistant	1	—	—
	Designated Teaching Staff	69	44	4
	Designated Assistant Professor	—	53	—
Administrative Staff		149	54	7
Medical Service(1):Medical Technologist		1	231	10
Medical Service(2):Nurse		—	948	43
Total		345	1,427	65

Number of Students:

(As of May.1,2020)

School of Medicine

Category/Year	1st	2nd	3rd	4th	5th	6th	Total
Fixed Number of Places	112	117	117	117	117	117	697
Number of Enrollees	112	125	129	107	122	117	712

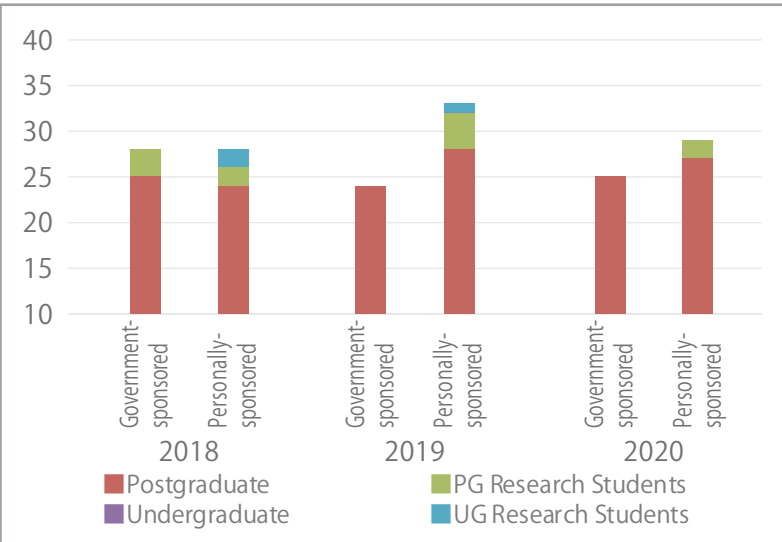
Graduate School of Medicine(PhD)

Category/Year		1st	2nd	3rd	4th	Total
Igaku Kenkyu-ka	Fixed Number of Places	100	100	100	100	3400
	Number of Enrollees	112	111	107	190	520

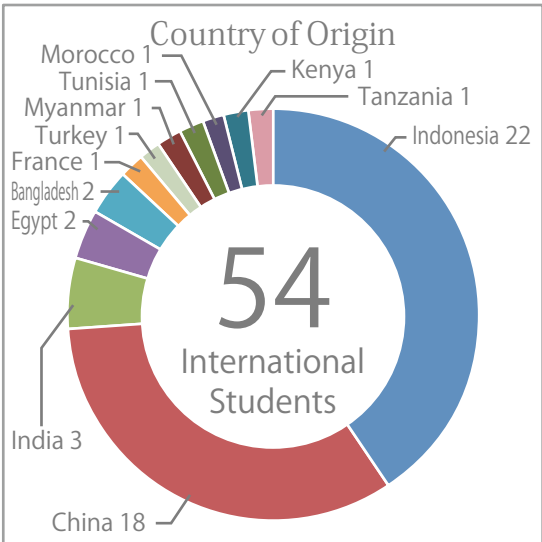
Graduate School of Medicine:Division of Biomedical Sciences(Master's)

Category/Year	1st	2nd	Total
Fixed Number of Places	25	25	50
Number of Enrollees	16	23	39

International Students(2018-2020)



International Students (2020)



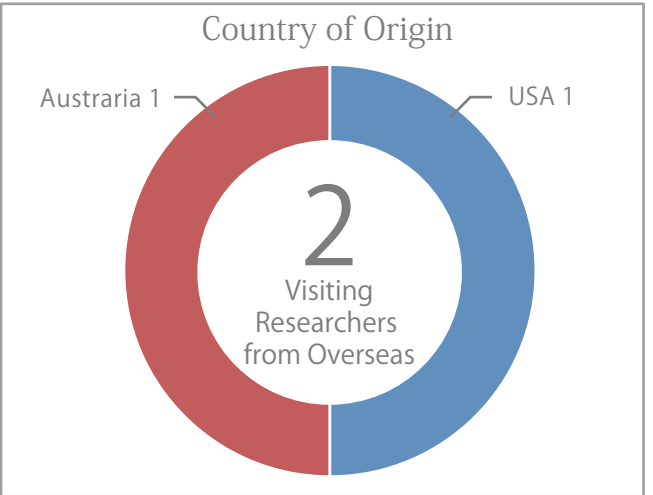
International Exchanges of Researchers and Students (2020)



Invited Researchers from Overseas (2019)

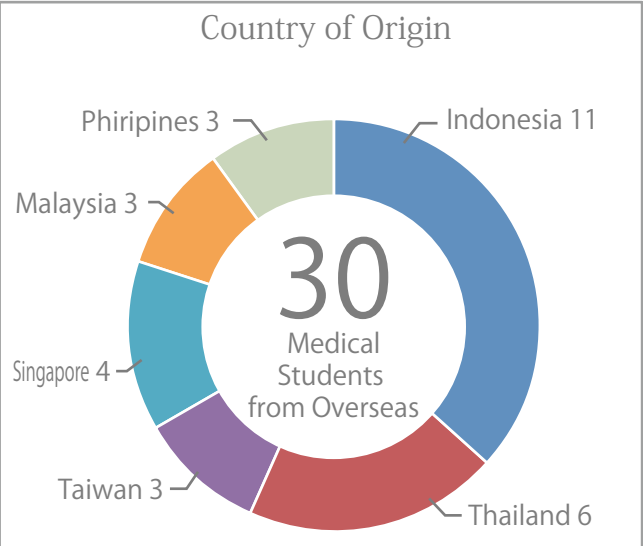


Visiting Researchers from Overseas (2019)



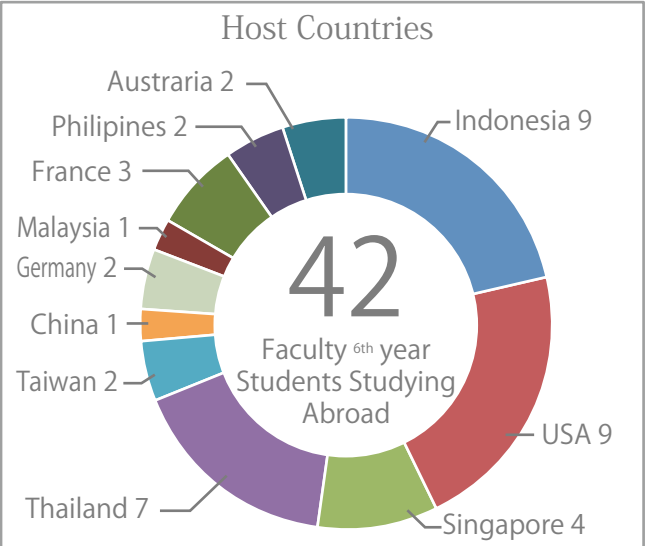
Medical Students from Overseas (2019)

◆ 2 to 4 week Short Programs



Faculty 6th year Students Studying Abroad (2019)

◆ 1 to 4-week Short Programs



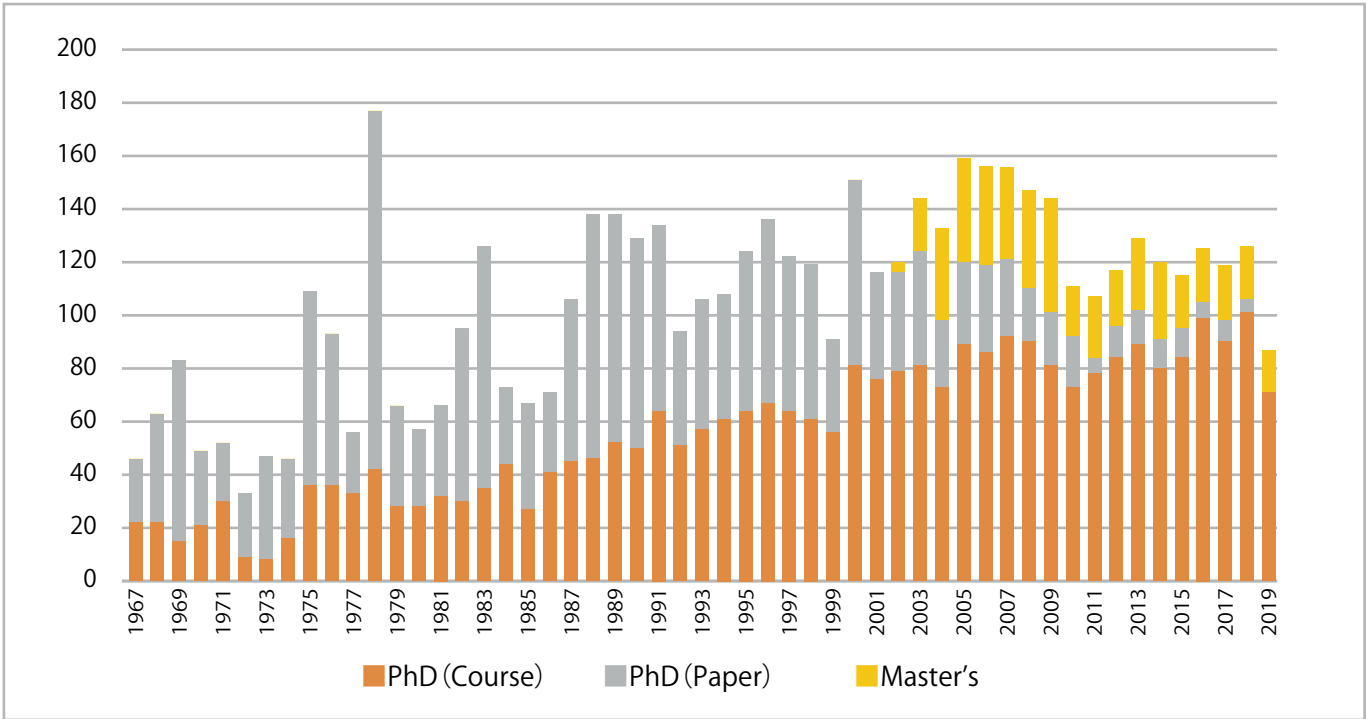
(As of April.1,2020)

Academic Exchange Agreements: Grarduate School of Medicine School of Medicine

Area	Country/ Region	Faculty/ Graduate School/ University/ Institute	Conclusion Date	Inter- University	Inter- Faculty/ Graduate School	Student Exchange
Asia	Korea	Dong-A University School of Medicine	2015.04.03		○	○
Asia	Thailand	Faculty of Medicine Siriraj Hospital Mahidol University	2013.02.20	○		○
Asia	Thailand	Faculty of MedicineRamathibodi Hospital Mahidol University	2013.05.31	○		○
Asia	Thailand	Faculty of Tropical Medicine Mahidol University	2013.04.10	○		○
Asia	Thailand	Faculty of Public Health Mahidol University	2015.04.07	○		○
Asia	Philippines	College of Medicine University of the Philippines Manila	2014.06.13		○	○
Asia	Singapore	Yong Loo Lin School of Medicine National University of Singapore	2014.01.30		○	
Asia	Indonesia	Faculty of Medicine University of Indonesia	2012.02.07	○		○
Asia	Indonesia	Faculty of Medicine Gadjah Mada University	2014.12.01	○		○
Asia	China	China Medical University	2002.06.25	○		○
North America	USA	University of Hawaii Jhon A. Burns School of Medicine	2019.09.23		○	
Asia	Indonesia	Faculty of Medicine Universitas Airlangga	2018.09.04	○		○
Asia	Malaysia	International Medical University	2019.12.17		○	
Asia	Viet Nam	Hanoi Medical University	2016.08.01		○	
North America	USA	University of Washington School of Medicine	2011.05.12	○	○	○
Asia	Thailand	Faculty of Medicine Chiang Mai University	2013.06.05		○	○
Asia	Bangladesh	Chittagong Medical College	2015.12.10		○	○
Asia	Thailand	Chiang Mai University Faculty of Nursing	2018.04.20		○	○
Europe	Belgium	Université catholique de Louvain, Health Sciences	2015.11.30		○	
Asia	Indonesia	Faculty of Medicine Andalas University	2013.10.08		○	○
Asia	Taiwan	Taipei Medical University College of Medicine and College of Nursing	2015.05.20	○		○
Asia	Indonesia	Faculty of Medicine, Universitas Padjadjaran	2014.08.04		○	○
North America	USA	University of Pittsburgh	2009.06.25	○		○
Asia	Indonesia	Faculty of Medicine, Diponegoro University	2014.11.07		○	○
Asia	China	The Affiated Hospital of Qingdao University	2015.03.16		○	
Europe	Germany	Asklepios Medical School, Semmelweis University	2015.06.01		○	○
Asia	Philippines	St. Luke's Medical Center	2015.10.12		○	
Asia	Taiwan	College of Medicine, Kaohsiung Medial University	2016.03.09		○	○
Asia	Thailand	Faculty of Associated Medical Sciences, Chiang Mai University	2016.10.18		○	○
Asia	Nepal	Tribhuvan University Institute of Medicine	2017.02.17		○	
North America	Canada	Campbell Family institute for Breast Cancer Research, University Health Network	2018.07.18		○	
Asia	Indonesia	Faculty of Medicine, Udayana University	2019.02.11		○	○
Asia	China	School of Nursing, The University of Hong Kong	2018.12.19		○	
North America	Canada	Royal Institution for the advancenment of Learning/ McGill University	2019.10.15		○	
Asia	Cambodia	International University	2019.10.08		○	
Asia	Lao	Faculty of Medical Technology, University of Health Sciences	2020.02.13		○	
Europe	Slovakia	Comenius University	2020.03.20	○		○

Number of Degrees Awarded

Accumulated Total 2019: PhD (Course): 2,970 PhD (Papers): 2,166 Master's:466



Aspects of Research Performance

Major Achievements of the Graduate School of Medicine

	2016	2017	2018	2019	2020
Number of Monograghs	1181 (931)	1201 (943)	1188 (979)	1362 (945)	130(129)
[Number of international collaborative paperst of all of the above]	[101]	[116]	[117]	[135]	[10]
Number of Authors	146	151	144	91	18
Number of Research Publications	3012	3129	2922	2930	10

Figures in parentheses: Number of peer-reviewed monographs.

*Source of citation counts: Thomson & Reuter, Inc., InCitesTM (Date of Citation Counting: July 2020)

(Date of Citation Counting: May 2020)

Patents and Inventions developed at the Graduate School of Medicine

	2016	2017	2018	2019	2020
Number of Patent Applications(Domestic)	22	18	12	8	2
Number of Patent Applications(PCT)	0	7	7	5	1
Number of Patent Applications(Respective countries)	4	10	8	16	0
Number of Patent Registrations(Domestic)	3	5	3	4	0
Number of Patent Registrations(Overseasc)	11	7	6	7	0
Number of Inventions	29	16	12	11	3

Kusunoki Campus

To the nearest stations

Access from Airports

Access from Osaka International Airport(ITAMI)

Take Osaka Monorail from "Osaka Airport" station and get off at "Hotarugaike" station (time required: 3 min). Change to Hankyu Takarazuka Main Line and get off at "Juso" station (time required: 15 min). Change to Hankyu Kobe Main Line and get off at " Kosoku-Kobe" station (time required: 25 min).

Access from Kansai International Airport(KIX)

By Railway
Take JR (Japan Railways) Kansai Airport Line from "Kansai Airport" station and get off at "Osaka" station (time required: 1 hour). Change to JR Kobe Line and get off at "Kobe" station (time required: 30 min).
When taking a train from "Kansai Airport," go up to the second floor of the passenger terminal building and go through the passage to the concourse.

By Bus
Take the Limousine Bus bound for "Kobe Sannomiya" from Kansai International Airport (time required: 65 min). At "Sannomiya" station, change to Kobe Municipal Subway Seishin-Yamate Line and get off at "Okurayama" station (2nd stop, time required: 3 min).
When using a limousine bus, go out of the passenger terminal building to buy a ticket for "Kobe Sannomiya" at the ticket counter; board the bus at No. 6 bus stop.
KATE Airport Limousine web site <https://www.kate.co.jp/>
By MK "Skygateshuttle" Omnibus
It is a service that delivers from Kansai Airport to the place of visit. The fares to Chuo-ku, Higashinada-ku, Nada-ku, and Hyogo-ku in Kobe are 2500 yen (one-way charge per person), and reservations are required in advance.
MK "Skygateshuttle" web site <http://www.mktaxi-japan.com/>

Access from Kobe Airport

Take Port Island Line from "Kobe Airport" station and get off at "Sannomiya" station (time required: 17 min). Change to Kobe Municipal Subway Seishin-Yamate Line and get off at "Okurayama" station (time required: 3 min).

Access from Stations on Shinkansen line

Access from "Shin-Osaka" station
Take JR (Japan Railways) from "Shin-Osaka" station and get off at "Kobe" station (time required: 30 min).
Access from "Shin-Kobe" station
Take Kobe Municipal Subway Seishin-Yamate Line from "Shin-Kobe" station and get off at "Okurayama" station (time required: 5 min).

Access from the nearest stations to Kusunoki Campus

Access from JR "Kobe" station
By taxi: about 5 minutes
By Kobe City Bus: Take No. 9 to "Daigaku-Byoin-Mae" bus stop.
Access from Kobe Kosoku Railway/ Hankyu/ Hanshin " Kosoku-Kobe" station
On foot: about 15 minutes
Access from Kobe Municipal Subway "Okurayama" station
On foot: about 5 minutes

International Clinical Cancer Research Center (ICCRC)

To the nearest stations

Access from Airports

Access from Osaka International Airport(ITAMI)

Take Osaka Monorail from "Osaka Airport" station and get off at "Hotarugaike" station (time required: 3 min). Change to Hankyu Takarazuka Main Line and get off at "Juso" station (time required: 15 min). Change to Hankyu Kobe Main Line and get off at "Sannomiya" station (time required: 25 min). Change to Port Island Line from "Sannomiya" station and get off at "Iryo Center" station (time required: 12 min).

Access from Kansai International Airport(KIX)

By Railway
Take JR (Japan Railways) Kansai Airport Line from "Kansai Airport" station and get off at "Osaka" station (time required: 1 hour). Change to JR Kobe Line and get off at "Sannomiya" station (time required: 25 min). Change to Port Island Line from "Sannomiya" station and get off at "Iryo Center" station (time required: 12 min).
When taking a train from "Kansai Airport," go up to the second floor of the passenger terminal building and go through the passage to the concourse.

By Bus
Take the Limousine Bus bound for "Kobe Sannomiya" from Kansai International Airport (time required: 65 min). At "Sannomiya" station, change to Port Island Line from "Sannomiya" station and get off at "Iryo Center" station (time required: 12 min).
When using a limousine bus, go out of the passenger terminal building to buy a ticket for "Kobe Sannomiya" at the ticket counter; board the bus at No. 6 bus stop.
KATE Airport Limousine web site <https://www.kate.co.jp/>
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MK "Skygateshuttle" web site <http://www.mktaxi-japan.com/>

Access from Kobe Airport

Take Port Island Line from "Kobe Airport" station and get off at "Iryo Center" station (time required: 7 min).

Access from Stations on Shinkansen line

Access from "Shin-Osaka" station

Take JR (Japan Railways) from "Shin-Osaka" station and get off at "Sannomiya" station (time required: 25 min). Change to Port Island Line from "Sannomiya" station and get off at "Iryo Center" station (time required: 12 min).

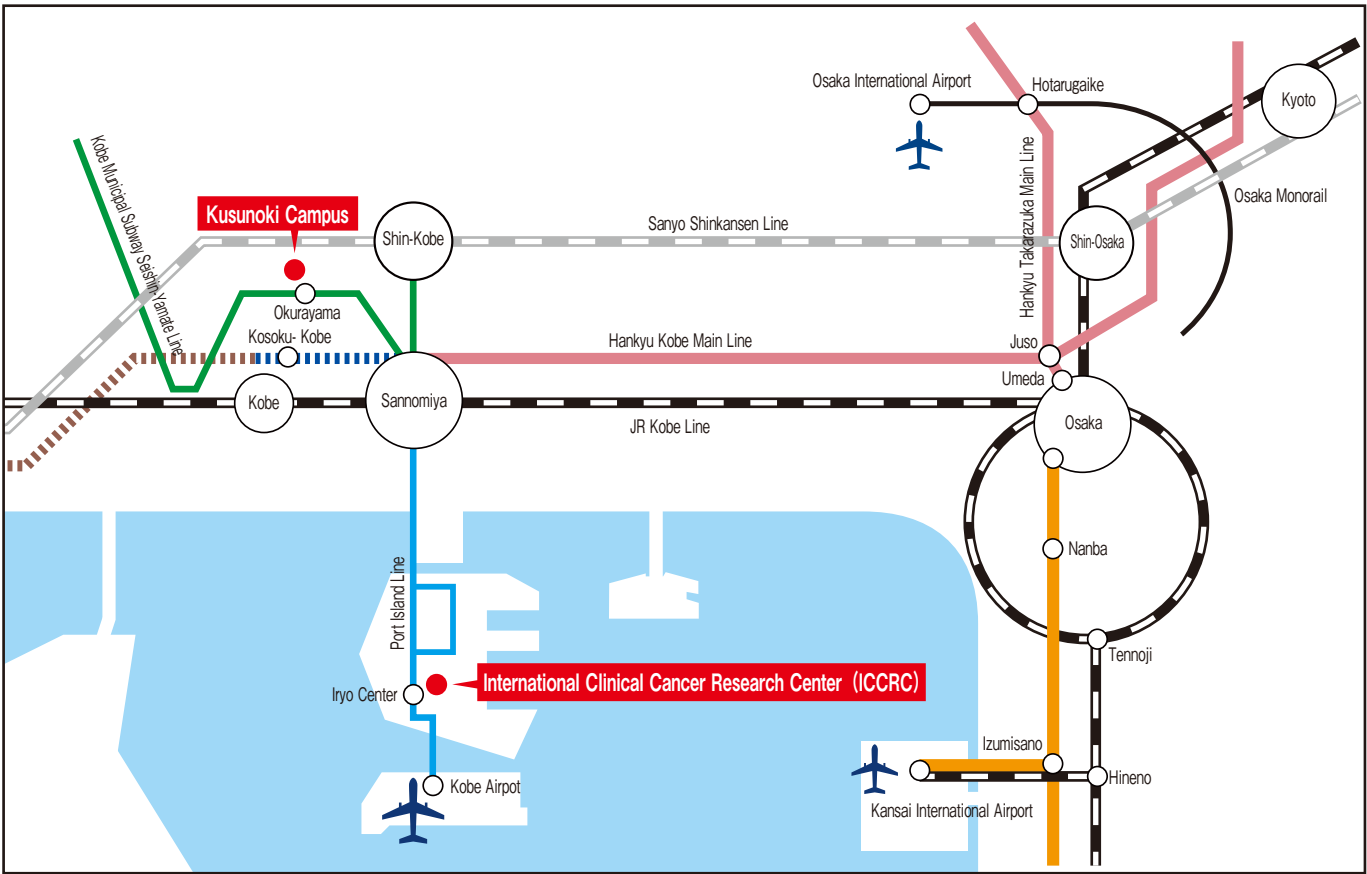
Access from "Shin-Kobe" station

Take Kobe Municipal Subway Seishin-Yamate Line from "Shin-Kobe" station and get off at "Sannomiya" station (time required: 2 min). Change to Port Island Line from "Sannomiya" station and get off at "Iryo Center" station (time required: 12 min).

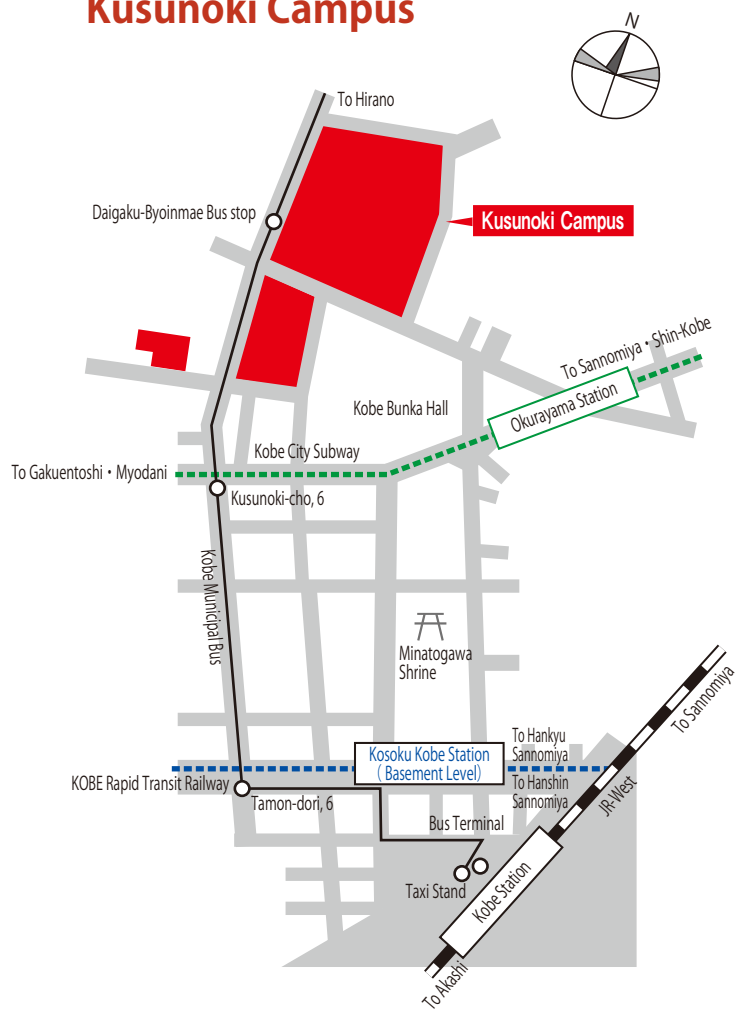
Access from the nearest stations to International Clinical Cancer Research Center(ICCRC)

Access from Port Island Line "Iryo Center" station

On foot: about 5 minutes



Kusunoki Campus



International Clinical Cancer Research Center (ICCRC)

