

Appendix II

List of Instructors and Areas of Research

Medical Life Science

Department	Director	Areas of Research
Diagnostic Pathology	Professor HIRABAYASHI Kenichi	<ul style="list-style-type: none"> • Clinicopathological and molecular studies of biliopancreatic diseases • Clinicopathological and molecular studies of neoplastic diseases • Clinicopathological and molecular studies on inflammatory diseases • Development of novel therapeutic approaches for pancreatic neuroendocrine neoplasms by targeting microRNAs • Analysis of fusion genes in intraductal oncocytic papillary neoplasms
Molecular Immunology	Professor KISHI Hiroyuki (will be retired in March 2023)	<ul style="list-style-type: none"> • Repertoire analysis of lymphocyte antigen receptors • Identification of antigens for lymphocyte antigen receptors • Development of methods of antigen-receptor analyses • Development of methods for identifying antigens • Clarification of the mechanism of autoimmune diseases • Clarification of the mechanisms of tumor immunity • Analysis of the interaction of Neo-self and their receptors
Microbiology	Professor MORINAGA Yoshitomo	<ul style="list-style-type: none"> • The role of microbiota on the colonization resistance against drug-resistant and/or pathogenic bacteria. • The role of microbiota in the transmission of drug-resistant genes. • The role of microbiota on the background of expansion of antimicrobial resistance beyond individuals. • The modulatory effect of microbiota on viral infection. • New concept for appropriate antibiotics use in the aspect of maintenance of commensal microbiota.
Epidemiology & Health Policy	Professor SEKINE Michikazu	<p>Our mission is to conduct epidemiological studies and apply the results for health policy. To achieve this mission, we conduct several epidemiological studies. The Japanese civil servants study (the JACS study) comprises approximately 5,000 Japanese civil servants and aims to clarify whether socioeconomic factors, psychosocial stress at work, and work-life balance is associated with the development of poor physical and mental health. The JACS study is an international collaborative study with the British civil servants study (the Whitehall II study) and the Finnish civil servants study (the Helsinki Health Study). The Toyama birth cohort study (the Toyama study) is a birth cohort study of approximately 10,000 Japanese children. The MEXT Super Shokuiku School project comprises approximately 2000 children and their parents. Both studies accumulate epidemiological evidence on health promotion from childhood. The Toyama Dementia Survey is an ageing and gerontological study of approximately 1000 adults aged 65 or more.</p> <p>Postgraduate students become members of the research units and are involved in each step of epidemiological research (i.e. study planning, and conducting, data analysis, and manuscript writing and publishing). The following is examples of current research topics.</p> <ul style="list-style-type: none"> • International comparative studies on the associations of psychosocial stress at work, work-life balances, health behaviors and personality characteristics with health • International comparative studies on socioeconomic inequalities in physical and mental health • Epidemiological study on the prevention of noncommunicable diseases from childhood • Epidemiological study on the prevention of dementia
Public Health & Environmental Medicine	Professor INADERA Hidekuni	<ul style="list-style-type: none"> • Epidemiological Study on Children's Environmental Health • Fundamental Study of Environmental Chemicals • Prevention of Life-style related Diseases • Occupational and Environmental Health

Department	Director	Areas of Research
Legal Medicine	Professor NISHIDA Naoki	<ul style="list-style-type: none"> • Pathology and molecular biology of cardiovascular disease • Pathology and molecular biology of sudden infant death • Neuropathology and associated molecular biology • Pathology and molecular biology of suicide and neuropsychiatric diseases.
Health Professional Education	Professor TAKAMURA Akiteru	<p>The research in our lab is mainly focused on the education of medical professionals. Specifically, we will conduct research on the goals, strategies, and evaluation of under-graduate education, post-graduate education, lifelong education, and community healthcare education (including patient education) for physicians, nurses, pharmacists, and other healthcare professionals. Epidemiological studies on primary care are also possible.</p> <p>Quantitative research (e.g., descriptive statistics), qualitative research (e.g., thematic analysis and content analysis), and text mining will be used to explore educational effects in medical education.</p>
Diabetes and metabolism, rheumatic and respiratory diseases	Professor TOBE Kazuyuki	<ul style="list-style-type: none"> • Dissection of the pathogenesis of type 2 diabetes and metabolic syndrome. Development of the methods to treat and prevent them. • Dissection of genetic factors of type 2 diabetes, rheumatoid arthritis and asthma. Development of tailor-made therapy. • The role of Sirtuin family proteins, longevity genes, in the development of metabolic syndrome and type 2 diabetes. • Dissection of the pathogenesis of rheumatic diseases, lung and rheumatic diseases. • The development of methods to detect lung cancers at an earlier stage. • The effects of gut microbiome on glucose metabolism.
Cardiology and Nephrology	Professor KINUGAWA Koichiro	<ul style="list-style-type: none"> • Establishment of optimization protocol for the treatment of heart failure using various biomarkers • Development of non-invasive home tele-monitoring system in order to minimization of re-hospitalization by heart failure • Mechanisms of sympathetic nerve inhibition by non-pharmacological therapy for heart failure • Introduction of novel staging of heart failure by cardiopulmonary function • Development of novel strategy for heart failure to alter cardiac-specific gene expression • Investigation of relationship between beta-adrenergic receptors and reversibility of myocardial remodeling • Exploitation of factors to determine the viability of renal collecting tubules • Effect of renal denervation on autonomic disorders in heart failure model • Mechanisms of onset of atrial fibrillation
Gastroenterology	Professor YASUDA Ichiro	<ul style="list-style-type: none"> • Development of novel endoscopic techniques and devices for diagnosis of gastrointestinal diseases • Development of novel minimally-invasive procedures for gastrointestinal diseases • Molecular mechanism of colon hypo-sensitivity in constipation patients • Molecular mechanism of enhanced intestinal epithelial permeability via digestive tract contents • Immunological analysis of liver diseases and liver cancer and its application to the therapy • Analysis of response for HBsAg to develop novel HB vaccine. • Investigation of causal relationship between gut microbiota and the efficacy or toxicity of chemotherapy for gastrointestinal cancer • Detection of aberrant DNA methylation in inflammation-associated carcinogenesis

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Clinical Infectious Diseases	Professor YAMAMOTO Yoshihiro	<ul style="list-style-type: none"> • Establishing Surveillance System of MRSA with Molecular Microbiology • Exploring Factors for Selection of antimicrobials against Chronic Pseudomonas Infection • Analysis of Prognosticator of Non tuberculous Mycobacteriosis • Study of Drug-Resistance Mechanism of Deep-seated Fungus Infection • Gene Therapy for HIV infection
Pediatric Developmental Medicine	Professor ADACHI Yuichi (will be retired in March 2023)	<ul style="list-style-type: none"> • Mechanisms of immunotherapy for allergic diseases • Association between allergic diseases and environmental factors • Genetic analysis of cardiac sudden death, fatal arrhythmia and cardiomyopathy • Neurodevelopmental outcome following cardiac surgery • Immunological diagnosis and treatment of childhood leukemia • Molecular mechanisms of the relationship between low birth weight and adult metabolic diseases
Pediatric Developmental Medicine (Cooperative Graduate School)	Professor MATSUMOTO Kenji [National Center for Child Health and Development]	<p>Our mission is to clarify precisely the pathomechanisms underlying various immunological diseases, such as allergies, Kawasaki disease. To achieve this, we use multiple experimental approaches, including epidemiology and clinical and basic research. Our ultimate aim is to develop better means of preventing, diagnosing, and treating allergic and immunological diseases based on our research findings and accumulated knowledge.</p> <p>We conduct basic epidemiological and clinical research through interdepartmental collaboration. We also promote collaboration among domestic and international researchers</p> <ul style="list-style-type: none"> • Development of strategies for allergic disease prevention • Comprehensive analysis of immunological and allergic diseases using 'omics' technology • Development of new therapeutic drugs for IVIG-resistant Kawasaki disease • Investigating how intravenous immunoglobulin suppresses the inflammatory reaction in the coronary artery of Kawasaki Disease patients
Diagnostic and Therapeutic Radiology	Professor NOGUCHI Kyo	<ul style="list-style-type: none"> • Development of new CT imaging technique for brain diseases • Development of new MR imaging technique for brain diseases • Assessment of brain function by MR imaging Assessment of therapeutic response of tumor by functional imaging
Radiation Oncology	Professor SAITOH Jun-ichi	<ul style="list-style-type: none"> • Free radical formation and DNA damage induced by ionizing radiation and ultrasound. • Molecular mechanisms of the enhancing of apoptosis and other types of cell death induced by ionizing radiation, hyperthermia, ultrasound and novel chemicals. • Regulation of gene expression by ultrasound • Development of radiation and ultrasound responsive promoters and its therapeutic applications. • Molecular and cellular responses to environmental stresses.
Cardiothoracic Surgery	Professor YOSHIMURA Naoki	<ul style="list-style-type: none"> • Surgical approach for arrhythmia • Clinical and biological research of lung cancer • Surgical approach for atherosclerosis • Surgery for ischemic heart disease • Mechanical assist for congestive heart failure • Surgery for congenital heart disease
Department of Surgery & Science	Professor FUJII Tsutomu	<ul style="list-style-type: none"> • Clinicopathological analysis of the progression of gastrointestinal cancer • Molecular-biological analysis of human cancers • Analysis of biological response and its regulation of the surgical stress • Clinical research for gastrointestinal and endocrine cancer • Biomarker research on gastrointesitinal cancer, and development of precision medicine • Development of novel surgical technique

Department	Director	Areas of Research
Orthopaedics and Locomotor System Science	Professor KAWAGUCHI Yoshiharu	<ul style="list-style-type: none"> • Developmental biology of cartilaginous tissues • Pathomechanism of joint and spine diseases • Regenerative medicine for cartilage and intervertebral disc • Origin of ossified lesions in spinal diseases • Genetic and clinical analysis of spinal disorders • Research on joint damage and therapeutic strategy for arthritic diseases • Bone and soft tissue tumors • Development of new surgical strategy and analysis of outcome • Robotic surgery
Otorhinolaryngology - Head and Neck Surgery	Professor SHOJAKU Hideo (will be retired in March 2023)	<ul style="list-style-type: none"> • Clinical and electrophysiological studies of inner ear disorders • Clinical application of amnion membrane in otolaryngology • Brain imaging in response to auditory, vestibular and olfactory stimulations • Development of minimally invasive examination in vestibular system • Clinical studies of diagnosis and treatment in head and neck cancer
Urology	Professor KITAMURA Hiroshi	<ul style="list-style-type: none"> • Biomarker research on urological cancers • Development of immunotherapy for urological cancers • Cancer stem cell research on urologic cancers • Growth factor research on prostate cancer • Basic research on impaired spermatogenesis • Research on vascular epithelial cells in erectile dysfunction • Research on Heat Shock Protein in acute/chronic rejection after renal transplantation
Anesthesiology and management during perioperative period	N/A	
Comprehensive Oral Sciences	Professor NOGUCHI Makoto	<ul style="list-style-type: none"> • Bone invasion of oral cancer and local immune system • Immunosuppressive population in oral cancer microenvironment • Novel strategy for management of oral cancer targeting on cancer stem cells • Mechanism of jaw osteonecrosis induced by bone-modifying agents • Regenerative medicine in oral and maxillofacial reconstruction • Rehabilitation of oral functions
Clinical Laboratory and Molecular Pathology	Professor KITAJIMA Isao (will be retired in March 2023)	<ul style="list-style-type: none"> • Development of a rapid measurement system for Nuclear factor-kappa B. NF-κB is a transcription factor, which regulates various processes of acute and chronic inflammatory diseases. • Development and clinical application of quantity profile analysis to inflammatory allied transcription factor activity by fluorescence correlation spectroscopy and the CAGE (Cap analysis of gene expression). • Novel "melting temperature (Tm) mapping method" for rapidly identifying the dominant bacteria in a clinical sample from sterile sites.
Crisis Medicine	Associate Professor WAKASUGI Masahiro	<p>Our mission is to conduct basic and clinical research on Emergency medicine and intensive care.</p> <p>The main research themes are as follows.</p> <ul style="list-style-type: none"> • Disaster medicine education • Pre-hospital care system • Patient triage system • Neuro-intensive care • Epidemiology and clinical study of heat stroke • Marine medicine
Hematology	Professor SATO Tsutomu	<ul style="list-style-type: none"> • Development of new drugs for multiple myeloma • Exploratory research into molecularly-targeted therapy for T-cell lymphoma • Prevention of bone mineral density reduction during lymphoma therapy • Effects of osteoporosis on hematopoietic stem cells

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Neurology	Professor NAKATSUJI Yuji	<ul style="list-style-type: none"> ▪ Investigation of the pathomechanisms of multiple sclerosis/NMOSD, CIDP, and Stroke to establish biomarkers for personalized medicine. ▪ Development of neurorehabilitation utilizing tDCS against cognitive impairment and fatigue in neurological diseases such as MS/NMO, Parkinsonism.
Clinical Oncology	Professor HAYASHI Ryuji	<ul style="list-style-type: none"> ▪ Clinical practice of cancer genome medicine ▪ The effect of immune check point inhibitor and micro biome ▪ Epidemiology of the elderly cancer patients ▪ The different recognition between ordinary person and medical staff ▪ Immuno-oncology ▪ Cancer metabolism ▪ Cancer cell biology and target therapy ▪ Clinical study using medical records ▪ Statistical analysis with data base ▪ In vivo and in vitro experiments
Patient Safety	Professor NAGASHIMA Hisashi	<ul style="list-style-type: none"> • Research for patient safety management systematic. • Research for investigation of medical malpractice. • Research for promoting patient safety environment cooperated with patients. • Research for creating integrated patient safety system enrolling regional medical care. • Research of educational system for satisfactory clinical communication.
Plastic, Reconstructive and Aesthetic Surgery	Professor SATAKE Toshihiko	<ul style="list-style-type: none"> • Vascular anatomy of perforator flaps • Reconstruction using adipose stem cells and cultured adipose stem cells • Regenerative medicine for sarcopenia: prevention and treatment • Developing treatment for CRPS using sensory flaps • Application of robotic microsurgery to various reconstructive procedures • Pathogenesis and treatment of lymphedema
Computational Drug Design and Mathematical Medicine	Professor TAKAOKA Yutaka	<p>Our aims to construct theoretical medicine, which has an analogous concept of theoretical physics in contrast with experimental physics. It is not easy to describe the human body, that is, a complex system, with a hard science which uses mathematical models in such field as physics or chemistry. Therefore, we utilize molecular simulation analyses to describe human body partially, and use this approach to predict the future disease treatments. It is a challenge to evolve the medical system as a science with accumulated logic for prediction from the one which emphasizes experiences and results. Our final goal is to enable a paradigm shift from "validation" to "prediction" in the system of medical science. It is important to note that we pay attention whether the mathematical model is applicable to the real world and do not aim for mathematical sophistication.</p> <p>In addition, we also study the themes for Kampo and Acupuncture, machine learning and natural language processing, and social medicine such as community medical policies, improvement of hospital function, and medical management as follows:</p> <ul style="list-style-type: none"> ▪ Prediction of adverse drug reactions base on molecular simulation and mathematical models ▪ Prediction of drug efficacy of molecularly target drugs for cancer based on molecular simulation and mathematical models ▪ Design of nucleic acid drugs and evaluation of drug efficacy ▪ Application of drug repurposing to computational drug design ▪ Molecular simulation analysis of pathological conditions caused by genetic mutations resulting in amino acid substitutions ▪ Molecular mechanisms of therapeutic effects of acupuncture and moxibustion ▪ Application of AI technologies such as machine learning and natural language processing to improvement of hospital functions ▪ Population dynamics and the future prediction of community medicine

Department	Director	Areas of Research
Rehabilitation Medicine	Professor HATTORI Noriaki	<p>Rehabilitation medicine is one of the most active fields of translational research with fields such as basic medicine, neuroscience, and engineering. Incorporating the latest technology, we aim to create innovative rehabilitation medicine. Examples of specific research themes are listed below, but the research themes are not limited to these. We will discuss the research theme with students and flexibly determine the themes.</p> <ul style="list-style-type: none"> ▪ Creation of objective indicators for rehabilitation medicine using new measuring instruments and analysis methods ▪ Development of neuromodulation methods to facilitate functional recovery ▪ Development of rehabilitation therapies aimed at improving activity of daily living (ADL) and quality of life (QOL) for various diseases ▪ Development of effective rehabilitation therapies for frailty, sarcopenia and malnutrition
Innovative Clinical Research	Professor CHUJO Daisuke	<ul style="list-style-type: none"> ▪ Observational studies using the data from electronic health records ▪ Patient registry studies using electronic data collection systems ▪ Development of innovative medicine using the internet of things (IoT) for the treatment of diabetes ▪ Development of the systems for conducting clinical research, such as supporting systems for writing protocols, medical statistics, medical ethics, data management, and clinical research coordination. ▪ Learning of medical data handling ▪ Total management of clinical research based on various regulations

Integrative Oriental and Western Medical Sciences

Department	Director	Areas of Research
Molecular and Medical Pharmacology	Professor NAKAGAWA Takashi	<ul style="list-style-type: none"> • Elucidating how NAD metabolism is involved in the fundamental aging process. • Implication of NAD metabolism in aging-related diseases, including cancer, neurodegenerative diseases and metabolic diseases. • Development of anti-aging therapeutics targeting NAD metabolism. • Elucidating pharmacological actions of KAMPO medicine using metabolomics analysis with LC/MS and GC/MS.
Dermatology	Professor SHIMIZU Tadamichi	<ul style="list-style-type: none"> • Mechanisms of the relationship between skin disease and inflammatory cytokine • Effects of inflammatory cytokine and UV on the skin • Pathology of the skin lymphoma • Development of the therapeutic agent of melanoma • Improving effects of Kampo medicines and their action mechanism
Obstetrics and Gynecology	Professor NAKASHIMA Akitoshi	<ul style="list-style-type: none"> • Molecular biology and immunology for reproduction • Autophagy in placentation • Molecular biology of growth and differentiation in trophoblasts • Molecular biology and immunology for cervical cancers between with and without HPV infection • Clinical diagnosis and therapy for preterm labor, preeclampsia and recurrent pregnancy loss • Roles of autophagy for folliculogenesis
Ophthalmology	Professor HAYASHI Atsushi	<ul style="list-style-type: none"> • Inhibition of ocular angiogenesis and drug delivery • Ophthalmic application of hyper-dried amniotic membrane • Rapid diagnosis and treatment of ocular infectious diseases • Quantitative analysis of eye movement and relationship to the diseases using the eye-tracker. • Gene expression and biomarker research on ocular tumors • To develop transplantation of iPS derived retinal pigment epithelium
Japanese Oriental Medicine (Kampo Medicine)	Professor SHIMADA Yutaka (will be retired in March 2023)	<ul style="list-style-type: none"> • Improving effects of Kampo medicines and their action mechanisms on microcirculation, vascular endothelial dysfunction and arteriosclerosis, etc. • Protective effects of Kampo medicines and their action mechanisms on cell and organ damages induced by neurological, hypertensive and diabetic diseases, etc. • Immunomodulating and defensive effects of Kampo medicines and their action mechanisms on immunological, allergic and infectious diseases, etc.
Biostatistics and Clinical Epidemiology	N/A	