Table I-1 List of Research projects Conducted by Academic Advisors (Medical Sciences)

Educational area Responsible teacher Contact address	Research contents
Anatomy Professor ICHIJO Hiroyuki ichijo@med	Using the advantages and specificities of in vivo and in silico studies, we study the neural basis of experience-dependent modification of neural circuits that regulate emotion and behavioral change, and evolution of the neural mechanisms of innate attack and defense behaviors.
Physiology Professor NISHIMARU Hiroshi nishimar@med	The amount of information processed in our brain in our daily life is estimated to be about 10 billion bits per second. These processes are carried out by the neural networks in the brain which are thought to be a real-time massive parallel processing system. Unraveling the mechanisms and principles of these networks is crucial for understanding how our brain works and also provides us a hint to live through the modern highly information-oriented society. To this end, we utilize neurophysiological and neuropsychological experimental approaches to elucidate higher brain functions including cognition of sensory information (input system), and behavioral manifestation based on sensory perception, memory, decision-making and motor control (output system).
Physiology Professor TAMURA Ryoi rtamura@med	This century will be the era of brain sciences. "The mind" has long been regarded as one of the most enigmatic psychological processes. Recent technological advances have enabled us to approach the neural basis of the mind. The purpose of our research is to elucidate brain mechanisms of "learning and memory", one of the key members of the mind. For this, we mainly use laboratory animals such as monkeys and rats, record neural activities in the brain of the animals while they perform a behavioral (learning and memory) task or they are asleep subsequent to the task performance, and analyze the pattern of brain activities.
Brain Science Professor INOKUCHI Kaoru inokuchi@med	Recently it has been clarified that neurons in the brain are active even when animals sleep or rest, denoted as “idling brain state”. Idling activity of the brain appears to play important roles in information processing than previously thought. In our laboratory, we aim to clarify the role played by idling brain by making full use of molecular biology, biochemistry, cell biology, histochemistry, electrophysiology,behavioral pharmacology, optogenetics, and live-imaging.
Systems Function and Morphology Professor ITO Tetsufumi itot@med	We do not sense the world as it is, but do collect the information which is important for our survival and recognize the sensory objects which are further selected by both unconscious and conscious processes. For the selection, which is essential for survival, animals possess sensory organs and neuronal circuitry which are optimized for their circumstances. Our laboratory mainly focuses on the hearing system, and study the mechanisms which allow to detect and sense the meaningful information for survival from environmental sounds. Using various techniques, we would like to investigate functional and morphological basis of the brain which allows the coding of sensory information, especially sounds, and the sensory perception.
Pathology Professor HIRABAYASHI Kenichi hiraken@med	Pathology is a field that deals with the pathophysiology and diagnosis of diseases. Pathology targets a wide range of diseases throughout the body, including not only malignant tumors but also inflammatory diseases. Until now, pathology has focused on the evaluation of macro- and microscopic morphology, but pathology is undergoing major changes with the introduction of molecular diagnostics and comprehensive genetic analysis. In our department, we are conducting clinical and basic research, including molecular methods, to elucidate the functions of diseases and to establish new disease concepts. In particular, we are conducting research on biliary tract and pancreatic diseases.
Pathology Professor TAKATA Katsuyoshi ktakata@med	Pathology is the study of classifying and describing diseases, investigating their characteristics, and researching their causes and development processes. In particular, it involves considering questions such as, "Why do these morphological changes occur in specific organs or tissues?" The essence of pathology research lies in elucidating the mechanisms behind disease onset and progression. In our department, we focus on investigating the mechanisms of disease development in malignant tumors, particularly hematologic tumors, from not only a morphological perspective but also from molecular biology and genetic perspectives.

Educational area Responsible teacher Contact address	Research contents
Molecular Immunology Professor KOBAYASHI Eiji ekoba@med	Immunity is a biological system that fights on the front lines of infection defense and cancer control. The immune system includes the innate immune system, which works in primary defense, and the acquired immune system, which works in secondary defense. In innate immunity, immune cells such as leukocytes and NK cells play a major role, while in acquired immunity, immune cells called B lymphocytes and T lymphocytes play a major role. The Department of Immunology conducts basic research on human and mouse B and T lymphocytes, focusing on analysis at the single cell level, and conducts research with the aim of applying the results to clinical practice. In addition, we are developing new analytical techniques for cancer immunotherapy and elucidation of immune diseases that occurred by unknown mechanisms.
Microbiology Professor MORINAGA Yoshitomo morinaga@med	The commensal microbiota on our body surface can affect our health and diseases. However, some microorganisms, which we call pathogens, also induce infectious diseases. We focus on the interaction between the microbiota and pathogenic microorganisms using culture- and molecular-based techniques and try to understand their roles on our health and diseases.
Molecular and Medical Pharmacology Professor NAKAGAWA Takashi nakagawa@med	Recently, a number of aging- and longevity-related molecules have been identified. Interestingly, most of them are linked with metabolism, and it has been reported that many of energy-sensing pathways are deeply involved in aging process. NAD (Nicotinamide adenine dinucleotide) is an important co-factor, and regulates various cellular processes, including energy metabolism, stress responses, and DNA damage repair. Decline of NAD metabolism causes physiological aging and aging-related diseases, such as cancer, neurodegenerative disease and metabolic disease. Aim of our laboratory is elucidating the molecular mechanism how NAD metabolism and its downstream targets regulate aging process. We also try to develop anti-aging therapeutics. Our lab takes the advantage of state-of-the-art techniques including metabolomics based on LC/MS and GC/MS, and mouse models in which various NAD synthesis and consuming enzymes are genetically engineered. We also elucidate the pharmacological action of KAMPO medicine using metabolomics.
Epidemiology and Health Policy Professor SEKINE Michikazu sekine@med	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. 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. ・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

Educational area Responsible teacher Contact address	Research contents
Public Health and Environmental Medicine Professor INADERA Hidekuni (will be retired in March 2025) inadera@med	Focus of children's environmental health is the discovery and prevention of diseases in children that are associated with harmful exposures from the environment. Our department is one of the regional centers of the Japan Environment and Children's Study, a nationwide birth cohort study in Japan. We also conducted toxicological research of environmental chemicals. The goal of occupational health is the promotion of the highest degree of physical, mental and social well-being of all workers.
Legal Medicine Professor NISHIDA Naoki nishida@med	We mainly interested in cardiovascular and neuropathology, and aim to establish the new aspect of the field. The area od studies are not localized in morphology, but the method of molecular biology is used. We try to perform investigation to contribute the progress of clinical medicine such as diagnosis and treatment, in addition to progress of forensic medicine.
Molecular Neuroscience Professor MORI Hisashi hmori@med	We focus on molecular basis of brain function and dysfunction. To develop the novel methods for diagnosis and cure of neurodegenerative and neurodevelopmental disorders, we have used molecular biological approaches to generate new mouse models of such disorders and new probes to detect functional change in the brain.
Health Professional Education Professor TAKAMURA Akiteru akiteru@med	Students will learn basic theories of pedagogy, andragogy and medical education based on cognitive psychology and behavioral science, etc., and research educational curriculum development, learner evaluation and assessment, teaching methods, etc. using these theories. In addition, we will conduct systems research in the area of primary care, including general practice, community-based comprehensive care, and multidisciplinary collaboration.
Clinical and Cognitive Neuroscience Professor HAKAMATA Yuko hakamata@med	We aim at understanding the neurobiological mechanisms underlying emotional dysregulation associated with distorted cognitions, and using this understanding to develop novel, effective psychological interventions for anxiety and depressive disorders. We address these questions from the integrative view including psychology, cognitive behavioral science, endocrinology, immunology, genetics, and neuroscience.
Gene Expression and Regulation Associate Professor KAIDA Daisuke kaida@med	Gene expression mechanism is indispensable for all organisms and defects in the mechanism cause many types of diseases. We are interested in gene expression mechanisms, especially pre-mRNA splicing and protein degradation. We are also interested in development of anti-cancer drug based on splicing inhibitors and development of drugs to cure aging related diseases which activate degradation of deleterious proteins accumulated in cells because of aging.
Diabetes and metabolism, rheumatic and respiratory diseases Professor KATO Masaru ktmasaru@med	・Since the number of patients with obesity and type 2 diabetes is increasing due to a high-fat diet, lack of exercise, their prevention as well as treatments are necessary. We are elucidating the pathophysiology from perspectives such as adipose tissue remodeling, regulation of muscle function, and interventions in the gut microbiota. ・We are conducting research on autoantibodies in rheumatoid arthritis and connective tissue diseases. ・The treatment of lung cancer is advancing rapidly with molecular-targeted drugs and immune checkpoint inhibitors. We are providing evidence for treatment strategies for lung cancer through a molecular biology approach and analysis of real-world data.
Internal Medicine Professor KINUGAWA Koichiro kinugawa@med	Cardiovascular diseases have been increasingly popular in Japan along with aging society. Ischemic heart disease due to atherosclerosis with uncontrolled multiple risk factors, valvular disease in aged population, heart failure as a terminal figure of all heart disorders, and a number of arrhythmias modifying their clinical course are common. It is crucial to find out the underlying mechanisms of them, and to explore the therapeutic and preventive strategies for them. Also, renal diseases are closely related with cardiovascular diseases, and the relationship has been called as cardio-renal syndrome. Not only primary kidney disease such as nephritis, but also secondary renal dysfunction caused by heart failure should be an important target for investigation.

Educational area Responsible teacher Contact address	Research contents
Internal Medicine Professor YASUDA Ichiro yasudaic@med	Gastrointestinal diseases are very popular and various. The second to fifth causes of cancer death in Japan are currently gastrointestinal cancers. Besides malignant tumors, they include benign tumors, inflammatory, infectious, and functional disorders. We elucidate the pathogenesis of such diseases and conduct basic and clinical studies on the diagnosis and therapy.
Internal Medicine Professor SATO Tsutomu tsutomus@med	With the advancement of an aging society, patients who have hematological malignancies have been steadily increasing. Since hematological malignancies are highly sensitive to chemotherapy, progress of chemotherapy has been accompanied by that of hematology. Hematopoietic stem cell transplantation was an answer reached by an extreme line of thought that the more chemotherapeutic agent was administered, the more cancer cells were killed. However, there were limits to that therapy, that is, severe side effects and multidrug resistance in tumor cells. Molecularly-targeted therapy and preventing side effects of chemotherapy is modern trends today. To meet such social needs, bench-to-bed research has been conducted in our department.
Clinical Infectious Diseases Professor YAMAMOTO Yoshihiro yamamoto@med	〔Research content〕 Study of infectious diseases 〔Guidance content〕 ・Pharmacokinetics-pharmacodynamics analysis of antimicrobial agents ・Appropriate antibiotic treatment with molecular microbiology ・Establishing surveillance system of nosocomial infection ・Analysis of prognostic factors of Legionella Infection
Dermatology Professor SHIMIZU Tadamichi shimizut@med	Environmental and intrinsic factors cause exacerbation of skin diseases. For example, percutaneous entry of environmental allergens through barrier-disrupted skin is strongly associated with the induction of immunological responses. Exposure to ultraviolet radiation leads to various acute deleterious cutaneous effects including sunburn and immunosuppression, and the long-term consequences lead to premature aging, including photo carcinogenesis. The purpose of our department is to investigate the mechanisms of cutaneous diseases caused by environmental and intrinsic factors.
Pediatric Developmental Medicine Professor IMAI Chihaya chihaya@med	In Department of Pediatrics, research projects to develop novel diagnostic and therapeutic strategies for intractable diseases in childhood and adolescents are performed. The research projects are set to investigate ways to solve the problems encountered in the clinics and the patient wards. The research projects include: ・pediatric hematology/oncology, ・pediatric immunology/allergology, ・pediatric cardiology, ・neonatology, ・emergency pediatrics and pediatric intensive care, ・pediatric nephrology and rheumatology, ・pediatric infectious diseases, ・pediatric neurology
Neuropsychiatry Professor TAKAHASHI Tsutomu tsutomu@med	Recent advances in brain imaging techniques have enabled us to explore brain structure and function non-invasively in vivo. However pathophysiology and mechanisms of mental disorders are still remain elusive. In our department, clinical and basic researches are being performed to elucidate pathophysiology of severe mental illnesses such as schizophrenia and to develop innovative and optimized approaches for diagnosing and treating patients for the purpose of improving their long-term outcome.
Diagnostic and Therapeutic Radiology Professor NOGUCHI Kyo kyo@med	By the rapid development of the medical imaging, not only high-resolution anatomical image but also functional image can be obtained. Using the functional images, we are able to evaluate the function and metabolism of the living body. We aim at developing the new imaging method of early diagnosis with combination of the high-resolution anatomical image and functional image

Educational area Responsible teacher Contact address	Research contents
Radiation Oncology Professor SAITOH Jun-ichi junsaito@med	Biological effects of physical and chemical stresses (radiation, ultrasound, hyperthermia, plasma and chemicals) and their application for therapeutics.
Surgery Professor YOSHIMURA Naoki ynaoki@med	We reach an aging society, and coronary disease, aneurysms, peripheral arterial disease, malignant neoplasms increase, and the less invasive surgical technique should be developed.
Surgery Specially Appointed Artificial Intelligence and Data Science Research TSUCHIYA Tomoshi tsuchiya@med	Collaboration with the Department of Biosystems and Biomedical Engineering, Faculty of Engineering, aims to regenerate lung organs. An organ regeneration method to recellularize rat decellularized tissue skeleton will be used to create disease models. Research areas will encompass stem cells, cell adhesion, mechanical stress, and cancer research. (Ref ; https://www.organengineering.com/)
Surgery Professor FUJII Tsutomu fjt@med	The aim of our research is to solve the clinical questions and feed them back to the clinical practice. Research for the science and technology about esophagus-gastro-enterological surgery, liver-biliary-pancreatic surgery, pediatric surgery and breast and thyroid disease surgery.
Neurosurgery Professor KURODA Satoshi skuroda@med	〔Research content〕 Neurosurgical aspects of basic and clinical research are included in this course. 〔Guidance content〕 (1) Stem cell research (2) Molecular and stem cell research of malignant glioma (3) Angiogenesis of cerebrovascular disorders (4) Cognitive function in neurosurgical disorders (5) Electrophysiological analysis (6) Epidemiological analysis of stroke
Orthopaedics and Locomotor System Science Professor KAWAGUCHI Yoshiharu zenji@med	・Developmental biology of skeletal tissues ・Pathomechanism of joint destruction ・Development of therapeutic strategy for arthritic diseases ・Genetic analysis of spinal disorders ・Biomarkers of spinal disorders ・Clinical outcomes of spinal surgeries ・Differentiation induction for malignant soft tissue tumors
Obstetrics and Gynecology Professor NAKASHIMA Akitoshi akinaka@med	Pregnancy is well balanced with sexual hormones, cytokines, chemokines, or angiogenic factors. As fetuses and mothers talk to each other during pregnancy, the disruption of this talk leads to some diseases in pregnancy, such as preterm labor, preeclampsia, or recurrent pregnancy loss. So far, we have focused on and investigated the relationship between fetuses and mothers from the viewpoints of immunology and molecular biology, especially autophagy, a mechanism for maintaining cellular homeostasis. Recently, we also tackle to develop new diagnostic technics for preterm labor, preeclampsia, or recurrent pregnancy loss, so called “bench-to-bedside”. For the gynecologic cancers, we tried to expect the prognosis by an immunological change in peripheral blood from women with MSI-high endometrial cancers. The technics might be available for other types of cancers. In addition, we investigate the role of autophagy for cervical cancers between with and without the HPV infection.

Educational area Responsible teacher Contact address	Research contents
Ophthalmology Professor HAYASHI Atsushi ahayashi@med	Ophthalmology is an area to research the eye which plays important roles in quality of life. The eye is a peculiar organ and needs specific approaches for its research. Our department focuses on quantitative analysis of eye movement using eye-tracker in strabismus patients, evaluation of treatment effects on orbital diseases using MRI images, neuroprotection research using ischemia-reperfusion model in animals. Our department is also researching new applications of hyper dry amniotic membrane for eye diseases. We aim translational researches.
Otorhinolaryngology - Head and Neck Surgery Professor MORITA Yuka yukam@med	We deal with diseases related to the sensory organs necessary for human life, as well as diseases related to breathing, swallowing, and sleep, which are important for maintaining life. In addition, it is necessary to treat all malignant tumors in the head and neck region while considering the preservation of their functions. In our department, we study the relationship between the sensory organs and brain functions, especially hearing and balance, establishing diagnostic and therapeutic methods for intractable middle ear diseases, and developing surgical treatments for nasal and paranasal diseases with emphasis on quality of life. In head and neck cancer treatment, we are conducting research directly related to clinical practice, such as the development of surgical methods for function preservation and the search for biomarkers for the selection of appropriate chemotherapy.
Urology Professor KITAMURA Hiroshi hkitamur@med	Our medical staffs in the department have dedicated themselves to better care for patients having urological diseases. We are conducting basic and translational research for providing various strategies for treatment of the diseases that patients are satisfied with. We are enthusiastic about studying basic science of urology that will lead to a future innovative treatment.
Anesthesiology Professor TAKAZAKA Tomonori takazawt@med	Anesthesiology has evolved to solve the problem of protecting patients from invasions added during surgery. In the process, anesthetics and analgesics have been developed and devised to administer such drugs effectively. Advances in equipment for monitoring vital signs have enabled anesthesiologists to monitor patients' respiratory and circulatory dynamics. In recent years, closed-loop systems, including electroencephalographs and muscle relaxation monitors, have enabled automatic control of anesthetics. On the other hand, patients undergoing surgery are getting older, and the proportion of patients with preoperative comorbidities is increasing. The number of patients requiring strict respiratory and circulatory control intraoperatively and postoperatively is increasing, and the scope of anesthesiologists' activities is expanding beyond the operating room. In light of this situation, our department is researching and developing anesthesia with fewer complications and optimal postoperative management.
Comprehensive Oral Sciences Professor YAMADA SHIN-ichi shinshin@med	・Research on pathological diagnosis and image diagnosis of oral diseases using artificial intelligence. ・Basic research on anticancer drug sensitivity using human oral squamous cell carcinoma cell lines. ・Basic research on cancer proliferation and invasion mechanisms using human oral squamous cell carcinoma cells. ・Immunological analysis using mouse oral squamous cell carcinoma model. ・Research on prevention of oral mucositis using human fibroblasts. ・Research on the development of minimally invasive oral cancer treatment. ・Research on the effects of oral bacteria on systemic diseases.
Clinical laboratory medicine Professor NIIMI Hideki hiniimi@med	In this master's course, we plan to have students engage in new research and development that advances and develops existing clinical examination methods. In order to advance and develop existing clinical testing methods, specifically, it is necessary to improve at least one of the rapidity, convenience, sensitivity, and specificity of testing, and as a result, contribute to clinical practice. Furthermore, if we can measure new biomarkers that have never existed before, there is even the possibility of creating new medical treatments. As mentioned above, I would like students to boldly take up the challenge of research and development with free thinking and a scientific approach.

Educational area Responsible teacher Contact address	Research contents
Japanese Oriental Medicine (Kampo Medicine) Professor KAINUMA Mosaburo kainuma@med	Due to the growing interest in Kampo medical practices in recent years, the number of doctors who prescribe Kampo medicine is increasing. Many prescriptions are evidence based, but it is difficult to know what should be done if the prescribed medicine is ineffective? Unfortunately, the number of Kampo medicines supported by evidence-based studies is limited, and something must be done to remedy this situation. The purpose of Basic Japanese Oriental (Kampo) Medicine is to understand the history and pathological concepts of Kampo, then to educate medical professionals in how best to use this knowledge in the diagnosis and treatment of our patients.
Neurology Professor NAKATSUJI Yuji (will be retired in March 2025) nakatsuj@med	The pathomechanisms of many neurological diseases are not well-known and there are few effective treatments against those disorders due to the lack of appropriate methods to elucidate. However, recent development of image analysis and analyzing biological samples, and neuroimmunological insight enable new approaches to elucidate. We need to learn latest knowledges and way of thinking to establish novel approaches to understand the disorders.
Emergency Medicine Professor DOI Tomoaki doit@med	Research Interests The concept of "saving lives" in emergency medicine is the starting point of medicine. Therefore, emergency medicine is an area that all medical professionals should learn. Emergency medicine is a fight against rapidly evolving invasions, and the challenge is how to provide damage control treatment or definitive treatment within the time constraints and limited amount of information to save lives. The analysis of pathophysiology and establishment of treatment methods for invasions are the research targets of emergency medicine. Contents of Instruction 1) Standardization of cardiopulmonary resuscitation and development of educational methods. 2) Standardization of primary trauma care and development of educational methods for medical professionals. 3) Standardization of disaster medicine and development of educational methods.
Clinical Oncology Professor HAYASHI Ryuji hsayaka@med	・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. ・Research of immuno-oncology with cancer model mice. ・Cancer metabolism. ・Cancer cell biology and target therapy. ・Cancer palliative care & herbal medicine
Patient Safety Professor NAGASHIMA Hisashi hisashin@med	Patient safety plays an important role in modern health care system but not well systematized. We are conducting basic and clinical research regarding systematic approach for creating and managing patient safety system and focused on changing healthcare environment affected by the current progress in health care sciences, divergence of public values, change of age composition and introduction of "Community-based integrated care systems".
Plastic, Reconstructive and Aesthetic Surgery Professor SATAKE Toshihiko toshi@med	Plastic, Reconstructive and Aesthetic Surgery aims to improve the patients' post-operative quality of life by correcting/enhancing the morphology, function, and color of their body surface with surgery, lasers, and other procedures. Our focus is on congenital anomalies of the face, extremities and trunk, trauma care and reconstructive surgery after cancer removal with better functional and cosmetic outcomes, anti-aging treatment, and cosmetic surgery. Our research mission is to look ahead 10-20 years, advance knowledge and create new treatment which is minimally invasive, with excellent functional and aesthetic outcomes and patient satisfaction.

Educational area Responsible teacher Contact address	Research contents
Artificial Intelligence and Data Science Research Professor TAKAOKA Yutaka ytakaoka@med	In our divisions, we address acupuncture research which is based on molecular cell biology and bioinformatics, molecular simulation-based mathematical modeling of medicine and social medicine research as follows: ・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 amino acid substitutions ・Application of AI technologies such as machine learning and natural language processing to improvement of hospital functions ・Research on diagnostic support of medical images by neural network analysis ・Research for medical treatment systems and elderly care service systems ・Research for Elderly Health Care as a Public Service of community healthcare ・Molecular mechanisms of therapeutic effects of acupuncture
Rehabilitation Medicine Professor HATTORI Noriaki hattorin@med	Based on the conventional concept of rehabilitation, namely, recovering physical and mental functions deteriorated due to diseases or injuries to overcome disabilities, recent rehabilitation medicine focuses on the individual "activity", and is aiming for having patients obtain better ADL (activities of daily living) and QOL (quality of life). The target diseases and injuries are not limited to the neurological and orthopedic diseases, but also include cardiovascular, respiratory, and other visceral diseases, cancer, sarcopenia, and frailty. The subjects of our research are the development of objective indicators for rehabilitation medicine using the latest technology and analysis methods for these disorders, as well as the creation of new rehabilitation intervention methods to promote functional recovery and to improve patients' ADL and QOL.
Innovative Clinical Research Professor CHUJO Daisuke dchujo@med	We are working on the development and support for innovative clinical research to investigate the pathology of various diseases and to develop novel therapies. We are not only conducting clinical research, but also investigating how to improve systems for conducting clinical research, such as supporting systems for writhing protocols, medical statistics, data management, and clinical research coordination, leading to the development of clinical research experts. In addition, we are conducting observational studies using the data from electronic health records, registry studies for various diseases, and interventional studies to develop innovative medicine. We are also working on the development of human resource handling medical data.
Behavioral Physiology Professor TAKAO Keizo takao@cts	"Mind" is one of many brain functions. The brain receives and processes various types of information necessary for the emergence of mind. An individual's behavior is the final output of brain functions. Even with today's technology, it is difficult to directly study "mind," but analyses of brain and behavior contribute to elucidating the principles of "mind". Our laboratory aims to resolve the cellular and molecular mechanisms of "mind", including memory, learning, and emotion, using behavioral genetics, optogenetics, data science, and pharmacological and physiological techniques. With these techniques, we also aim to resolve the pathophysiology of neuropsychiatric disorders and to develop treatments for these diseases. In addition, we are working to develop mouse models of nervous system diseases, and new reproductive technologies.
Medical statistics Professor YONEMOTO Naohiro yonemoto@med	Biostatistics have purposes to contribute to the development of medical and health care and the improvement of community health through the development and application of statistical methods, modelling, and efficient study designs. Real-world data on medicine and health, as well as clinical trials, clinical research, and epidemiological studies, are increasing exponentially from ever more diverse data sources, as well as rapidly advancing computing, and advanced analysis methods. Our department conducts methodological research on the development of new statistical theories and methods and their applications for medicine and health.

Table I-2 List of Research projects Conducted by Academic Advisors (Nursing Sciences)

Educational area Responsible teacher Contact address	Research contents
Fundamental Nursing Professor NISHITANI Miyuki nisitani@med Associate Professor YOSHII Miho umiho@med	1 Research on the development of rationales, methodologies, and scales to improve the quality of nursing practice 2 Research on the extraction of nursing logic in nursing practice, nursing education, and nursing management 3 Research on infection control 4 Research on hand hygiene 5 Research on anti-microbial effects of natural ingredients
Adult Nursing Professor YASUDA Tomomi tomomi@med	1 Research on cancer nursing 2 Research on social reintegration of persons with defecation disorders 3 Research on bedsore prevention and wound care 4 Research on adult nursing education 5 Research on nurse practitioner's role, responsibility, decision support, and team medicine across different fields
Maternity Nursing Professor HASEGAWA Tomomi thase@med	1 Research on perinatal mental health 2 Research on growth and development of children 3 Research on mother-child interaction 4 Research on family support for mothers and children 5 Research on mother-to-child infection 6 Research on pediatric clinical nursing
Gerontological Nursing Associate Professor NAKAHORI Nobue nakahori@med	1 Research on the health of the elderly 2 Research on dementia prevention
Psychiatric/Mental Health Nursing Professor HIGA Hayato hhiga@med	1 Research on mental health 2 Research on spiritual health 3 Research on mental and spiritual health nursing care 4 Research on psychiatric nursing education
Community Health Nursing Professor TAMURA Sugako tamusuga@med	1 Research on the evaluation of community health nursing 2 Research on the development of integrated community care and care-systems 3 Research on the method of health guidance for health problems caused by lifestyle
Human Science Professor KANAMORI Masahiko (will be retired in March 2025) kanamori@med	1 Basic research on human science and disease studies 2 Clinical research on medical practice 3 Research on hospital infection 4 Research on anti-microbial effects of natural ingredients
Human Science Professor IWATA Minoru miwa0717@med	1 Basic research on diabetes and metabolic syndrome 2 Clinical research on the management, epidemiology, and etiology of diabetes and metabolic syndrome 3 Research on hospital infections 4 Research on risk factors and prevention of obesity in university students
Behavioral Science Professor HORI Etsuro hori@med	1 Basic behavioral science research on emotion and communication 2 Physio-behavioral research on nursing art and science

Table I-3 List of Research projects Conducted by Academic Advisors (Pharmaceutical Sciences)

Educational area Responsible teacher Contact address	Research contents
Biopharmaceutics Professor HOSOYA Ken-ichi (will be retired in March 2026) hosoyak@pha	・Blood-retinal barrier transport function analysis and drug delivery to the retina ・Blood-retinal barrier cell reconstruction and analysis of interaction between cells ・Elucidation of biological function and transport function in in vivo barrier tissue
Applied Pharmacology Professor KUME Toshiaki tkume@pha	・Elucidation of pathogenesis mechanisms of neurodegenerative diseases, pruritus, pain and dysesthesia and search and development of preventive and therapeutic drugs for these disorders ・Establishment of novel animal models that exhibit the brain diseases and the sensory symptoms, such as itch, pain and dysesthesia ・Search for cytoprotective substances derived from foods and plants
Biorecognition Chemistry Professor TOMOHIRO Takenori ttomo@pha	・Chemical biology for efficient drug discovery: target identification, visualization, utilization, and manipulation ・Drug activity-based functional proteomics ・Synthetic multicomponent integration strategy toward chemical biology and drug discovery
Cancer Cell Biology Professor SAKURAI Hiroaki hsakurai@pha	・Elucidation of the molecular mechanisms of tumor progression via inflammatory signaling pathways ・Study on the activation mechanisms of molecular targets in cancer therapy ・Study on the intracellular signals in malignant progression of melanoma
Chemical Biology Associate Professor CHIBA Junya chiba@pha	・Chemical biology based on synthetic chemistry, particularly three projects in artificial DNA, protein control, and saccharide recognition
Synthetic and Medicinal Chemistry Professor MATSUYA Yuji matsuya@pha	・Development of new organic reactions for drug discovery ・Search for novel seeds of new drugs and structure-activity relationship research ・Synthesis and structural optimization of bioactive compounds
Molecular Neurobiology Associate Professor TABUCHI Akiko atabuchi@pha	・Elucidation of the molecular mechanisms underlying regulation of neuronal function and plasticity by gene expression and cellular communication between synapses and a nucleus ・Studies on neurological disorders caused by dysfunction of transcription factors and synaptic molecules ・Basic studies on transcription factors and synaptic molecules toward drug development targeted for neurological disorders
Gene Regulation Associate Professor HIROSE Yutaka yh620@pha	・Study on the molecular mechanism of transcription initiation by RNA polymerase II ・Study on the role of mammalian Mediator complex in controlling gene expression ・Study on the regulatory mechanism of pre-mRNA processing coordinated with transcription ・Study on the pathogenic mechanisms of human diseases caused by misregulation of gene expression program
Molecular Cell Biology Professor SO Takanori tso@pha	・Elucidation of the molecular mechanism of cytokine signaling regulated by TRAF5 ・Development of immunotherapeutic recombinant TNF family proteins ・Elucidation of the molecular pathology of X-linked adrenoleukodystrophy

Educational area Responsible teacher Contact address	Research contents
Synthetic and Biomolecular Organic Chemistry Professor YAKURA Takayuki yakura@pha	・Development of environmentally benign organic reactions ・Synthesis of biologically active natural products ・Pharmaceutical chemical research in bioactive substances
Biointerface Chemistry Professor NAKANO Minoru mnakano@pha	・Study of membrane lipid dynamics and elucidation of lipid transfer machinery ・Elucidation of lipid flip-flop mechanisms ・Biophysical research for interaction of amyloid beta with membranes ・Structural and functional investigation and pharmaceutical application of lipid nanoparticles
Structural Biology Professor MIZUGUCHI Mineyuki mineyuki@pha	・Studies on the conformations of disease related proteins ・Structural basis for intracellular membrane trafficking ・Protein structure-based drug discovery
Pharmaceutical Physiology Professor SAKAI Hideki sakaih@pha	Physiological, biochemical and pharmacological studies on normal and cancer cells to clarify 1) interactions between drugs and ion transporting proteins such as pumps, transporters and channels 2) functional relations among ion transporting proteins 3) pathophysiological functions of ion transporting proteins
Medical Pharmaceutics Professor TO Hideto hidetoto@pha	・Translational research for clinical application of chronotherapy ・Development of new drugs targeting factors regulating the circadian rhythm of morbid states ・Application of chronotherapy for individualized medicine ・Nasal formulation development and therapeutic application for CNS diseases by nose-to-brain drug delivery system
Clinical Pharmacology Professor SASAOKA Toshiyasu (will be retired in March 2026) tsasaoka@pha	・Development of new insulin sensitizers based on the mechanisms of type 2 diabetes and insulin resistance ・Elucidation of central mechanisms regulating energy and glucose homeostasis via inter-organ metabolic pathway ・Development of a novel treatment of diabetic complications based on the pathogenic mechanisms
Clinical Pharmacokinetics Professor HASHIMOTO Yukiya (will be retired in March 2025) yukiya@pha	・Basic and clinical research on pharmacokinetics and drug efficacy/toxicity: especially, analysis of effects of disease states, concurrently-administered drugs, and genetic polymorphisms on the function of the drug-metabolizing enzyme and transporter; furthermore, development of individualized dosage regimens based on the influencing factors identified
Pharmaceutical Therapy and Neuropharmacology Professor NITTA Atsumi nitta@pha	・Behavioral pharmacological, molecular biological and cell biological studies to clarify the function of the novel molecules for clarification of mechanism of psychiatric diseases onset ・Study for the clarification of the mechanisms of establishment of addiction of nicotine, THC and methamphetamine ・Clinical studies for the clarification of causes of onset of mental diseases
Pharmacy Practice and Sciences Professor TAGUCHI Masato taguchi@pha	・Development of minimal clinical trial design and data analysis for personalized medicine ・Optimization of dosing regimen based on the interindividual variability of physical development ・Problem formulation and scientific implementation in practice to address therapeutically relevant issues

Educational area Responsible teacher Contact address	Research contents
Integrative Pharmacology Professor TSUNEKI Hiroshi htsuneki@pha	・Development of novel therapeutic strategy to treat type 2 diabetes and its complications based on the pathogenic mechanisms ・Investigation of the mechanisms underlying the maintenance of glucose and lipid homeostasis by brain and inter-organ network ・Investigation of the role of olfactory and other sensory systems in the regulation of glucose and lipid metabolism
Clinical Pharmaceutics Professor KATO Atsushi kato@med	・Drug design and validation of chaperone compounds for rare lysosomal diseases utilising Protein-Ligand Docking ・Research on the development of functional cosmetics based on scientific evidence ・Research on the isolation and purification of the iminosugars from plants and their application as pharmaceuticals. ・Reverse translational research on Japanese and Chinese, taking into account clinical experience.
Pharmaceutical Technology Specially Appointed Associate Professor OKADA Kotaro kokada@pha	・Development of methods for evaluating the physical properties of pharmaceutical products using nuclear magnetic resonance relaxation
Molecular Genetics Professor TABUCHI Yoshiaki ytabu@cts	・Mechanical control of cell differentiation ・Elucidation of molecular mechanism of cellular stress response ・Reconstruction of tissue functions by immortalized cells
Pharmacognosy Professor SHOJI Tsubasa tsubasa@inm	1. Molecular regulation of alkaloid and terpenoid pathways in medicinal plants of the Solanaceae family. 2. Novel regulatory mechanisms of alkaloid pathways in tobacco plants. 3. Biosynthesis and accumulation of natural sweeteners. 4. Collaborate with industry partners to apply our research to the stable supply and production of herbal medicines.
Natural Products & Drug Discovery Professor MORITA Hiroyuki hmorita@inm	・Studies on biosynthesis of naturally occurring bioactive compounds ・Structural basis for secondary metabolite enzymes ・Enzyme engineering for novel drug development ・Isolation of bioactive compounds from plants, microorganisms, and marine organisms ・Investigation of Asia's natural resources not fully utilized ・Discovery of natural anticancer agents from medicinal plant resources by employing a novel antiausterity screening strategy ・Chemical investigation of medicinal plants and search for novel bioactive secondary metabolites ・Investigation of the structure-activity relationship of the active natural compounds and their mechanism of action against cancer cell survival pathways ・Discovery of metabolomics biomarkers associated with cancer cells by utilizing FT-NMR and MS strategy

Educational area Responsible teacher Contact address	Research contents
Neuromedical Science Professor TOHDA Chihiro chihiro@inm	・Elucidation of the molecular mechanism of restoring the neuronal network, and crosstalk between the central nervous system and peripheral organs to activate neural function. ・Traditional medicine research for developing fundamental therapeutic drugs for Alzheimer's disease, spinal cord injury, degenerative cervical myelopathy, glaucoma, and disuse syndrome. ・Clinical study aiming to develop new botanical drugs and new usage of Kampo formulas. ・Clinical study to analyze factors affecting physical and mental health and to identify biomarkers of wellbeing. ・Consilienceology for Wakan-yaku 1) Diagnosis for functional mental diseases based on the Wakan-yaku response, and clarification of molecular mechanisms for the diseases 2) Development of novel Wakan-yaku prescriptions to prevent lethal recurrence of heart failure
Host Defences Professor HAYAKAWA Yoshihiro haya@inm	・Study of NK cell biology and its roles in immunity ・Role of innate immune responses in cancer progression ・Immunological study of inflammatory & allergic diseases ・Modulation of immune responses and immunological diseases by Kampo medicines ・Study to regulate cancer progression & metastasis ・Elucidation of novel actions of kampo medicines and food factors on the basis of modulation of intraluminal bile acid metabolism in gastrointestinal tract
Complex Biosystem Research Professor NAKAGAWA Yoshimi ynaka@inm	・Functional analysis of transcription factors that regulate glucose and lipid metabolism ・Study for nutrient metabolism regulation by cell-cell and tissue-tissue interaction ・Study for the molecular mechanism of improvement of lifestyle-related diseases by Wakan-yaku
Presymptomatic Disease Professor KOIZUMI Keiichi kkoizumi@inm	・Understanding of the fluctuation of biometric information and its medical applications. ・Development of the glutaminase inhibitor and its medical applications. ・Elucidation of the function of immunostimulatory nanoparticles and nucleotide degradant discovered by traditional Japanese medicine (Kampo formula) and their medical applications.
Kampo Diagnostics Professor SHIBAHARA Naotoshi (will be retired in March 2026) shiba1@inm	・Pharmacological effects of Kampo medicines and their herbal components, as well as their mechanisms of action ・Search for indicators of clinical pathology of Kampo medicine and "sho"
Pharma-Medical Informatics and AI Specially Appointed Professor SUGANO Aki sugano@pha	・Prediction of drug efficacy of molecular target drugs or adverse drug reactions by molecular simulation or AI based analyses ・Binding affinity analysis of key molecules to human receptors by bioinformatics and molecular simulation ・Analysis of candidate compounds by *in silico* drug repurposing

・A portion of email address is listed in the contact address. Please use it for preliminary consultations with the relevant academic advisor in the field of your choice. Please add ".u-toyama.ac.jp" after the address.
Example) abc@def → abc@def.u-toyama.ac.jp