

Category (科目区分)	Master's Thesis		
Course Title (授業科目名)	Special Theme Research in Medical Science		
Instructors (担当者名)	Academic Affairs Chair	Academic Year (配当年次)	1,2
Required Course / Elective Course (必修/選択)	Required	Credits (単位数)	8
Class Format (授業形態)	experimental practice		
Schedule (開講期間)	Students will be notified by email after completing the course registration.		
Class Date/Period (開講曜日・時間)	Students will be notified by email after completing the course registration.		
Course Outline/ Course Objectives (授業の概要・到達目標)			
<p>Students will be trained in medical research activities in a laboratory supervised by a faculty advisor. This process includes developing the ability to understand original medical papers, setting research questions based on an understanding of the current state of the research field, designing and conducting experiments suitable for testing hypotheses, and discussing the results of the research. Students write a master's thesis and give an oral presentation to cultivate writing and presentation skills that will be important in any future career.</p> <p>Two interim presentations will be given at the end of the first year and at the middle of the second year.</p>			
Course Planning (授業計画)			
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	<p>Students will learn how to use a microscope to observe anatomical structures. In addition, students will learn how to use morphological approaches such as immunohistochemistry and electron microscopy by actually performing some of the basic research conducted in this course. Students can also learn molecular and cellular biological methods according to their own motivation.</p> <p>The specific research topics are mainly the pathogenesis of neurodegeneration and neuroregeneration in cerebrovascular diseases and demyelinating diseases. In addition, we are always available for technical consultations and joint researches, so please feel free to contact us.</p>	Yoshio Bando	Department of Anatomy
	<p>We will clarify the molecular basis that governs tissue construction and deepen our understanding of various pathological conditions caused by abnormal tissue morphology. We will tackle the following research topics by making full use of multifaceted methods including immunohistochemical staining, molecular genetics, imaging, and mathematical models.</p> <ol style="list-style-type: none"> 1. Research on intracellular localization of molecules using immunohistochemical staining. 2. Research on construction of tissues and organs. 3. Research on hepatic stellate cells. 	Yasukazu Hozumi	Department of Cell Biology and Morphology

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	<p>Research aims to understand the molecular mechanisms of brain function and to develop technologies to control these functions. In particular, research will focus on the mechanisms of synaptic transmission, which are fundamental elements of the brain. Molecular biology, electrophysiology, single-molecule imaging and mathematical modelling will be combined to address the following issues</p> <ol style="list-style-type: none"> 1. understanding the principles of neuronal synaptic transmission 2. to study developmental and pathological changes in synaptic function 3. the study of synapse regeneration 4. research on the artificial generation of synapses 	Takafumi Miki	Department of Cell Physiology
	<p>Studying pathological bases of the diseases with acquisition of research techniques in pathology.</p> <p>Topics</p> <ol style="list-style-type: none"> 1. Lung cancer development and microRNA 2. HPV-infected lung cancer and esophageal cancer 3. Clinicopathological characteristics of ATL in Akita Prefecture 4. Vascular endothelial cells and atherosclerosis 5. Cardiomyocytes in cardiomyopathy 	Akiteru Goto	Department of Cellular and Organ Pathology
	<p>Students will conduct research on diabetes and tumors, elucidate biological phenomena at the molecular and cellular level, and deepen our understanding of the mechanisms of physiology and pathophysiology. Students will learn how to conduct biomedical research through biochemistry/cell biology experiments, discussion of results, presentations, and writing research papers.</p>	Yoshihiro Matsumura	Department of Biochemistry and Metabolic Science
	<p>Students will be instructed to develop various approaches to clarify the functions in vivo of biologically active lipids, called lipid mediators. We have 1) searched for novel lipid mediators and receptors, 2) elucidated the intracellular signaling mechanism of lipid mediator receptors, and 3) investigated the function of lipid mediators at the cellular and individual (mouse) levels. We also aim to conduct basic research useful for the treatment of human diseases.</p>	Satoshi Ishii	Department of Immunology

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	Obesity and diabetes have become global epidemics due to the increased consumption of high-fat diets and shifts in dietary patterns. Students will engage in research focused on the regulation of glucose, lipid, and energy metabolism by various hormones and organs, utilizing molecular biology, cell biology, and genetically engineered animal models.	Hironori Waki	Department of Metabolism and Endocrinology
	Clinical issues related to general practice, immunological and allergic diseases, and infectious diseases will be studied using pathological, epidemiological, molecular, and cell biology methods.	Shigeharu Ueki	Department of General Internal Medicine and Clinical Laboratory Medicine
	Students will examine the mechanism and prevention of postoperative delirium and cognitive dysfunction that are likely to occur in the elderly using methods such as molecular biology and cell biology,	Yukitoshi Niyama	Department of Anesthesia and Intensive Care Medicine
	Radiological imaging is used in a wide range of clinical practice, including CT, MRI, and 18F-FDG PET-CT, and is used to evaluate the presence or absence of lesions, to assess disease activity, and to predict prognosis. In this course, we will learn the design and statistical methods of clinical studies using radiological imaging.	Naoko Mori	Department of Radiology
	With the remarkable development of optical coherence tomography (OCT), the understanding of the pathogenesis of retinal diseases has advanced dramatically. Recently, it has become possible to detect blood flow dynamics from OCT angiography. Based on the data obtained from the analysis of these images, we will continue our research on the elucidation of the pathogenesis of new retinal diseases.	Takeshi Iwase	Department of Ophthalmology
	To improve the quality of psychiatric care through objective assessment of clinical signs of mental illness and sleep-wake disorders using biological sensing techniques. Acquire data mining and analysis techniques.□	Kazuo Mishima	Department of Neuropsychiatry
	Innate immune system confers early protection against pathogens including viruses, bacteria, and parasites. Innate lymphoid cells are major components to produce helper cytokines and decide the type of immune responses. We are investigating physiological significance and regulatory mechanisms of innate lymphoid cells in the context of infections, allergy, and anti-tumor immunity.	Takashi Ebihara	Department of Medical Biology
	Critical and Emergency medicine covers a wide range of clinical areas, detailing cases of acute illness or injury. It contains pathophysiological analyses of acute illness or injury, whether the cause is medical and/or surgical. Studies of acute medicine include initial care in the emergency room, definitive treatment during acute phases of illness or injury and may also include subsequent critical care. In addition, acute medicine studies health care systems for acute patients, medical control systems and disaster medicine.	Hajime Nalae	Department of Emergency and Critical Care Medicine

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	Tumors contain heterogeneous stromal cells including cancer-associated fibroblasts (CAFs), inflammatory cells e.g. macrophages, endothelial cells and mesothelial cells. Interplaying of these stromal cells create a favorable niche for cancer cells, which sometimes precede to the infiltration of cancer cells, like soil pollution. We focus on the mechanisms of “How are pro-tumor stromal cells generated and how do they expand in tumors?” Clarifying the mechanisms of successive transmission of protumoral molecules from stromal cell to stromal cell may become a potential therapeutic strategy for prevention of tumor spreading and cancer progression.	Masamitsu Tanaka	Department of Molecular Biochemistry
	<p>•Mechanisms underlying the disordered regulation of liver-composing cells in liver diseases.</p> <p>The liver consists of different epithelial and mesenchymal cells, in which various cytokines induce apoptosis, regeneration, metaplasia, and proliferation. Our research is addressed to elucidation of regulatory mechanisms of apoptosis, metaplasia, and proliferation of hepatocytes and sinusoidal endothelial cells,</p>	Yasufumi Omori	Department of Molecular Pathology and Tumor Pathology [Reserch Building for Basic Medicine]
	To understand and study the global trends, causes, and treatment of gastrointestinal cancers, taking into account the actual situation in Akita Prefecture.	Katsunori Iijima	Department of Gastroenterology and Neurology
	<p>To analyze molecules involved in hematopoietic tumor, such as cell signaling, structural protein, or metabolism, etc. by biochemistry / molecular biology / immunochemistry / cell biology methods.</p> <p>To discuss the biological and clinical significance and to consider the possibilities of the drug discovery.</p>	Naoto Takahashi	Department of Hematology, Nephrology, and Rheumatology
	<p>The basic concepts in hepatobiliary surgery, pancreatic surgery, gastric surgery, and colorectal surgery.</p> <p>Address some previous clinical research to understand basic approach to surgical science.</p>	Junichi Arita	Department of Gastroenterological Surgery
	The basic and applied research in General thoracic surgery	Kazuhiro Imai	Department of Thoracic Surgery
	Students will learn research and analysis methods and perform actual research and analysis in urologic oncology, renal transplantation, renal replacement medicine, pediatric urology, regenerative medicine and urology, neuro-urology, male infertility, and more.	Tomonori Habuchi	Department of Urology
	Research will be conducted on the development of novel anti-tumor compounds, mechanism elucidation, drug discovery, and clinical application. In particular, tumor immunostimulatory and remark-preventive effects will be investigated.	Hiroyuki Shibata	Department of Clinical Oncology

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	<p>Students will solve research problems centered on ion channels by fully using the molecular physiological methods shown below in a multi-hierarchy from various molecules that control our body's homeostasis to individual organisms. In the process, learn and practice related knowledge and skills. In addition, presentation skills will be cultivated by presenting research content. Through these series of experiences, students acquire a research mindset which leads to lifelong education.</p> <ol style="list-style-type: none"> 1. Molecular functional analysis of gene and protein expression of intracellular signals and membrane transporters 2. Physiological analysis of cell function 3. Physiological analysis of model animals 	Tomohiro Numata	Department of Integrative Physiology
	Learn the historical process and current issues of surgery for aortic dissection and discuss the future trends.	Hiroyuki Nakajima	Department of Cardiovascular Surgery
	We aim to elucidate the pathology of bone and joint diseases and to develop new treatment strategies, by conducting research using pathological, biomechanical, molecular biological methods on animal models and clinical cases, and by the evaluation of physical functions using motion analysis. These studies will contribute for all the clinical issues related to orthopedic diseases such as spine/joint diseases, bone metabolic disorders, and bone and soft tissue tumors.	Naohisa Miyakoshi	Department of Orthopedic Surgery
	To learn the pathogenesis of various genetic skin diseases, students will be instructed how to do gene analysis in practice. Particularly we focus on genetic pigmentary disorders, genetic keratotic disease and genetics of atopic dermatitis.	Michihiro Kono	Department of Dermatology and Plastic Surgery
	Clinical and basic research results of otolaryngology, head and neck surgery, tracheoesophageal surgery, upper respiratory medicine, allergy, immunity, sensory organs, and cancer should be well understood. Furthermore, the clinical research activities such as writing and presenting papers could be mastered.	Takechiyo Yamada	Department of Otorhinolaryngology – Head and Neck Surgery
	Learn techniques and methods that are essential for data analysis and presentation of the results in meetings and in scientific journals. Students will be asked to complete a paper that can be submitted and accepted in a scientific journal and eventually get the medical doctor degree. Research work is to be continued thereafter.	Hiroaki Shimizu	Department of Neurosurgery
	Each student will acquire clinical research activities, such as reading original papers, discussing research results, and writing and presenting papers, throughout the course of the cardiovascular research program.	Hiroyuki Watanabe	Department of Cardiovascular Medicine
	Through practice of search in respiratory medicine, the graduate students will acquire clinical research activities such as reading original papers, consideration of research results, and preparation and presentation of papers.	Katsutoshi Nakayama	Department of Respiratory Medicine

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	Mechanisms of large cargo secretion. Although collagens and chylomicrons are essential molecules within the cell body, the mechanism of secretion of these molecules are not well understood, because these molecules are too large to fit into conventional vesicles. Therapeutic targets of fibrosis We would like to find the therapeutic targets for fibrosis by understanding the mechanisms of secretion of these molecules.	Kota Saito	Department of Biological Informatics and Experimental Therapeutics,
	Graduate students practice research activities of pediatric medicine, such as reading original papers, planning research, discussing research results and writing and presenting papers. Through the course of research, students will cultivate and acquire writing and presentation skills that will be important in any future career.	Manatomo Toyono	Department of Pediatrics
	Assisted reproductive technologies (ART) such as in vitro fertilization (IVF) for infertility were covered by insurance in 2022, and are becoming increasingly popular. As a result, one in ten babies born in Japan is now being born using this technology. However, the cell biological knowledge of in vitro manipulation of human life, even for a short period of time, is still extremely limited, and it is necessary to accumulate such knowledge for the sound development of ART in the future. I would like to deepen this issue together with the students, as it concerns the future of human being.	Yukihiro Terada	Department of Obstetrics and Gynecology
	Through practice of search in pediatric surgery, the graduate students will acquire clinical research activities .	Masaru Mizuno	Department of Pediatric Surgery
	The student learns a process of the postmortem investigation and joins examination and data handling. Also, the student studies to elucidate the cause of death. About the results of research, an instructor instructs the student for presentation to academic conference and journal. The forensic autopsy is performed at any time regardless of a holiday, the night. The student is careful about infection and must adhere rigidly to confidentiality. The student should choose this course after consultation with an instructor.	Akira Hayakawa	Department of Forensic Sciences
	The student learns various epidemiological studies that contribute to public health issues such as the declining birthrate, aging population, cerebrovascular disorders, and cancer prevention, and is expected to publish a scientific paper and presentations at relevant academic conferences.	Kyoko Nomura	Department of Environmental Health Science and Public Health
	How should medical education be structured in the future? We study practical outcome-based education technique, considering the medical situation in Japan,	Hitoshi Hasegawa	Department of Medical Education

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	<p>Individuation therapy based on information of genetic polymorphism and pharmacokinetics is one technique improving treatment outcome by drug therapy. Here, students carry out the following studies; 1) Analysis of genetic polymorphisms of enzymes or drug-transporters related to pharmacokinetics, 2) quantitative methods of drug concentration in blood/plasma/serum.</p>	Masatomo Miura	Department of Pharmacokinetics
	<p>To contribute to the development of healthcare systems aimed at maintaining and improving the quality, efficiency, and equity of medical care, we conduct research on medical information systems and the utilization and management of their data.</p> <ol style="list-style-type: none"> 1. Development and implementation of evaluation methodologies and methods for healthcare systems using real-world data. 2. Research on the design of medical information systems. 3. Research on the role and utilization of medical information in society. 	Tetsuya Otsubo	Department of Medical Informatics
	<p>We will conduct reverse translational research on clinical questions related to drug therapy using various analytical instruments and medical databases.</p> <ol style="list-style-type: none"> 1. Research on a precise quantitative method for drugs in biological samples 2. Research on pharmacokinetics, pharmacodynamics, and pharmacogenetics 3. Research on pharmacoepidemiology using real-world data 4. Research on regional medical cooperation 5. Research on pharmaceutical health care and sciences using Artificial Intelligence 	Masafumi Kikuchi	Department of Pharmaceutics
Contact Information (問い合わせ先(氏名, メールアドレス等))			
Name: School affairs division, In charge of Graduate School / E-mail: gakumu-in@jimu.akita-u.ac.jp			
Comment (その他特記事項)			
<p>Course Information: If you are a working graduate student and cannot attend the practical training due to your work schedule, we will adjust the schedule. Textbooks and references: materials will be distributed as necessary. Learning contents in self-study: preparatory study according to the class contents is recommended.</p>			