GRADUATE SCHOOL OF MEDICAL SCIENCE

Anatomy	Medicine Ⅰ(Respiratory)	Surgery Ⅰ(Chest Surgery)	Advanced Techno-Surgery
Anatomy and Developmental Biology	Medicine Ⅱ(Endocrinology and Hypertension)	Surgery Ⅱ(Breast, Endocrine, Pediatric Surgery)	Gene Medicine
Pathology Ⅰ (Department of Human and Experimental Pathology and Neuroscience)	Medicine Ⅲ(Diabetes and Metabolic syndrome)	Cardiovascular Surgery	Organ Replacement
Pathology Ⅱ(Human and Molecular Pathology)	Medicine Ⅳ(Nephrology)	Department of Therapeutic Strategy for Severe Heart Failure	Tissue Regeneration
Microbiology and Immunology	Cardiology	Gastroenterological Surgery	Integrated Medical Sciences
Physiology Ⅰ(Neurophysiology)	Gastroenterology	Chemotherapy on Digestive Organs	Cooperative Major in Advanced Biomedical Sciences
Physiology Ⅱ(Molecular and Cellular Physiology)	Neurology	Neurosurgery	
Biochemistry	Hematology	Orthopedic Surgery	
Pharmacology	Rheumatology	Plastic and Reconstructive Surgery	
Hygiene and Public Health Ⅰ (Occupational and Environmental Health)	Psychiatry	Ophthalmology	
Hygiene and Public Health Ⅱ (Pidemiology and Preventive Medicine)	Pediatrics	Otolaryngology	
Legal Medicine	Dermatology	Obstetrics and Gynecology	
International Affairs and Tropical Medicine	Radiation Oncology	Anesthesiology	
Medical Education	Diagnostic Imaging and Nuclear Medicine	Urology	
		Oral and Maxillofacial Surgery	
		Critical care and Emergency medicine	

ANATOMY

About us

Our main research focus is the molecular mechanisms regulating cell proliferation and differentiation during retinal development and regeneration. We also study on the neural circuitry in hippocampal and parahippocampal areas of the brain, the development of the human skull and the mechanism of arterial calcification during osteoporosis. As we teach gross anatomy to medical students, the gross anatomy course including lectures and cadaver dissection is also offered if requested.

Research

1)Mechanisms regulating the proliferation and differentiation of retinal cells during development

The retina is a part of the central nervous system consisting of 6 types of neurons and 1 type of glia (Müller glia). During development, retinal progenitor cells increase their number by proliferation, but eventually exit the cell cycle and differentiate into specific cell types. Molecular mechanisms regulating this process are only partially understood. We study the role of cell cycle regulators, transcription factors, and epigenetic factors in the developing rodent retina using histological and molecular biological techniques.

The gene of interest is injected into the subretinal space of the newborn rat retina, electroporated and the expression analyzed after 3 days.

(2)Retinal neuronal regeneration by Müller glia

In lower vertebrates like fish, Müller glia dedifferentiate to retinal progenitors, proliferate and redifferentiate to neurons when the retina is damaged. However, such regenerative capacity of Müller glia in mammals is very limited. We are investigating the mechanisms that limit the regenerative potential of Müller glia and exploring the strategy to repair damaged retina by activating the endogenous regenerative potential of the mammalian retina.

ANATOMY

(3)Morphological analysis of memory circuits in the mammalian species.

3D reconstruction of the rat retina, explanted after MNU-induced photoreceptor damage. Müller glia, which enter the cell cycle (EdU positive, red) redifferentiate into photoreceptors (Recoverin positive, green). Blue, DAPI nuclear stain.

It is predicted that the most essential portion of the memory circuit is generally preserved from rodents to primates. To elucidate such fundamental connections, we invesigate neuronal connections between the hippocampus and parahippocampal cortices (i.e., the presubiculum, parasubiculum, and entorhinal cortex) in several mammalian species including the rats, rabbits and marmosets. Standard tracers, such as HRP, CTB, and BDA, are injected into the hippocampal body or several parahippocampal cortices, which allows investigation of the input-and-output connections between these areas on the cell mass level. We also use the *palGFP*-expressing Sindbis virus vector to analyze axonal arborizations and terminations of single neurons.

(4)Morphological analysis of the commissural entorhino-dentate fibers following unilateral entorhinal lesion.

It is known that, following unilateral lesion of the entorhinal cortex of the adult rat, the denervated granule cells of the dentate gyrus are reinnervated as a result of the growth of the pathway from the surviving contralateral entorhinal cortex. To investigate the morphological features of sprouted commissural entorhino-dentate fibers from single entorhinal neurons, we use the *palGFP*-expressing Sindbis virus vector as the anterograde tracer. The vector is useful for tracing long and highly arborized axonal branches and it is possible to detect some unknown morphological changes in the reinnervated fibers. Our study may contribute to understanding the mechanisms of spontaneous recovery from memory impairment, which is caused by degeneration of the entorhinal cortex.

ANATOMY

(5)Morphogenesis of the human fetal cranial bones.

Although there has been interest in the morphogenesis of the human fetal cranial bones for many years, the 3D results have only been published as schematic illustrations in authorized textbooks because of the lack of acceptable observation techniques. We investigate the morphogenesis of the human fetal temporal bone using very high resolution CT (μ-CT).

Tomographic images of the cochlea of the human fetus. The internal structure of the cochlea is not clearly seen by standard medical CT (a). By contrast, the resolution of μCT is much higher and the Reissner's membrane (2 cell thick) is clearly visualized (b).

(6)Local correlations between calcified arteriosclerosis and rarefaction of bones (osteoporosis).

We investigate the local correlations between calcified arteriosclerosis and rarefaction of bones (osteoporosis) by the bone morphometry based on the μ-CT image of the lower legs of the arteriosclerosis obliterans (ASO) patients derived from diabetes and oxalosis (dialysis) and their control groups. Photoelectric spectroscopy and *in vivo* SPECT with 99m-Tc-HMDP using rabbits suggested that ectopic bone formation is involved in the calcification. Elucidation of the mechanism of this correlation is important because the 2nd and 3rd places of the cause of death of our country are vascular diseases and the population of osteoporotic patients is very high in aging society.

(7) Decrease of the effect of X-ray radiation exposure.

If we can apply μ-CT for the clinical use, it would be extremely useful for the early detection of diseases, development of the therapy and the study of the experimental medicine. However, μ-CT cannot be used for the living human bodies without enormous quantity of radiation exposure. To solve this problem, we are attempting to decrease the effect of X-ray radiation exposure and currently exploring how to control the vital reaction of • OH, in collaborations with other universities.

- **Faculty**

Hiroki Fujieda **Yoshiko Honda** **Takashi Shibata** **Toru Hayakawa**
Fuminori Saitoh **Norihiro Sudou** **Kaori Nomura-Komoike**

publication

ANATOMY AND DEVELOPMENTAL BIOLOGY

About us

The department was founded in February, 1956 as Second Department of Anatomy by Professor Morio Ihnuma (till March, 1985) taking charge of histology. After his retirement, Professor Eizo Aikawa directed the department and proceeded to embryology in addition to histology (from September, 1988 till March, 2001). The name of the department was changed to Department of Anatomy & Developmental Biology in April 1992. The department has been directed by Taichi Ezaki from Kumamoto University since May, 2001.

The aims of our education program are to demonstrate the beauty, exquisiteness and heterogeneity of living creatures and to consider the relationship between their morphology and biological function. The department is in charge of Cytology & Histology and Human embryology & Comparative embryology. Students learn general human microscopic anatomy and the mechanisms of embryogenesis during the course of integrated curriculum for the undergraduate medical education in Tokyo Women's Medical University.

Research

The department is open to all students and scientists who are interested in any morphological approaches to medical biology. Our strategies are a variety of morphological techniques including polychromatic immunohistochemistry, in situ hybridization, and computer-based image analyses for 3-demensional structures. The main facilities available are fluorescent light microscopy, phase-contrast microscopy, Nomarski differential-interference-contrast microscopy, confocal laser scanning microscopy, transmission electron microscopy, and scanning electron microscopy. Both in vivo animal operation system and in vitro cell culture system are also undertaken in addition to various approaches in molecular biology.

ANATOMY AND DEVELOPMENTAL BIOLOGY

- **Faculty**
  - Shunichi Morikawa (Senior lecturer) Ph.D.
  - Kazuhiko Shimizu (Instructor) Ph.D.
  - Sachiko Kikuta (Instructor) Ph.D.
  - Shuji Kitahara (Instructor) D.D.S., Ph.D.
  - Masae Morishima (Instructor) V.S., Ph.D.
  - Ayako Sedohara (Instructor) Ph.D.

publication

PATHOLOGY I

(DEPARTMENT OF HUMAN AND EXPERIMENTAL PATHOLOGY AND NEUROSCIENCE)

About us

1st Department of Pathology is entrusted with the following three major missions for Tokyo Women's Medical University: (1) medical education on teaching etiology and pathomechanisms of common and rare diseases, (2) medical research on molecular pathology and neuroscience for medical student, graduate school student and research fellows; and (3) medical contribution by diagnostic activities on pathological anatomy and surgical pathology. In medical education, we regard active learning concerning pathophysiology based on morphological and functional changes of several organs. In medical research, we aim at determine molecular pathomechanisms of human diseases using materials obtained from human tissues as well as experimental animals and cultured cells as disease models, which may be in turn directed to establishment of novel therapeutic strategies. In pathological anatomy, we make pathophysiological stories, which occurred in the body of died patients, clear, and make use of the obtained results and assessments for the future. In surgical pathology, we work promptly and practically and provide information that is useful for choosing the most suitable medical service on the living patients.

Research

(1) Molecular mechanisms of motor neuron death in amyotrophic lateral sclerosis

(2) Cancer cell metabolism taking into consideration for establishment of novel therapeutic strategies

(3) Molecular mechanisms of activated microglia and reactive astrocytes in penumbra at acute stage of ischemic stroke

(4) Molecular mechanisms of atherosclerosis

(5) Molecular pathology of neovasculization in glioma

(6) Involvement of fukutin in maturation and proliferation of several types of cells

(7) Molecular mechanisms of invasion and metastasis of thyroid cancers

(8) Molecular mechanisms of postnatal neurogenesis

PATHOLOGY I

(DEPARTMENT OF HUMAN AND EXPERIMENTAL PATHOLOGY AND NEUROSCIENCE)

- **Faculty**

Noriyuki Shibata (Professor & Chairman) taking charge of (1) (2) (3) (4)
Tatsuo Sawada (Professor) taking charge of (5)
Tomoko Yamamoto (Associate Professor) taking charge of (6)
Motoko Niida-Kawaguchi (Lecturer) taking charge of (1) (8)
Yoichiro Kato (Assistant Professor) taking charge of (7)
Kenta Masui (Assistant Professor) taking charge of (2)

publication

PATHOLOGY Ⅱ

(HUMAN AND MOLECULAR PATHOLOGY)

About us

Pathology is the study of cause, origin and nature of disease. We contribute to the clinical services including surgical pathology and autopsies, research and medical school education. We conduct research utilizing molecular biological techniques, which bridge the gap between microscopic-level response to cellular damage and molecular mechanisms involved in disease development. Because all pathologists in our department have background of clinical experience, clinical questions that arise from clinical work will be the target of our research. The technicians have excellent skills to support our work from clinical diagnosis to laboratory research. We have a friendly atmosphere. Please feel free to drop in our department.

Research

Research in our department is broad and varied, and all investigators focus on human disease. Some of us study cancer and try to understand the molecular mechanisms of tumor growth and metastasis through mitochondrial morphology. Other research interests are vascular calcification and abnormal bone metabolism, metabolic fatty liver disease, and pathogenesis of FSGS and diabetic nephropathy, utilizing electronmicroscopy, fluorescence microscope, and FACS analysis, besides molecular methodology. We have lab meetings regularly with the whole staff members to help focus on our research goals. We hope to conduct basic/clinical research in collaboration with other divisions or institutions.

Faculty

Hideaki Oda, Professor, Chair of the Second Department of Pathology
Sekiko Taneda, Assistant professor (pathogenesis of FSGS and diabetic nephropathy)
Kenta Uto, Research associate (Vascular calcification and abnormal bone metabolism)
Saeko Kanai, Research associate (Vascular calcification and abnormal bone metabolism)
Akane Yamauchi, Research associate (Regulation of mitochondria in tumorigenesis)

publication

MICROBIOLOGY AND IMMUNOLOGY

About us

The Department of Microbiology and Immunology covers a range of fields in research and in teaching, from immunology, which studies how the immune system of the body protects itself from infectious diseases, to microbiology, which focuses on microbial structure, genetics and metabolism. Our basic research is undertaken in close collaboration with the university hospital physicians, for the aim to understand how host immune response endeavors to overcome microbial infection, and how pathobionts elicit pathogenesis to inflammation, autoimmunity, and allergy.

Research

(1) Antigen-induced immune responses of T cells and B cells: Mechanisms underlying differentiation and maturation of lymphocytes in response to allo-, auto- and super-antigens will be studied by using experimental mice.

(2) T cell maturation and aging: Investigation into T cell responses from newborns to the elderly in humans will provide insights into how to combat age-related immune-antigen interactions, in infection, cancer and autoimmune diseases.

(3) Immune cells in inflammatory diseases: Kinetics of innate and acquired immune cells will be analyzed in correlation with gut microbiota, in autoimmune diseases, allergy and metabolic syndrome. Pathogenic factors contributing to host responses will be characterized in the aim to seek its underlying pathogenesis for primary inflammatory diseases.

(4) Infection-induced shock: Exotoxins of staphylococci and streptococci will be utilized in systemic shock induction. Innate, acquired and humoral immune responses, as well as shock-inhibitors, will be analyzed in mice to clarify the mechanism by which exotoxins elicit pathogenesis in the infected host.

(5) Molecular and biochemical analysis of *de novo* superantigens: Structural and functional analysis will be elucidated on the superantigens detected and purified from shock patients.

MICROBIOLOGY AND IMMUNOLOGY

- **Faculty**

Professor, Chief Lecturer	Naoko Yanagisawa
Associate Professor	Ikuko Haruta (administrative leave)
Part-time Lecturer	Kenichi Imanishi
Associate Lecturer	Hidehito Kato
Assistant Professor	Miyuki Miyake
Assistant Professor	Shigeru Ashino
Assistant Professor	Toshifumi Osaka

publication

PHYSIOLOGY I
(NEUROPHYSIOLOGY)

- **About us**

How is our brain circuit assembled during the course of development and how does the mature network respond to the changes in environmental cues? In order to tackle these questions, we employ multiple levels of techniques including the molecular biology, mouse genetics, histology, *in vitro* slice as well as *in vivo* electrophysiology and the animal behavior. We actively involve researches with laboratories for clinical medicine and also welcome you to join our laboratory as PhD student from clinical department.

- **Research**

(1) Rewiring mechanism of neuronal circuits in the central nervous system

Neural circuits are dramatically refined under the influence of external environments and experiences during development. Even though neural circuits have reached full maturity, the rewiring of circuits can occur again after deafferentation such as the limb amputation. Synapses in the sensory thalamus are known to undergo the synaptic rewiring during postnatal development and deafferentation. We examine the regulation of synaptic function under the synaptic remodeling in the somatosensory system using a combination of tools *in vivo* and *in vitro*, including electrophysiological and imaging techniques, as well as genetically manipulated mice.

(2) Mechanisms underlying postnatal development of sensory synapses and maintenance after maturation

The elimination of early-formed redundant synapse is a fundamental process for this developmental refinement of neural circuits. After maturation, the neural circuits are maintained. We explore mechanisms of this synapse pruning during development and the synaptic maintenance using electrophysiological techniques in combination with pharmacological and/or molecular biological methods.

PHYSIOLOGY I
(NEUROPHYSIOLOGY)

(3) Towards elucidating the endophenotypes of autism spectrum disorders (ASD)

By utilizing developmental genetics strategies, we were able to establish mouse models with social and working-memory deficits. In addition to the genetic and molecular mechanisms underlying these behavioral phenotypes, we examine the cortical networks and synaptic properties.

- **Faculty**

Professor and Chairperson Mariko MIYATA
Assistant Professor Madoka YUKIMOTO (NARUSHIMA)
Assistant Professor Yuki KIUCHI (YAGASAKI)
Assistant Professor Hironobu OSAKI
Assistant Professor Yoshifumi UETA
Assistant Professor Goichi MIYOSHI

publication

PHYSIOLOGY Ⅱ

(MOLECULAR AND CELLULAR PHYSIOLOGY)

About us

Physiology is an important academic field on functions of living organisms. Physiological research aims to understand the mechanisms how living organisms live. Department of Physiology II is involved in molecular and cellular physiological research. We are studying the function of genes and proteins using the fast-growing information of genome scientific understandings. We use genetically-modification technology and RNA intereferences to contribute medical sciences and physiology.

Research

(1) Molecular genetic analyses on vesicular trafficking
(2) Molecular genetic analyses on neuronal development via transcription factors
(3) Development of gene therapy by RNA intereferences
(4) Pathophysiological analyses on cell death
(5) Mechanisms of diseases related to endoplasmic reticulum
(6) Mechanism on the maintenance of pluripotency in the stem cells

Faculty

Shohei Mitani,
Sawako Yoshina,
Sayaka Hori,
Yuji Suehiro,
Katsufumi Dejima,
Satoru Iwata,
Tomoko Motohashi

publication

BIOCHEMISTRY

About us

Biochemistry is a scientific field to try to understand life phenomena in the molecular level. Understanding of life phenomena includes elucidation of structure-function correlation and its regulation in health and disease.

We are conducting research on structure-function correlation of cell membranes, especially on fundamental issues regardless that they may be out of fashion, based on unique ideas and strategies.

We mainly use human red blood cells as the best material for membrane research, because i) the subject in medical school should be human, and human red blood cells are readily available. ii) Red blood cells are indispensable for life. iii) Membrane functions (deformability and membrane stability) can be quantitated. iv) Membrane abnormalities result in diseases, i.e., hemolytic anemia, or malaria parasite invasion.

Research

(1)Maintenance and regulation of red cell membrane function (cell morphology, deformability, and membrane mechanical stability).

(2)Interaction between various red cell membrane proteins (measurement of a dissociation constant, and association or dissociation rate constants)

(3)Mechanism(s) for modulation of membrane protein functions by posttranslational modifications such as phosphorylation or glycation.

(4)Mechanism(s) for maintenance and disruption of asymmetric distribution of phospholipids in lipid bilayer. Identification of flippase and scramblase and elucidation of mechanism(s) through which their functions are modulated.

(5)Mechanism(s) for dying of human red cells, which lack nuclei. Elucidation of mechanisms for two “eat me signals”, clustering of band 3 and exposure of PS to the outer leaflet.

BIOCHEMISTRY

(6)Mechanism(s) for malaria parasite invasion of red cells: trial to prevent parasite invasion.
(7)Self-organization hypothesis of membrane architecture. Analysis of single-molecule fluctuation.
(8)Mechanism(s) for degranulation in mast cells. Classification of, and membrane fusion between distinct classes of granules.
(9)Investigations of the red cell membrane from patients such as hemolytic anemia (in corroboration with many hospitals).

- **Faculty**

Fumio Nakamura(professor)
Ichiro Koshino (lecturer)
Shotaro Tanaka (assistant professor)
Nobuto Arashiki (assistant professor)
Yuji Henmi (assistant professor)
Mikiko Ito
Tomohiko Iwakami
Mayumi Enoki

publication

PHARMACOLOGY

About us

We focus on cancer- and inflammation-related genes in tumor cell proliferation and metastasis and have been investigating roles of those genes in a metastatic process composed by tumor growth at primary site, extravasation, intravasation, and regrowth at metastasized sites. We also examine effects of primary tumors on tumor microenvironment and pre-metastatic organs. We use various experimental materials such as vascular endothelial, bone marrow, pulmonary epithelial, liver, and immune cells with various experimental techniques, and each researcher vigorously promotes own research project at own discretion.

Research

(1) Signal transduction in cancer
  1) Molecular functions of oncogene and tumor suppressor
  2) Cellular pharmacology of tumor-bearing or leukemia model mice
(2) Molecular biology of vascular endothelial cells
  1) Growth factor signaling
  2) Vascular development
(3) Molecular biology of Reactive oxygen species (ROS)-related signal
  1) Regulation of gene expression by ROS and/or free radicals
  2) Molecular mechanisms of ROS production
(4) Molecular biology of chaperons
  1) Molecular functions of Heat shock proteins (HSP-54, -70, -90) in stress signal
  2) Dysfunction of HSPs in pathophysiological settings
  3) Molecular interactions regulated by chaperons and drugs

PHARMACOLOGY

(5) Molecular biology of steroid-responsive factors
1) Regulatory mechanism of the glucocorticoid receptor
2) Regulatory mechanism of steroid-related signal by glucocorticoid receptor-binding proteins

- **Faculty**

Prof. Yoshiro Maru
Degree: M.D., Ph.D.
Research interest: Inflammation and Metastasis, CML, angiogenesis
Papers: http://www.twmu.ac.jp/Basic/yakuri/paper.html

publication

HYGIENE AND PUBLIC HEALTH I

(OCCUPATIONAL AND ENVIRONMENTAL HEALTH)

About us

Physical and chemical factors present in both general and occupational environments affect our health. Much attention has been paid in recent times to environmental exposure to toxic metals, dioxins, persistent organic pollutants, volatile organic compounds and fine particulate matter, as well as to the effects of global environmental issues on public health. Workplace exposure to organic solvents and metal compounds remains a key factor that causes harmful clinical or subclinical intoxication. The primary objective of research in our laboratory is to clarify the molecular mechanisms of toxic chemical-induced cell dysfunction and cell death (or cell proliferation) using the techniques of molecular and cellular biology. Identification of signaling molecules that promote cell survival or cell death is important for designing preventive strategies against toxic chemical-induced cellular damage. In addition to *in vitro* studies, zebrafish (*Danio rerio*) and the nematode *C. elegans* are utilized as model organisms in these toxicological research projects. Our recent research interests are focused on signal transduction pathways that lead to apoptosis and autophagy, endoplasmic reticulum (ER) stress and subsequent unfolded protein response (UPR). In addition to the above areas of laboratory investigation, studies on women's health and occupational health are ongoing projects in our department. We hope to welcome many young researchers to work with us on molecular and cellular toxicology research projects.

Research

1. Effects of toxic metals on the signaling pathways responsible for cell survival/death
2. Role of ER stress and UPR in toxic chemical-induced cell death
3. Toxicological studies on the cellular damage induced by nano-sized fine particles
4. Developmental toxicology using zebrafish as a model organism
5. Molecular mechanisms of the neurotoxic substance acrylamide
6. Investigation of occupation-related diseases and their prevention

HYGIENE AND PUBLIC HEALTH Ⅰ

(OCCUPATIONAL AND ENVIRONMENTAL HEALTH)

- **Faculty**

Masato Matsuoka, M.D., Ph.D.
Noriko Kojimahara, Ph.D.
Yuta Komoike, Ph.D.
Kota Fujiki, Ph.D.
Takamitsu Miyayama, Ph.D.

publication

HYGIENE AND PUBLIC HEALTH Ⅱ

(PIDEMIOLOGY AND PREVENTIVE MEDICINE)

- **About us**

Physical and chemical factors present in both general and occupational environments affect our health. Much attention has been paid in recent times to environmental exposure to toxic metals, dioxins, persistent organic pollutants, volatile organic compounds and fine particulate matter, as well as to the effects of global environmental issues on public health. Workplace exposure to organic solvents and metal compounds remains a key factor that causes harmful clinical or subclinical intoxication. The primary objective of research in our laboratory is to clarify the molecular mechanisms of toxic chemical-induced cell dysfunction and cell death (or cell proliferation) using the techniques of molecular and cellular biology. Identification of signaling molecules that promote cell survival or cell death is important for designing preventive strategies against toxic chemical-induced cellular damage. In addition to *in vitro* studies, zebrafish (*Danio rerio*) and the nematode *C. elegans* are utilized as model organisms in these toxicological research projects. Our recent research interests are focused on signal transduction pathways that lead to apoptosis and autophagy, endoplasmic reticulum (ER) stress and subsequent unfolded protein response (UPR). In addition to the above areas of laboratory investigation, studies on women's health and occupational health are ongoing projects in our department. We hope to welcome many young researchers to work with us on molecular and cellular toxicology research projects. The Department of Public Health was founded by Professor Hiroto Yoshioka and has been chaired by Professor Naohito Yamaguchi since 2002. We provide educational programs and conducts researches about public health, which treats various global health issues for health promotion.

We offer high quality education in public health for preparing the next generation of researchers and physicians in the field of public health, as well as dissemination of knowledge to health professionals and the general public. We are committed to the enhancement of quality of health not only in our own country, but internationally.

HYGIENE AND PUBLIC HEALTH Ⅱ

(PIDEMIOLOGY AND PREVENTIVE MEDICINE)

We offer high quality education in public health for preparing the next generation of researchers and physicians in the field of public health, as well as dissemination of knowledge to health professionals and the general public. We are committed to the enhancement of quality of health not only in our own country, but internationally.

In our researches, we assess the distribution and determinants of human illness with the aim of establishing reasoned preventive measures by using epidemiological method. We investigate the etiology of disease in human populations, evaluate health care delivery, develop methodology for translating epidemiologic research findings into clinical medicine, and develop approaches for applying the findings of epidemiologic research in the formulation of public policy. We make continuous efforts to improve methods for epidemiological investigation, to enhance validity and efficiency, and to expand the scope of activities in which epidemiologic methods can be usefully applied.

- **Research**

(1) An epidemiological study and risk assessment for a circumstance of urban life and health

With a rapid change in urban life, the safety of environmental factors, which did not exist before, has often become a problem. We are conducting a case-control study on mobile phone use and brain tumor in collaboration with international research institutions. Students can use in these epidemiological data and get involved in each phase such as developing a plan, conducting a research, collecting information and analyzing the data. In addition, students can systematically collect relevant medical literature published throughout the world, and perform a risk assessment for safety through the qualitative and quantitative evaluation including meta-analysis and pooled analysis. Through these activities, students can acquire ability to plan and conduct an epidemiological study and furthermore to perform a risk assessment based on scientific evidence.

HYGIENE AND PUBLIC HEALTH Ⅱ

(PIDEMIOLOGY AND PREVENTIVE MEDICINE)

(2) Epidemiological studies that have applied behavioral sciences and social sciences

Epidemiological studies that have applied behavioral sciences (behavioral epidemiology) reveal the law of health behavior of people by scientific investigation. Epidemiological studies that have applied social sciences (social epidemiology) reveal about the social factors that define the people's health. In our laboratory, we have been conducting studies on the consciousness and the change of behavior of the exercise and studies on consciousness and behavior of quit smoking. In this program, we will decide the theme, create a research plan, and conduct a survey. And then we will carry out the statistical analysis and study about the effect of behavior and society to the people's health.

(3) A study on epidemiological evaluation of clinical practice

We are conducting a study on epidemiological evaluation of diagnostic and therapeutic approaches in collaboration with the other clinical departments. Based on this program, we can take in graduate students in a clinical department for a certain period. The graduate students can perform practical training, such as developing a study plan, conducting a study and performing statistical analyses, on the subject of practical clinical issues.

- **Faculty**

Professor on joint appointment: Yoshio Uetsuka

Professor on joint appointment: Takahiro Okamoto

Part-time Assistant Professor: Narumi Eguchi

Part-time Assistant Professor: Mariko Fujikawa

Assistant Professor: Yasuto Sato

Instructor: Motoki Endo

Instructor: Kosuke Kiyohara

publication

LEGAL MEDICINE

About us

The primary research topics currently addressed by the division include “traumatic brain injury” and “accident diagnosis and prevention.”

1) Diagnosis of and research on traumatic brain injury for medicolegal death investigation

Interpreting the situation resulting from a head injury, and the causal relationship between damage and disorder, are required in forensic medicine. Until now our research has focused on nerve cell degeneration caused by head injury, neuropathy caused by foreign bodies in the brain, and the relationship between accidents and dementia among the elderly. We continue to pursue our research, identifying important issues in the course of our forensic practice and verifying them through methods including experiments on animals that employ basic laboratory procedures.

2) Accident Diagnosis and Prevention

Major causes of death include falls, abnormal environments, acute intoxication, and traffic accidents, and researching their diagnosis and prevention is necessary to ensure public safety and peace of mind. We analyze accidents involving children and the elderly, examining and investigating the relationship between accidents and existing or latent conditions as well as complications resulting from accidents. Also, for pathological changes requiring a determination of condition or damage caused by an abnormal environmental, we perform histomorphological and molecular-biological analyses to study causes and conditions and to detect information that will assist in making a determination. Furthermore, we also research the toxicological and forensic aspects of the relationship of accidents to drugs and toxic substances.

Research

1. Damage to the brain caused by head injury: Analyze damage to the brain caused by head injuries through histomorphological and molecular-biological analyses using experiments on animals.

2. Brain conditions caused by abnormal environments: Devise methods of autopsy diagnosis by understanding the morphological changes in the brain caused by high and low body temperature.

LEGAL MEDICINE

3. Forensic pathology and clinical forensic medicine: Devise methods of autopsy diagnosis or sickness and injury prevention by gathering and analyzing examples of sudden or accidental death.
4. DNA analysis for personal identification

- **Faculty**
- Professor KIBAYASHI, Kazuhiko
- Lecturer SHIMADA, Ryo
- Lecturer TAKI, Takashi
- Assistant professor NAKAO, Ken-ichiro
- Assistant professor MACHIDA, Mitsuyo
- Assistant professor TATARA, Yuki

publication

INTERNATIONAL AFFAIRS AND TROPICAL MEDICINE

About us

Our department is focused on field-oriented research on global health and tropical medicine using our experiences on global cooperation of health and research networks from home and abroad. Further, we aim to train experts with a global perspective through research experiences and support their activities in the global community.

Research

1. Malaria parasites resistant to antimalarial drugs

The *Plasmodium falciparum* has a well-developed ability, through different processes and mechanisms, to become resistant to antimalarial drugs, being a challenging issue for malaria control. After the discovery of genes in the *Plasmodium falciparum* that confer the resistance to antimalarial drugs, the molecular mechanisms of the action for resistance are becoming unveiled. The genetic elements coding for resistance are contained on chromosomal and/or on extra chromosomal (Mitochondrial) elements. At the same time, molecular population genetic analyses using sophisticated methods to determine the patterns of microsatellite variability flanking the resistance genes have elucidated the geographic origins and spread of parasite drug resistance. Thus, in addition to its mechanistic details, understanding of evolution and spread of drug resistance provide a rationale for pharmacological intervention to overcome the exacerbation and rampancy of drug-resistant parasites in the fields.

INTERNATIONAL AFFAIRS AND TROPICAL MEDICINE

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2. Treatment choice of caretakers on their child's acute infectious illnesses

Treatable infectious diseases, such as malaria, pneumonia and diarrhea, are the main cause of death in the developing countries. Health service provision with prompt and adequate treatment is the one of main disease control strategies and understanding on treatment seeking behavior is essential to promote utilization of the health facilities. We investigate treatment choice of caretakers for their child illness using econometric and epidemiological analyses on empirical data from a cohort population in the developing countries. Our research outcomes will contribute policy implications for disease control.

- **Faculty**

Takahiro Tsukahara, Lecturer

Miki Sakurai, Assistant professor

Hajime Honma, Assistant professor

publication

MEDICAL EDUCATION

About us

The department of medical education was established in 1995 followed by a foundation of a chair of medical education in 2003. The role of our department is to explore how to think, how to teach, and how to evaluate in order to create proper medical education system adapted to academic, medical, and social changes. So far we have introduced new curriculums, have developed new educational methods such as Problem-based Learning (PBL) and Team-based Learning (TBL), and have reformed clinical clerkship.

In undergraduate medical education we teach students how to study as medical students to become physicians. In postgraduate education we teach how to teach others.

It is a very interesting theme to research bringing up people. We welcome graduate students who are interested in learning a theory of the medical education, developing new education system, practicing it, and evaluating it. You can continue your clinical or basic medical work during the terms.

Research

(1)Development of educational system

(2)Development and evaluation of Outcome-based Education (OBE) curriculum

(3)Measurement of educational effects

(4)Study on professionalism in medical students and medical doctors

(5)Study of leaning characteristics among female medical students and support for continuous employment for female doctors

(6)Development of teaching strategy and evaluating methods of clinical decision making

Faculty

Yumiko Okubo (Professor, chairperson)

Kagari Murasaki (Endowed associate professor)

Taiyo Suganuma (Research associate)

publication

MEDICINE Ⅰ
(RESPIRATORY)

- **About us**

The First Department of Medicine, Tokyo Women's Medical University is one of the leading institutes of respiratory medicine in Japan. We have 26000 outpatients and 11000 inpatients every year in our department. Our clinical fields cover all respiratory diseases such as pneumonia, lung cancer, bronchial asthma, COPD, pulmonary fibrosis, sleep apnea syndrome and so on. We also perform basic and clinical research on respiratory medicine to develop the new methods and therapies in this field. Especially, our themes are as follows; airway inflammation and remodeling in asthma and COPD, airway secretion, chemotherapy of lung cancer, pulmonary circulation, respiratory rehabilitation, and new techniques of bronchoscopy. We recently focus on the studies using the techniques of molecular biology and cellular physiology. We hope everyone coming to our institute and studying with us.

- **Research**

1. Clinical Research

Management and treatment in asthma and COPD

Research on abnormal airway secretion in chronic inflammatory airway diseases including asthma, COPD, DPB, and bronchiectasis

Efficacy of chemotherapy in lung cancer

A research of driver oncogene for lung cancer using micro specimen by a bronchoscopy

2. Basic Research

- Remodeling of the airway diseases
- Regulation of smooth muscle contraction in the airway and the pulmonary vasculature
- Ion transport in the airway epithelium
- Basic study towards regenerative medicine
- Apoptosis and senescence of the lung cells

MEDICINE Ⅰ
(RESPIRATORY)

- **Faculty**
- Professor： Etsuko Tagaya
- Associate Professor：Mitsuko Kondo
- Associate Professor：Kiyoshi Takeyama
- Instructor：Ken Arimura
- Instructor：Ayako Kubo
- Instructor：Rie Mizobuchi

publication

MEDICINE Ⅱ

(ENDOCRINOLOGY AND HYPERTENSION)

About us

Our department is in charge of hypertension and endocrine diseases. We have been giving ourselves 1) to establish strategies to "cure" hypertension, 2) to create novel treatments for endocrine diseases by utilizing epigenetic analyses, and 3) to discover novel humoral factors originating from endocrine organs to apply innovative drug development for lifestyle-related diseases. Our ultimate goal is to bring up our graduate students to excellent researchers to win Nobel Prize in Physiology or Medicine.

Research

(1) Investigations of roles and regulatory mechanisms of the (pro)renin receptor in endocrine and endocrine-related diseases (Instructors: Ando T, Morimoto S, Ichihara A)

(2) Analyses of the blood pressure control system by the diencephalohypophysial renin-angiotensin-aldosterone system (Morimoto S, Ichihara A)

(3) Mechanism analyses of the tissue renin-angiotensin system dependent organ damages by thyroid dysfunction (Morimoto S, Ichihara A)

(4) Elucidation of pathophysiological roles of steroid hormones in lifestyle-related diseases (Ando T, Ichihara A)

(5) Elucidation of tumorigenesis mechanisms of adrenal tumors via ectopic receptor expressions (Watanabe D, Morimoto S, Ichihara A)

(6) Establishment of appropriate evaluation criteria for endocrine diseases (Yatabe M, Morimoto S, Ichihara A)

(7) Investigations of regulatory mechanisms of neurohumoral factors and anti-atherosclerotic effects by medications for lifestyle-related diseases (Morimoto S, Ichihara A)

(8) Investigations of pathophysiology of hypertension induced by neurovascular compression of the rostral ventrolateral medulla (Morimoto S, Ichihara A)

(9) Mechanism analyses of the blood pressure control system by sex hormones (Yatabe J, Morimoto S, Ichihara A)

MEDICINE Ⅱ

(ENDOCRINOLOGY AND HYPERTENSION)

- **Faculty**

Atsuhiro Ichihara: professor, department head
Satoshi Morimoto: associate professor
Takashi Ando: assistant professor
Daisuke Watanabe: assistant associate
Junichi Yatabe: assistant associate
Midori Yatabe: assistant associate

publication

MEDICINE Ⅲ

(DIABETES AND METABOLIC SYNDROME)

About us

The Diabetes Center was established to provide the best comprehensive and up-to-date care for patients with diabetes and their families in order to reduce the number of patients and families suffering from diabetes-related diseases.

We provide patient education, medical treatment and early detection and interventions for the complications related to diabetes based on the latest research and treatment by a multidisciplinary staff to facilitate the best possible outcome for the patient.

We have a wide range of patients, those newly diagnosed with diabetes, those who have had some diabetes education before, those who need some up-to-date education, and those with and without severe complications. We provide educational programs mainly in the inpatient units, but also in the outpatient units according to each patient's needs.

Research

http://gyoseki.twmu.ac.jp/twmhp/KgApp?kozac=N10000000000&year=2016

Faculty

Tetsuya Babazono Professor & Chairman
Shigehiko Kitano Professor
Tomoko Nakagami professor
Makiko Ogata Lecturer
Reika Yanagisawa Lecturer
Jyunnosuke Miura Lecturer

publication

MEDICINE Ⅳ
(NEPHROLOGY)

- **About us**

In 1979, Kidney center was established in Tokyo women's medical university, and the department of medicine (nephrology) was also established as a clinical department in that Kidney Center at that time.

In 1983, the department medicine IV was established as the chair. Under the guidance of professor Kosaku Nitta, about 90 doctors of the member of department of medicine IV make an effort on the clinical site, research, and education every day.

Our clinical policy is to give the first priority to our patients. Chronic kidney disease is not short term disease, then we must help and cooperate our CKD patients for a long time. Without considering a disease alone, we always take care of our CKD patients with considering patient's minds and social backgrounds. That's our most important point. Therefore, we have considered that our aim of research is to analyze the questions from patients in actual clinical settings and to return the answers and results to the patients. The senior residents make an effort on clinical and/or basic research, because we recognize that to take Ph.D. (Doctor of Philosophy) is the start to become a real doctor. We perform the clinical research based on a lot of clinical and pathological data, and also perform the basic research with animal disease models, patient's genetic information, and regenerative medicine to recognize deeply the pathophysiology.

- **Research**

① Chronic Glomerulonephritis (CGN): Rituximab treatment for nephrotic syndrome (NS). Prognosis, treatment, and risk factors of IgA nephropathy, lupus nephritis and ANCA related nephritis.

② Chronic Kidney Disease (CKD): Analysis of mineral and bone disorder (MBD), vascular calcification (VC)and risk factors in CKD patients.

③ Autosomal dominant polycystic kidney disease (ADPKD): Genetic analysis. Tolvaptan treatment. Quality of life in ADPKD patients with polycystic liver.

④ Hemodialysis (HD): Analysis of mineral and bone disorder, vascular calcification and anemia in HD patients

MEDICINE Ⅳ
(NEPHROLOGY)

- **Faculty**

Kosaku Nitta (Professor, Chairman)
Ken Tsuchiya (Professor, Department of Blood Purification)
Keiko Uchida (Professor, Student health care center)
Toshio Mochizuki (Professor, Clinical research division for polycystic kidney disease)
Mitsuyo Itabashi (Assistant Professor)
Takahito Moriyama (Assistant Professor)

publication

CARDIOLOGY

- **About us**

Under Construction

- **Research**

Under Construction

- **Faculty**

Under Construction

publication

GASTROENTEROLOGY

About us

Digestive internal medicine is targeted to many organs, including the liver, gallbladder, pancreas and gastrointestinal tract (esophagus, stomach, duodenum, small intestine, large intestine). The target diseases are various, consisting particularly of high incidences of gastric cancer, colorectal cancer, liver cancer, and pancreatic cancer. Early detection of these diseases is difficult. There are many research challenges, and the mission of our Department is to identify the pathogenesis of these diseases, and define early diagnosis and treatment. We cooperate with the Department, as well as both inside and outside the basic research groups and facilities. We are looking for young researchers for digestive science.

Research

(1)Hemodynamics and therapy of gastric and esophageal varix
(2)Therapy of virus hepatitis,
(3)Improvement of long survival in the patients with liver transplantation
(4) Hepatocarcinogenesis from NASH,
(5) Genomic background in liver diseases,
(6) Basic and clinical research of autoimmune pancreatitis
(7) Early detection of pancreatic tumor
(8) Regeneration of colon epithelial cell

Faculty

Professor; Katsutoshi Tokushige MD
Etsuko Hashimoto MD
Shinichi Nakamura MD
Kyoko Shimizu MD

Senior lecture; Maiko Taniai MD
Nobuyuki Torii MD
Bunei Iizuka MD
Tomomi Kogiso MD
Yukiko Takayama MD

publication

NEUROLOGY

About us

Our goal of the basin and clinical study is to clarify the pathophysiology and develop the novel therapeutic strategy for neurological disease. We cover wide range of neurological disease including stroke, parkinson-related disease, neuro-inflammatory disease, dementia and peripheral nerve and muscle disease. We employ several clinical examination such as MRI/CT, SPECT, ultrasound, MEP/SEP, NCV/EMG and EEG. We publish many original articles covering wide area of neurology in peer-review journals. Many clinical studies are now on going together with basic experimental studies for stroke. We welcome all researchers interested in neurology.

Research

1. Experimental studies for ischemic tolerance and remote ischemic conditioning for brain protection
2. Clinical studies for ESUS (embolic stroke of undetermined source)
3. Pathophysiology for neuro-inflammatory disease (MS/NMO)
4. Gait disturbance analysis for Parkinson-related disease
5. Neuropsychological analysis for dementia patients
6. Neuroimaging (SPECT, DAT, MIBG) for neurodegenerative disease
7. Pathophysiology for CIDP/MMN using samples in peripheral nerve and muscle biopsy

Faculty

Professor and Chairman; Kazuo Kitagawa

Associate Professor; Yuko Shimizu, Mutsumi Iijima

Lecturer; Hiroshi Yoshizawa

publication

HEMATOLOGY

About us

Our goal of the basin and clinical study is to clarify the pathophysiology and develop the novel therapeutic strategy for neurological disease. We cover wide range of neurological disease including stroke, parkinson-related disease, neuro-inflammatory disease, dementia and peripheral nerve and muscle disease. We employ several clinical examination such as MRI/CT, SPECT, ultrasound, MEP/SEP, NCV/EMG and EEG. We publish many original articles covering wide area of neurology in peer-review journals. Many clinical studies are now on going together with basic experimental studies for stroke. We welcome all researchers interested in neurology.

Research

(1)Role of NK cells on hematopoietic stem cell transplantation
(2)Analysis of imunne response after hematopoietic stem cell transplantation
(3)Analysis of imunne response during treatment of hematological diseases
(4)Development of new cell therapies for hematological diseases
(5)Analysis of gene mutations of hematological diseases
(6)Analysis of molecular mechanisums of myelodysplastic syndrome (MDS)
(7)Prognostic factors of malignant lymphoma

Faculty

Junji Tanaka, MD, PhD. Professor & Chairman
Naoki Mori, MD, PhD. Associate professor
Masayuki Shiseki, MD, PhD. Associate professor
Kentarou Yoshinaga, MD, PhD. Lecturer

publication

RHEUMATOLOGY

About us

Department of Rheumatology, Tokyo Women's Medical University is aiming to foster a physician scientist who can understand basic and clinical research of rheumatology and is able to plan, implement, and instruct a cutting-edge and high-quality research project. In basic research, students are encouraged to understand molecular mechanisms of systemic rheumatic diseases and to obtain ability to find a novel cause and/or mechanism of diseases. In clinical research, we request our students to understand clinical epidemiology and biostatistics, and garner a capability to find and publish novel evidence based on ethical and scientific research plan.

Research

1. Basic research

- Molecular mechanism of preclinical stage of rheumatoid arthritis and strategy for prevention of disease onset
- Association of genetic variants and expression of peptidylarginine deiminase genes
- Molecular pathogenesis of systemic lupus erythematosus
- Genetic approach to immunopathogenesis of ANCA-associated vasculitis
- Molecular mechanism of fibrotic changes in systemic sclerosis

2. Clinical research

- A large-scale cohort study of rheumatoid arthritis (IORRA)
- Pharmacoepidemiological study of rheumatoid arthritis
- Pathogenesis, diagnosis, and treatment of pediatric rheumatic diseases
- Diagnosis and treatment of systemic lupus erythematosus
- Clinical epidemiological study and clinical development of a novel molecular targeted therapy of ANCA-associated vasculitis

RHEUMATOLOGY

- **Research**
- Diagnosis and treatment of systemic sclerosis
- Clinical epidemiological study of gout
- Clinical epidemiological study of spondyloarthritis
- Big data analysis for pharmacoepidemiological study of rheumatic diseases

- **Faculty**

Masayoshi Harigai, MD, PhD.	Professor and Chairman
Atsuo Taniguchi, MD, PhD.	Professor
Yasushi Kawaguchi, MD, PhD.	Associate Professor
Eiichi Tanaka, MD, PhD.	Associate Professor
Takako Miyamae, MD, PhD.	Assistant Professor
Naomi Ichikawa, MD, PhD.	Assistant Professor
Yasuhiro Katsumata, MD, PhD.	Assistant Professor

publication

PSYCHIATRY

About us

Psychiatry, a branch of clinical medicine, deals with a wide range of human behavior, from various mental disorders to mental health among healthy people. The range of methodologies used in psychiatry include traditional methods such as physiology, biochemistry, pharmacology, as well as public health, humanistic methods such as psychology, as well as cognitive behavioral science and computational analysis. In the 21st century, mental disorders impose a substantial disease burden on societies around the world. Researchers face increasing challenges in elucidating the pathophysiology of mental disorders and developing appropriate treatment methods. Thus, psychiatry is an exciting field of scientific research that promises an academic sense of fulfilment and a sense of accomplishment for ambitious students.

Research

1)Basic psychopharmacology

Understanding the mechanisms of psychiatric disorders and psychotropic drugs is important for developing protocols for appropriate use. Thus, our laboratory undertakes basic psychopharmacology research with own experimental facility. Our main research themes are stress, memory, vulnerability and resilience. Our research seeks to optimize pharmacological therapy.

Clinical psychopharmacology

2)This is a field of research focused on informing rational judgments about pharmacotherapy for psychiatrists in general clinical settings. By advancing this area of study, we seek to update and standardize the way psychotropic drugs are used in daily medical practice. We engage in several specific projects, including the investigation of factors that predict clinical responses or side effects of pharmacotherapy, verifying the validity of rating scales in some psychiatric illnesses, and carrying out clinical trials of psychoactive drugs before marketing.

PSYCHIATRY

3)Clinical research in consultation-liaison psychiatry including palliative care

We have traditionally emphasized consultation-liaison psychiatry. In collaboration with various medical departments, we are conducting active clinical research in the following fields: organ transplantation (kidney, liver and heart), rheumatic diseases (systemic lupus erythematosus), heart diseases, and delirium. In addition, as members of the palliative care team for patients with cancer, we also conduct multidisciplinary research.

- **Faculty**

Katsuji Nishimura, MD, PhD
Professor and chairman
Consultation-liaison psychiatry

Hitoshi Takahashi, MD, PhD
Lecturer
Clinical psychopharmacology

Ken Inada, MD, PhD
Lecturer
Basic and clinical psychopharmacology

publication

PEDIATRICS

About us

We often feel that the key to the successful management of a disease of unknown pathogenesis in our field of specialization is always hidden in some unfamiliar field. The slogan of our department is 'From incurable to curable'. Are you satisfied with the present standard treatment of intractable diseases associated with chromosomal anomaly or cerebral palsy ? If your answer is 'No', then please join us to investigate new strategies for these incurable diseases. We are currently trying to find new ways to utilize regenerative medicine in order to be able to effectively treat those diseases.

Research

1. Study to elucidate the pathogenesis of Kawasaki Disease (Dr. Nagata)

In our previous study, we found certain microbes that produce heat-shock protein 60 and which have superantigenic-like properties on the surface of the pharyngeal and upper gastrointestinal tract mucosa, which might play a role in the onset of Kawasaki disease. We will perform further investigations on these microbes in this project.

2. Investigation of vaginal bacterial flora causing premature delivery. (Dr. Nagata)

We recently developed novel probes to search for microbes in the vaginal bacterial flora that may cause premature delivery. We will attempt to regulate these microbes to protect patients from premature delivery due to bacterial vaginosis.

3. Effectiveness of probiotics for maintaining remission of inflammatory bowel diseases. (Dr Nagata)

We will demonstrate that a probiotic strain can contribute to maintaining the remission of inflammatory bowel diseases in a clinical trial. This has previously been reported in animal models

PEDIATRICS

4. Audiovisual cognitive development and its disorders in full term neontates and prematurely born babies.(Dr. Hirasawa)

The survival rate of very low birth weight babies are decreasing with the progress of the neonatal medicine. But the occurrence of the developmental disorders in prematurely born babies. So it seems to be necessary to study the audiovisual development in early infancy in these babies and full term babies using the new technology such as gaze detectors.

5. Developmental trajectory of very low birth weight babies with autistic trait and intervention (Dr. Hirasawa)

It is becoming a problem that the occurrence rate of autism spectrum disorders in prematurity born babies is increasing. It seems to be interesting to investigate the developmental trajectory of the prematurely born babies with autistic trait from a vast follow- up data in our NICU graduates And analyzing such data, we would like to suggest the efficient procedures of developmental intervention.

6. Neurophysiological study of myoclonic seizures and epileptic spasms (Dr. Oguni)

In order to investigate the underlying neurophysiological mechanism of myoclonic seizures and epileptic spasms, we study on ictal polygraphs of these seizures by means of computer-based EEG analysis to measure the latency between various EEG components of epileptic EEG seizures and the onset of EMG manifestation, and also high-frequency oscillation in the epileptic EEG seizures.

7. Translational research for pediatric malignant tumor. (Translational research)

Available also except a medical doctor. (Dr. Tsuruta)

To learn the translational research (mediation research from basic to clinical) about the treatment of a childhood cancer, for example, the molecular targeted therapies, the cancer peptide vaccines, the chimeric antigen receptor T-cell therapies, the inhibitors of regulatory T-cell, the immune checkpoint inhibitors, or the oncolytic viruses. Especially, to learn the process to how to make the plan of a basic experiment, to make the protocol of a clinical trial, to take data, and to make recognition of the pharmaceutical affairs , etc.

PEDIATRICS

8. Development of new drugs for pediatric malignant tumor

(Investigator initiated clinical trial). (Dr. Tsuruta)

To learn the translational research (mediation research from basic to clinical) about the treatment of a childhood cancer, for example, the molecular targeted therapies, the cancer peptide vaccines, the chimeric antigen receptor T-cell therapies, the inhibitors of regulatory T-cell, the immune checkpoint inhibitors, or the oncolytic viruses, that are applied to the adult, but children.

9. Trial of new therapy for the intractable hematopoietic diseases. (Dr. Tsuruta)

To learn a proccess of development of the new therapy for such as the intractable hemolytic anemia, by using the technique of molecular therapy or cellular therapy, such as a gene therapy or a hematopoietic-stem-cell-transplantation.

10. Clinical or basic research for incurable neurogenic or muscular diseases by the tissue stem cells. (Dr. Tsuruta)

Available also except a medical doctor.

To learn the clinical or basic research of the regeneration medicine which used tissue stem cells, such as a mesenchymal stem cell, for various incurable diseases, such as neurogenic diseases, muscular diseases or metabolism diseases.

11. Approach to developing a new treatment for Fukuyama congenital muscular dystrophy (Dr.Ishigaki)

Our emeritus professor, Dr. Fukuyama, reported the first patient with Fukuyama congenital muscular dystrophy (FCMD) in our department. Since reports of FCMD patients are localized within Japan, only a few institutes are working to develop a treatment for this disease, in contrast to the extensive research being conducted on Duchenne muscular dystrophy. We are planning (i) to identify new factors causing necrosis or exacerbating FCMD in order to discover new methods of treatment and (ii) to develop regenerative medicine techniques employing stem cells with Dr. Tsuruta's (Associate professor) group.

PEDIATRICS

12. Steroid therapy for patients with FCMD (Dr.Ishigaki)

Steroid therapy is now part of the care recommendations for Duchenne muscular dystrophy and is in widespread routine use. The evidence that short-term steroid administration is also effective for aggravation of muscle weakness after infections in FCMD patients supports the possible efficacy of this therapy for FCMD patients, but only a few cases have been reported to date. We are planning a prospective study to assess the efficacy of long-term steroid therapy for patients with FCMD.

13. A novel measure of function for FCMD (Dr.Ishigaki)

Within a few years, we might be able to launch a clinical trial for FCMD patients. To assess the efficacy of any new medication, we need a stable and highly reliable measure that accurately reflects function in FCMD patients. We are planning to evaluate actinography as a promising tool for function measurement in FCMD patients.

Faculty

Satoru Nagata, MD, PhD. Professor and Chairman of the department, Director of Children's Medical Center
Kyoko Hirasawa, MD, PhD. Associate Professor
Keiko Ishigaki, MD, PhD. Assistant Professor
Akiko Takeshita, MD, PhD. Research Associate
Miyuki Sakakibara, MS. Clinical Psychologist
Satoshi Kusuda, MD, PhD. Professor of Neonatal Medicine

publication

DERMATOLOGY

About us

Dermatology is a medical science which deals with the skin, the largest organ of human body. It covers a wide range of diseases including allergic, inflammatory, infectious and hereditary diseases, and benign and malignant tumors. In addition to clinical aspect, basic and clinical research is also important and attractive, since skin symptom is visible and accessible, therefore, it is less invasive to obtain the specimens. This is a great advantage to dermatology.

Research

(1)The effect of Near-infrared Radiation on the skin and sebocytes

(2)The pathogenetic role of bacteria including Fusobacteria in the patients with facial dermatitis

(3)Chemokines and cytokines in atopic dermatitis

Faculty

Naoko Ishiguro, M.D., Ph.D., Professor

publication

RADIATION ONCOLOGY

- **About us**
- Radiation oncology is a field for cancer treatment with radiation. It based on clinical oncology, radiation biology, and medical physics.
- Cancer is the main cause of death among Japanese and it will be increasing with advancement of aging society. So we should overcome cancer by high precision radiotherapy with lesser burden to elderly patients.
- Recent technological development, radiotherapy enables to irradiate tumors precisely without high dose area of normal tissue. Intensity modulated radiation therapy (IMRT), stereotactic irradiation (STI), image-guided radiation therapy (IGRT) and particle therapy are the example of recent advancement.
- To provide the best medical care is the spirit of the university's founding. Our department has more than 70 years history of radiation oncology research, Professor Tasaki, our second chief professor, was the first president of Japanese Society of Radiation Oncology (JASTRO), and the first annual meeting of JASTRO was held at Yayoi Memorial Hall of our university in 1989, large number of clinical data has been accumulated for clinical study.
- The aim of our department is training of excellent researchers, clinicians and educators. Our department has a division of clinical radiation oncology and a medical physics. And also have a strong joint research system with researchers of National Institute of Radiological Sciences and Waseda University.
- Thus, our department treats variety of fields to develop the radiation oncology with good balance among clinical radiation oncology, radiation biology, and medical physics.

RADIATION ONCOLOGY

- **Research**

1. Clinical oncology

- Usefulness of hypofractionated whole breast irradiation for early breast cancer
- Research for carbon-ion radiotherapy for early breast cancer
- Development of multidisciplinary treatment for refractory tumors
- Clinical utility of high-precision radiotherapy by high energy X-ray
- Optimization of intensity modulated radiation therapy for prostate cancer
- Optimization of intensity modulated radiation therapy for brain tumor
- Optimization of stereotactic irradiation for early lung cancer
- Research on optimization of brachytherapy for prostate cancer
- Optimal postoperative irradiation method for breast cancer

2. Medical physics

- Research for development of ultra-compact proton therapy system
- Research for effective irradiation method of carbon-ion
- Optimization of high-precision radiation therapy
- Optimal treatment planning for intensity-modulated radiation therapy
- Study on the reduction of normal tissue reaction from medical physics approaches
- Prediction of radiation skin reaction
- 3. Radiation biology
- Chemical modification of carbon-ion radio-sensitivity for breast cancer
- Search of radio-sensitivity modifier on X-ray and charged particle radiotherapy
- Development mechanism of late radiation reaction

RADIATION ONCOLOGY

Faculty

- Professor and Chair: Kumiko Karasawa, MD, PhD
- Visiting professor: Teiji Nishio, PhD
- Lecturer: Yaichiro Hashimoto, MD, PhD
- Associate lecturer: Sachiko Izumi, MD
- Assistant professor: Chie Toramatsu, PhD
- Assistant professor: Hiroaki Matsubara, PhD
- Part-time Lecturer: Masashi Koto, MD, PhD
- Part-time Lecturer: Mayumi Fujita, PhD

publication

DIAGNOSTIC IMAGING AND NUCLEAR MEDICINE

- **About us**

Under Construction

- **Research**

Under Construction

- **Faculty**

Under Construction

publication

SURGERY I

(CHEST SURGERY)

About us

Our department offers medical treatment including mainly surgical interventions. Multidisciplinary therapy, such as operation with chemotherapy and/or radiation is perform for treating lung and a thymic cancers. Number of operations is from 250 to 300 cases a year (Lung cancer, 100-110 cases; Metastatic lung tumors, 50-60 cases; Mediastinal tumors, 30 cases; Cystic lung diseases, 50 cases). Almost all cases have been performed by thoracoscopic surgery. Complete video-assisted thoracoscopic segmentectomy or subsegmentectomy with referring to patients' individual virtual 3-D pulmonary models is performed for both early stage lung cancer and metastatic lung tumors. For primary lung cancer cases such as mediastinal tumors and myasthenia gravis, robotic-assisted resections have started in 2012. Various procedures, such as bronchoscopic laser therapy, airway stent, and catheter intervention are performed for many thoracic diseases.

Research

1. Advance improvement of both simulation and navigation for the pulmonary resection
2. Study of thoracoscopic surgical treatment and the circulation of the blood in the lungs for the chronic pulmonary emphysema
3. Bronchial artery infusion for treating the lung cancer
4. Tissue-engineered epithelial cell sheets for creating a bioartificial trachea
5. Resipatory organs regeneration
6. Chest surgery with biomaterials

Faculty

Masato KANZAKI, Associate Professor
Masahide MURASUGI, Associate Professor
Kunihiro OYAMA, Assistant Professor
Tamami ISAKA, Assistant Professor

publication

SURGERY Ⅱ

(BREAST, ENDOCRINE, PEDIATRIC SURGERY)

About us

The goal of this program is to provide practical experiences to be an independent researcher of clinical research. You will learn about scientific methods in design, measurement and evaluation in detail through a particular theme of your clinical expertise.

Research

(1)Patient-reported outcomes research in endocrine surgery
(2)Circulating tumor cells in breast cancer
(3)Drug metabolism and cancer-related gene analysis in breast cancer
(4)Clinical management of laparoscopic operation in pediatric surgery
(5)Nutritional status after gastrectomy
(6)Surgical stress
(7)Robotic surgery for colorectal cancer
(8)Laparoscopic surgery for inflammatory bowel disease
(9)Parathyroid cancer
(10)Quality of life in patients with breast cancer
(11)Biomarker analysis for thyroid follicular tumor

Faculty

Takahiro Okamoto
Takako Kamio　　Kiyomi Horiuchi
Akiko Sakamoto
Akiyoshi Seshimo　　Yoko Omi

publication

CARDIOVASCULAR SURGERY

- **About us**

Under Construction

- **Research**

Under Construction

- **Faculty**

Under Construction

publication

DEPARTMENT OF THERAPEUTIC STRATEGY FOR SEVERE HEART FAILURE

- **About us**

  Under Construction

- **Research**

  Under Construction

- **Faculty**

  Under Construction

GASTROENTEROLOGICAL SURGERY

About us

The Institute of Gastroenterology, Tokyo Women's Medical University (TWMU) was founded in 1965 by Prof. Komei Nakayama. The institute leads Japanese gastroenterological surgery and internal medicine and has established a special clinical postgraduate training system for young doctors. In the postgraduate school of TWMU, we have focused on regenerative medicine, liver transplantation, cell therapy, immunotherapy and gene therapy for tailor-made treatment. We await active young surgeons to enter our postgraduate school for creating a new era in the 21st century.

Research

1. Immune cell therapy （Prof. Egawa and Kotera）
2. Open MRI (Prof. Ohki)
3. Biomarker of bile duct cancer (Prof. Yamamoto and Higuchi)
4. Mucin producing biliopancreatic tumor (Prof. Furukawa and Higuchi)
5. Robotic surgery for gastrointestinal disease （Prof. Yamamoto, Itabashi and Ohki））
6. Imaging system and Interventional Radiology （Prof. Yamamoto and Ariizumi）

Faculty

Prof. and Chairman：Masakazu Yamamoto
Prof.：Hiroto Egawa
Prof.：Toru Furukawa
Prof.：Harushi Osugi

Associate Prof.：Akiyoshi Seshimo
Associate Prof.：Michio Itabashi
Assistant Prof.：Yuji Inoue
Assistant Prof.：Takeshi Ohki
Assistant Prof.：Shyun-ichi Ariizumi
Assistant Prof.：Yoshihito Kotera
Assistant Prof.：Shinpei Ogawa
Assistant Prof.：Ryota Ogawa

publication

CHEMOTHERAPY ON DIGESTIVE ORGANS

- **About us**

Under Construction

- **Research**

Under Construction

- **Faculty**

Under Construction

publication

NEUROSURGERY

- **About us**

Under Construction

- **Research**

Under Construction

- **Faculty**

Under Construction

publication

ORTHOPEDIC SURGERY

About us

Diseases of the bone, joint, muscle, nerve, which cause dysfunction of limbs and trunks are observed, examined, diagnosed, treated, and studied in our orthopedic department.

These diseases have become more popular one in the aging society, and will result in the low quality of life.

Most of Japanese people complained of low back pain, neck stiffness, upper and lower limbs pain, especially in aged people more than 65 years old.

Our department focused on spine disease, osteoporosis, dysfunction of bone metabolism, degenerated joint disease, rheumatoid arthritis, fracture in clinical treatment.

Research

(1)Electolonic stimulation for the diagnosis of foraminal stenosis.

(2)Cartilage tissue regenerative biology using cell sheet.

(3)Application of artificial ligaments for animal models of ACL tear.

(4)Application for the automatic measurements of bone morphology in dysfunction of bone metabolism.

Faculty

Yasuaki Murata, M.D., Ph.D.
Keiji Wada, M.D., Ph.D.
Yuji Morita, M.D., Ph.D.
Tadahiko Ohtsuru, M.D., Ph.D.
Yoko Hagiwara, M.D.
Kenji Yasui, M.D.
Naoko Iwakura, M.D.
Masashi Ito, M.D.
Ryo Tamaki, M.D.
Mitsuru Yui, M.D.
Kazuhiro Maeda, M.D.
Nobuyuki Yoshimoto, M.D.

publication

PLASTIC AND RECONSTRUCTIVE SURGERY

- **About us**

Under Construction

- **Research**

Under Construction

- **Faculty**

Under Construction

publication

OPHTHALMOLOGY

- **About us**

The information by visual, is said to account for more than 80 percent of the information received from the outside world. Feelings and thoughts, including the emotion from receiving information occur, based on it, such as acts of behavior and risk aversion is expressed. If data vision is lost, it decreased or lack of collection of information, feelings and thoughts, the quality and quantity of behavior and act to decrease. This leads to a decrease of the Quality of Life. Ophthalmology is a specialized area to the visual degradation prevention and recovery.

In the School of Medicine education, was obtained pathology, the treatment, the knowledge in a wide range for such prognosis. These knowledge base is in graduate school, and more deeply investigate the pathogenesis of diseases causing visual impairment, is preventive medicine for suppressing the onset and progression of disease becomes a theme.

There is a vitreoretinal diseases, including age-related macular degeneration as a research field at the international level in our ophthalmology. In addition to the retina, cornea, uveitis, such as perspective amblyopia, doing research the Pathogenesis and prevention of various fields.

We are specialists in each field, we have to practice the best of treatment in accordance with the individual patients. In addition, as ophthalmic top runner, and horsetail to provide and promote a highly-advanced medical progress. .In ophthalmology, we are taking a system that can treat the disease of all the regions. Systemic disease in the (diabetes, high blood pressure, cranial nerve diseases, such as gastrointestinal disease) eye diseases associated with, have done the treatment in cooperation with other departments.Both at home and abroad, we offer a high eye care quality and safety of the highest level.

OPHTHALMOLOGY

Research

1. Cell biological research and pathology analysis of retina and vitreous diseases
   ① study of blindness prevention by vitreoretinal disease
   ② age-related macular degeneration
   ③ vitreoretinal interface syndrome
   ④ retinopathy of prematurity
   ⑤ other study diseases
2. A study of the anti-TNF-α antibody therapy related to pathology of Behcet's disease
3. Immunological, molecular biological research related to the accumulation of inflammatory cells of allergic conjunctivitis
4. Image analysis of the stability of the tear film in dry eye

Faculty

Chief Professor chief: Tomohiro Iida

Clinical Professor: Etsuko Takamura

Assistant Professor: Kazumi Shinozaki

publication

OTOLARYNGOLOGY

About us

Postgraduate programs at the department of otolaryngology are research-based as well as clinical-based. The main research projects are as follows:

Research

(1)Clinical histopathological study of IgG4-related salivary gland diseases and sinusitis.
(2)Efficacy of anti - immunoglobulin E antibody (omalizumab) in kimura's disease.
(3)The novel treatment strategies for eosinophilic sinusitis and eosinophilic otitis media.
(4)Evaluation of salivary gland function with near infrared spectrochemical analysis system (WOT-S20)
(5)Clinical Study of M3 selective muscarinic antagonists in the treatment of sialorrhea

Faculty

Manabu Nonaka Clinical Professor
Yukie Yamamura Senior Assistant Professor
Norio Kondou Assistant Professor
Kaoru Kusama Assistant Professor
Yukako Seo Assistant Professor
Eri Sakitani Assistant Professor
Mayako Tachikawa Assistant Professor
Keiko Kujirai Assistant Professor

publication

OBSTETRICS AND GYNECOLOGY

- **About us**

Under Construction

- **Research**

Under Construction

- **Faculty**

Under Construction

publication

ANESTHESIOLOGY

- **About us**

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- **Research**

Under Construction

- **Faculty**

Under Construction

publication

UROLOGY

About us

We focus on several aspects of the urological field including kidney transplantation, urological cancer, female urology, pediatric urology, and urinary stone. In each field, we have several specialists. Regarding kidney transplantation, the number of surgeries is more than 100, and the 10-year graft survival rate is more than 90%, which is an excellent outcome. In addition, we have nearly 300 surgical cases of kidney cancer, the highest in Japan. Robotic surgery has been adopted in partial nephrectomy and radical prostatectomy and the number of cases is rapidly increasing. Our basic research has allowed for providing immunotherapy using γδ cells to patients with metastasis from urological cancer such as kidney cancer, bladder cancer, or prostate cancer can receive. As mentioned above, we provide the latest medical service corresponding to the diversifying demands from patients.

Research

(1)Immune tolerance
(2)Kidney transplantation
(3)Carcinogenesis and cyst formation of kidney
(4)Chemoablation for prostate cancer
(5)Kidney dysfunction after urinary tract obstruction
(6)Cause of progression and metastasis of prostate cancer
(7)Prevention of urinary stone
(8)Outcome of nephron-sparing surgery for kidney cancer
(9)Prevention of recurrence of bladder cancer
(10)Diagnosis and treatment of renovascular hypertension
(10)γδtherapy for urologic cancer

UROLOGY

- **Faculty**

Kazunari Tanabe
Hideki Ishida
Tsunenori Kondo
Hirohito Kobayashi
Tomokazu Shimizu
Masayoshi Okumi
Toshio Takagi
Kazuya Omoto
Jyunpei Iizuka
Toshihito Hirai
Akiko Sakota

publication

ORAL AND MAXILLOFACIAL SURGERY

About us

Department of Oral and Maxillofacial Surgery is responsible for the diagnosis, treatment, or prevention for diseases in the oral and maxillofacial region. Because research in this field is important not only for eating, chewing, or swallowing, but also for aesthetic, it can be expected to expand further interesting studies. Jaw bone regeneration has been attempted for a long time by oral surgeons, and there are stem cell sources in the oral cavity. Therefore, regenerative medicine is familiar to the oral and maxillofacial surgery as a research field. For those reasons, we are especially focusing the research about regenerative medicine. You can study in collaboration with other departments, universities, or institutes for a variety of research.

Research

(1)Regenerative therapy in the oral and maxillofacial region using “cell sheet engineering”

We are researching about “cell sheet engineering” in collaboration with Institute of Advanced Biomedical Engineering and Science, Tokyo Women’s Medical University (TWIns). We have completed a clinical study of Autologous periodontal ligament cell sheet transplantation for periodontitis, and confirmed the long-term stability and their safety of this cytotherapy. Moreover, we demonstrated that bone marrow derived mesenchymal stromal cell sheet transplantation is effective for bisphosphonate-related osteonecrosis of the jaw in a rat model. Besides, we are researching about oral mucosal regeneration or dental implants using tissue engineering. Our goal is actually to deliver a new treatment to patients.

(2)Assessment of human intraoral mechanical and thermal sensitivity with novel simple devices in the clinic: implications for orofacial pain conditions.

The reliability of intraoral mechanical and thermal sensitivity recorded with the intraoral simple devices was applicable. This semiquantitative assessment of intraoral mechanical and thermal sensitivity is feasible for clinical studies in different intraoral pain conditions. The aim of our projects is to investigate intraoral somatosensory changes in patients with orofacial pain conditions and to evaluate the effects of the treatments.

ORAL AND MAXILLOFACIAL SURGERY

(3) Peripheral nerve regeneration using dental pulp cells

We study peripheral nerve regeneration with dental pulp cells, because dental pulp tissue contains Schwann cells and neural progenitor cells. A nerve guide containing dental pulp cells in type I collagen gel is transplanted into a gap of the facial nerve in rats and miniature pigs. The recovery is investigated by histological, functional, and electrophysiological analysis several months after transplantation.

(4) Use of dermoscopy for the diagnosis of oral mucosal diseases

Dermoscopes are loupes for examining pigmented skin lesions noninvasively, and they are useful in dermatology for making an early differential diagnosis between melanoma and melanocytic nevi. We are researching about the diagnosis using dermascopy for oral mucosal diseases, including oral lichen planus, pemphigus, leukoplakia, or initial cancer.

Faculty

Professor Tomohiro Ando D.D.S., Ph.D.
Associate Professor Toshihiro Okamoto D.D.S., Ph.D.
Associate Professor Takanori Iwata D.D.S., Ph.D.
Assistant Professor Kenji Fukada D.D.S., Ph.D.
Assistant Professor Ryo Sasaki D.D.S., Ph.D.
Assistant Professor Toshiyuki Kataoka D.D.S.
Assistant Professor Akira Shimasaki D.D.S.
Assistant Professor Takuya Naganawa D.D.S., Ph.D.
Assistant Professor Satoshi Fukuzawa D.D.S.

publication

CRITICAL CARE AND EMERGENCY MEDICINE

- **About us**

Under Construction

- **Research**

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- **Faculty**

Under Construction

publication

ADVANCED TECHNO-SURGERY

- **About us**

The Faculty of Advanced Techno-Surgery (FATS) conducts research and development to bring about higher levels of quality in medical care. At the core of our research is image-guided surgery (IGS) performed in our intelligent operating theater. Since adopting intraoperative magnetic resonance imaging (MRI) in March 2000, as of July 2016, we have performed IGS on 1623 patients, and in doing so, have contributed to the spread of this modality from its inception. Now that we are entering the age of information-guided surgery, FATS aims to improve the quality of multidisciplinary medical care, not only via existing modalities of intraoperative MRI and updated neuro-navigation systems, but also through the addition of a range of innovative modalities that can deliver seamless support in pre-, intra-, and post-surgery settings. Examples of these techniques and procedures include MR spectroscopy, awake craniotomy, intraoperative examination monitoring for awake surgery (IEMAS), rapid intraoperative pathological diagnosis, intraoperative diagnosis of malignancy using flow cytometry, photodynamic diagnosis and treatment, touchless interface (Opect), automated tracking robotic arm (iArmS), and higher brain function testing. We are also working to realize the integration of these technologies in our Smart Cyber Operating Theater (SCOT) by expanding our research and development (R&D) framework to encompass interdisciplinary partnerships in the field of medical engineering with academia, industry, and government.

In the field of oncology, we are striving to realize the fourth modality of cancer therapy after surgery, radiotherapy, and chemotherapy, namely sonodynamic therapy, combining the use of high intensity focused ultrasound therapy and sonosensitizer. However, our emphasis is not solely on technological development, and we are also focused on initiatives to obtain international standard.

Our faculty bring a multidisciplinary approach to all of our processes, from basic research to clinical application and product development. Their efforts are forging a model for our next-generation collaborative (interdisciplinary) medical engineering research, translational research, and commercialization of product.

ADVANCED TECHNO-SURGERY

- **Research**

(1) Surgical strategy systems in the field of neurosurgery

Surgery—and neurosurgery in particular—is host to highly complex systems characterized by the continuous introduction of various equipment for testing, diagnosis, and treatment. The key to successful surgery lies in leveraging the information from these systems to optimize procedures by developing the best surgical plans and modifying these plans in response to the surgical process. In this research theme, students will learn how to plan for surgery preoperatively, how to monitor progress by visualizing intraoperative information, how to systematically and effectively modify the surgery to resolve any identified issues, and how to develop the software and hardware to achieve these goals.

Students will be required to report on the progress of their research in an academic presentation setting twice a year so that the teaching staff can provide feedback and guidance on their research presentation skills.

(2) Surgical risk management using surgery recorder and simulator systems

Surgery recorder systems for digitally recording and storing intraoperative anesthesia management data, patient physiological data (wearable device data), and surgical data (video data of the operative field) are essential for streamlining and optimizing risk management in surgery. Surgery simulator systems have the potential to be an invaluable data-gathering tool for the analysis and assessment of unforeseen problems. In this research theme, students will learn how to develop surgery recorder and simulator systems to help ensure that surgeries are performed safely.

Students will be required to report on the progress of their research in an academic presentation setting twice a year so that the teaching staff can provide feedback and guidance on their research presentation skills.

ADVANCED TECHNO-SURGERY

(3) Minimally invasive neurosurgery systems based on augmented reality

In the surgical field, navigation techniques are seen as an important aid for narrow operative field maneuvers to minimize invasiveness. The core technology of augmented reality (AR) provides comprehensive real-time information to assist the surgeon with a constant level of precision, consistency, and objectivity, while eliminating the need to rely on experience and intuition to confirm the current position of the surgical area and progress of the surgical procedure. This research theme aims to equip students with the skills to both develop and utilize a minimally invasive neurosurgery system through the advanced use of AR.

Students will be required to report on the progress of their research in an academic presentation setting twice a year so that the teaching staff can provide feedback and guidance on their research presentation skills.

(4) Surgical assistance robotic devices

In this research theme, students will research and develop robotic surgical lasers and new surgical devices using ultrasound and lasers in order to provide surgeons with a “new hand” capable of realizing a level of accuracy, resolution, and operability that exceeds that of human hands by utilizing mechanical, electronic, informational, engineering, and computer-assisted surgical techniques. Students will take a medical engineering approach to their research on the conceptual design, realization, functions, and effects of various diagnostic and therapeutic supportive devices in a number of fields including neurosurgery, abdominal surgery, and thoracic surgery.

Students will be required to report on the progress of their research in an academic presentation setting twice a year so that the teaching staff can provide feedback and guidance on their research presentation skills.

ADVANCED TECHNO-SURGERY

(5) Robotic devices for cell sheet transplantation

In this research theme, students will conduct R&D on devices capable of clean-environment, minimally invasive, simple *in vivo* transplantation of regenerative cell tissues produced by automated cell sheet culturing and stacking systems using temperature-responsive polymers. Specifically, students will research and develop devices to transplant myocardial cell and fibroblast sheets.

Students will be required to report on the progress of their research in an academic presentation setting twice a year so that the teaching staff can provide feedback and guidance on their research presentation skills.

(6) Regulatory science for medical devices

Japan's medical device manufacturing industry currently faces a disconnect in terms of its ability to develop devices and its inability to commercialize them. In particular, the industry is facing a crisis due to its inability to commercialize therapeutic devices, the majority of which are clinically tested and commercialized overseas. The underlying cause of this inability to manufacture is risk aversion by all stakeholders including the public, developers, management, and regulatory authorities. As such, measures to mitigate risk are essential to overcoming this situation. It is also crucial to focus on data packaging from the development stage with an eye to regulatory approval and commercialization and to submit proprietary scientific evidence for safety and efficacy evaluation. In this research theme, students will investigate the regulatory science required to develop various medical devices.

Students will be required to report on the progress of their research in an academic presentation setting twice a year so that the teaching staff can provide feedback and guidance on their research presentation skills.

ADVANCED TECHNO-SURGERY

(7) Stereotactic and functional micro-radiosurgery

In gamma knife radiosurgery, the surgeon uses gamma radiation as though using a knife to remove brain tumors without harming the surrounding normal brain tissue in an attempt to radically resect the tumor. The gamma knife device contains 192 cobalt-60 (Co60) sources arranged in a concentric and semi-circular array. The device is designed to focus the gamma radiation on a single point to deliver a single high dose of radiation to the target lesion. Current gamma knife technology is capable of automatically targeting any location within the brain, including tumors located in the craniocervical junction, with an accuracy of 0.1 mm. Using this precise radiosurgical device, students will study the therapeutic accuracy and clinical outcomes of stereotactic and functional micro-radiosurgery.

Students will be required to report on the progress of their research in an academic presentation setting twice a year so that the teaching staff can provide feedback and guidance on their research presentation skills.

- **Faculty**

Associate Professor:

Kyojiro Nambu

Assistant Professor:

Manabu Tamura, Mikhail Chernov, Jun Okamoto,Motohiro Hayashi (on joint appointment), Takashi Maruyama (on joint appointment)

Instructor:

Kiraro Yoshimitsu, Soko Ikuta, Chiharu Niki, Yoshiyuki Konishi, Masanori Maeda, Yuki Horise, Masayuki Nitta (on joint appointment)

publication

GENE MEDICINE

About us

In April 2003, whole human genome sequencing was declared by presidents of 6 countries; the United States, United Kingdom, Japan, France, Germany, and China, and the world had entered into the post genome era. Genome researches with new directions are now expanding worldwide, such as genome-based drug discovery and personalized treatment. The social attention has been heightened and focused on genome as more than ever before, and genomes are anticipated to take a very important role in core medicine and in a part of industry in the near future. Molecular biology and cell biology, which had been important so far, would take large role as ever. However, more significant role would be held by genetic statistics, genomic ethics, genetic diagnostics and gene therapies. In the Affiliated Field of Medical Genetics, Division of Biomedical Engineering and Science, Graduate School of Medicine, Tokyo Women's Medical University, such investigations and education, which are essential in the precision medicine including genome medicine, are carried out. Furthermore, in the Affiliated Field of Medical Genetics located in the Institute of Medical Genetics, we hold training program for “the Clinical Geneticists” and “Certified Genetic Counselors” to provide clinical genetic medicine in high quality. In those programs, credit transfer system is induced in cooperation with Ochanomizu University Graduate Course.

Research

1. Correlation between clinical medicine and genome in genetic diseases
(Neuromuscular disorders, ***hematorogical*** diseases, ***Diabetes mellitus, Familial cancer, Cardiovascular disease, Multifactorial diseases)***
2. Genetic counseling (Genetic testing, Prenatal diagnosis, Presymptomatic diagnosis)

GENE MEDICINE

3. Study on ethics of genetic testing
4. Pharmacogenomics
5. Analysis of biomarker in spinal muscular atrophy
6. Investigation of new methods of treatment in genetic intractable diseases
7. Theory and practice of genetic statistics

- **Faculty**
- Kayoko Saito, Professor (Director)
- Mari Matsuo, Assistant Professor
- Reiko Arakawa, Assistant Professor
- Hitoshi Kanno, Professor
- Atsuo Taniguchi, Professor
- Naoko Iwasaki, Associate Professor
- Toshiyuki Yamamoto, Associate Professor
- Akemi Yamauchi, Assistant Professor (Part time)
- Eri Kondo, Assistant Professor (Part time)
- Mayuri Ito, Assistant Professor (Part time)
- Yuji Kubo, Assistant Professor (Part time)
- Toshitaka Uchiyama, Assistant Professor (Part time)

publication

ORGAN REPLACEMENT

About us

Organ replacements, such as organ transplants, artificial hearts or dialyzers, are widely utilized in the clinic as treatments for patients with functional decline or loss of function of organs. Furthermore, the research and development for creating tissues and organs from cells has accelerated due to recent advances in regenerative medicine.

The primary aim of our field is to research and develop new cutting-edge organ replacements. We seek to create all kinds of medical materials including biocompatible materials, as biomaterials are a fundamental component of this work.

We also are developing new methods for next generation organ creation, including high-throughput cell culture, scaled-up vascular network formation, cell/organ culture through use of bioreactors, and further technical development of related devices to perform these methods.

Research

(1)Fabrication of 3D tissues/organs based on cell sheet technology

(2)Fabrication of human tissues/organs

(3)Technical development to engineer skeletal muscle tissue

(4)Regenerative medicine for kidney disease

(5)Technical development for tissue/organ factories

(6)Bio-interfaces for creation of substitutional organs

(7)Engineering of tissues having complex structure/function using micro-fabrication techniques

(8)Development of new treatments with artificial organs

ORGAN REPLACEMENT

- **Faculty**
- Tatsuya Shimizu
- Michio Mineshima
- Katsuhisa Matsuura
- Masamichi Nakayama
- Yoshikatsu Akiyama
- Jun Kobayashi
- Hidekazu Sekine
- Yuji Haraguchi
- Shinako Aoki
- Sachiko Sekiya
- Hironobu Takahashi
- Tetsutaro Kikuchi
- Daisuke Sasaki
- Jun Homma

publication

TISSUE REGENERATION

About us

Donor transplantation has been the definitive treatment for severe diseases, but is limited by a lack of donors and the need for immunosuppressant drug application after transplantation. Global interest has turned to regenerative medicine and tissue engineering to present new solutions to these problems.

Tissue engineering was proposed in 1993 by Robert Langer, an American engineer, and Joseph Vacanti, an American surgeon, who proved that the regeneration of the three - dimensional tissue structure is feasible by adding cells to a biodegradable polymer in the presence of growth factors. The further parallel development of tissue engineering and cell biology is expected to progress.

Regenerative medicine is interdisciplinary, achieving more than medical science or engineering alone. This research field integrates medicine, science and engineering to provide innovative, new concepts and approaches for the future development of medicine.

Research

(1)Technical development of isolation/differentiation/amplification of stem cells

(2)Regenerative therapy with cell sheet engineering

(3)Development of new regenerative treatment using mesenchymal stem cell sheet

(4)Application of culture epithelial cells to regenerative medicine

Faculty

Masayuki Yamato	Takanori Iwata
Katsuhisa Matsuura	Kaoru Washio
Nobuo Kanai	Shinako Aoki
Ryo Takagi	Mami Kokubo

publication

INTEGRATED MEDICAL SCIENCES

- **About us**

The field of Integrated Medical Sciences was established within the Advanced Biomedical Science Major of the Graduate School of Medicine, Tokyo Women's Medical University, with a foundation of International Research and Educational Institute for Integrated Medical Sciences (IREIIMS) by the fund of Program for Promoting the Establishment of Strategic Research Centers, Special Coordination Funds for Promoting Science and Technology, Ministry of Education, Culture, Sports, Science and Technology (Japan) on 2006. In our field of Integrated Medical Sciences, we conduct research on medical sciences by means of integration of basic sciences and clinical medical research. Our main focus is on elucidation of molecular mechanisms of diseases and its application to development of novel and efficient medical procedures for prevention, diagnosis, and treatment of diseases. Although there have been many fruits of basic research to understand the disease mechanisms so far, these fruits may not have been well applied to medical practice, which is often called 'the valley of death' that means a gap between basic research and clinical medicine. The gap is regarded as a big problem for medical research today, therefore, translational research that bridges the gap is especially encouraged. On the other hand, a reverse translation that means an application of problems found in clinical medicine on basic research is also important. In Integrated Medical Sciences, we promote bidirectional translational research bridging basic sciences and clinical medicine on diseases of cancer, life style-associated, and congenital anomalies by means of advanced molecular analyzing techniques employing equipments in Tokyo Women's Medical University Institute for Integrated Medical Sciences (TIIMS) that was founded as a successor of IREIIMS.

INTEGRATED MEDICAL SCIENCES

- **Research**

1) To uncover the molecular mechanisms of cancer and its application to development of novel molecular medicines

Cancer is a molecular disease. Signaling pathways are major players in phenotypes of the disease. The pathways form very complex networks consisted of many molecules interacting each other, where there remains a big room to be uncovered. We pursue research to analyze the complex molecular pathways in cancer and its application to development of novel molecular medicines useful for prevention, diagnosis, and therapy of the disease.

2) Elucidation of molecular mechanisms of diseases by means of comprehensive genomic analysis

Genes implicated in diseases have been identified by linkage and association analyses with positional cloning or candidate gene analyses. However recently, a major breakthrough has been taken place by development of the massive parallel sequencer that enables comprehensive whole genome sequencing in a single institution in a modest cost. By using this high-throughput sequencer as well as other advanced molecular analyzing techniques, we conduct research on understanding molecular mechanisms of diseases and elucidate information useful for clinical medicine.

3) Disease pathological studies using disease-specific iPS cells

Since patients with neurogenetic disorders such as Parkinson disease and Alzheimer disease show brain dysfunctions, brain imaging is often used for clinical diagnosis. Furthermore, molecular diagnosis is often required for the final diagnosis. However, disease mechanism in the neuron is still unknown in most disorders. To overcome this dilemma, we are using disease-specific iPS cells. In this study, rare intractable neurological disorders are the target patho-physiological studies.

INTEGRATED MEDICAL SCIENCES

4) Research on the context of the genome copy number and disease susceptibility

There are so many genomic copy number variations in the human genome. Some of the copy number variations are related to specific human disorders such as congenital disorders and the development of cancers. Disease susceptibility of the copy number variations is the target of this study.

- **Faculty**

Toru Furukawa. MD, PhD.

Professor

Expertise: Pathology, Oncology, Gastroenterology, Surgery, Molecular biology, Cell biology, Genomics, Genetics

Research interest: Cancer of digestive system, Pancreatobiliary disease

Toshiyuki Yamamoto. MD, PhD.

Associate Professor

Expertise: Medical genetics

Research interest: Clinical sequencing, Chromosomal microarray testing, disease-specific iPS cells, neurological disorder, congenital disorder

Hiroyuki Akagawa. MD, PhD.

Assoicate Professor

Experience: Neurosurgery, Neurology, Genetics, Genomics, Bioinformatics

Research interests: Stroke, Movement disorders

publication