

## 5. Details and Areas of Research of Faculty Members at Graduate School of Biomedical Sciences

Doctoral Courses [Four years (Department of Medical and Dental Sciences, Infection Research, Life Sciences and Radiation Research, Division of Advanced Preventive Medical Sciences)]

### ① Areas of Research in Department of Medical and Dental Sciences

Area of Research	Professor, etc.	Details of main research work
Macroscopic Anatomy	[TSURUMOTO Toshiyuki ] (Professor) MURAI Kiyohito (Senior Assistant Professor)	① Microstructural analysis of bone tissue ② 3D structural analysis and finite element analysis of CT images of bones ③ Research into functional adaptation of motor organs from the perspective of skeletal microevolution among Japanese people ④ Research into gene polymorphism in skeletal/joint structure ⑤ Translational research on human clinical anatomy ⑥ Anthropological research into skeletal transformation in archeological remains excavated in western Japan ⑦ Analysis of molecular mechanism of neuronal aging
Histology and Cell Biology	SHIBATA Yasuaki (Associate Professor) MATSUMOTO Gen (Senior Assistant Professor)	① Development and improvement of molecular histochemical techniques ② Epigenetic regulation of germ cell differentiation ③ Role of Wnt/ $\beta$ -catenin signaling-related molecules on juvenile development and poor prognosis of hepatocellular carcinoma ④ Molecular mechanisms of protein aggregates by selective autophagy ⑤ Degradation mechanisms of Tau in Alzheimer's diseases ⑥ Novel drug discovery for neurodegenerative diseases
Oral Anatomy and Dental Anthropology	OYAMADA Jyoichi (Associate Professor)	① Dental anthropological study of the ancient Japanese ② Dental anthropological study of the ancient Chinese ③ Dental pathological study of the ancient people ④ Anatomical study of head and neck
Cell Biology	OHBA Shinsuke (Professor) SUMITA Yoshinori (Associate Professor)	① Epigenetics and gene regulatory network in skeletal and tooth development ② Modeling of tissue development using pluripotent stem cells ③ Bioactive peptides/compounds for formation and repair of bone and cartilage ④ Bone and cartilage tissue engineering ⑤ Clinical study of novel cell therapies and gene therapies for alveolar bone defects ⑥ Clinical study of novel cell therapies for xerostomia (atrophic salivary glands)
Physiology of Visceral Function and Body Fluid	INOUE Tsuyoshi (Professor)	① Elucidation of the pathophysiology of kidney diseases and development of treatment methods ② Anti-inflammatory and organ protection mechanisms through the nervous-immune systems ③ Atherosclerosis progression mechanism
Biochemistry	ITO Takashi (Professor)	① Mechanisms of DNA higher-order structure formation in the nucleus ② Mechanisms of Estrogen receptor-induced gene activation ③ Post-translational histone modification and structural changes of chromatin ④ ES cell differentiation and structural changes of chromatin
Oncology	IKEDA Hiroaki (Professor)	① Development of novel immuo cell therapy for cancer patients ② Development of novel gene therapy for cancdr patients ③ Translational researh of novel immuno-therapy for cancer patients ④ Development of novel transplantation therapy with allogeneic cells ⑤ Research into T cell functionality
Molecular and Genomic Biomedicine	MASUTANI Mitsuko (Professor)	① Oncology and drug development based on molecular and quantum medical science ② Optimization of radiotherapy and radioprotection based on molecular and quantum medical science and radiation biology ③ Biochemistry and molecular epidemiology on environmental stress biomarkers based on molecular and quantum medical science ④ Biochemistry and molecular epidemiology on disease biomarkers based on molecular and quantum medical science
Oral Chrono-Physiology	NAKAMURA Wataru (Professor)	① Circadian regulation of Physiological Functions ② Neural mechanism in the Suprachiasmatic nucleus; internal circadian clock ③ Age related decline in physiological rhythms
Pharmacology	ARUGA Jun (Professor)	① Molecular function and physiological role of synapse organizer proteins ② Function and pathophysiology of blood-brain-barrier ③ Analysis of pathological conditions and development of therapeutic strategies in neurological disorders ④ Wiring mechanism of neural circuit and its regulation by diffuse modulatory system
Dental Pharmacology	TSUKUBA Takayuki (Professor)	① Functions and pathological condition of endo-lysosomal protease ② Molecular biological research into endosome and lysosome systems ③ Cellular biological research into osteoclast-induced bone resorption mechanisms ④ Research into protease in bacteria pathogenic in gum disease
Pathology	FUKUOKA Junya (Professor)	① Standardization of pathological diagnosis using digital technology ② Clinical pathological consideration of obesity-induced pulmonary disease ③ Investigation and research into biomarkers in cancer and other difficult-to-cure diseases
Pathology	[SHIMOKAWA Isao] (Professor) MORI Ryoichi (Associate Professor)	① Experimental research on regulation of ageing and age-related diseases ② Mechanisms underlying the anti-ageing effect of calorie restriction ③ Investigation of longevity genes ④ Pathology of Breast Cancer ⑤ Molecular mechanisms linking wound inflammation and fibrosis
Oral Pathology	FUJITA Shuichi (Associate Professor)	① Microenvironment of oral squamous cell carcinoma ② Functional analysis on DKK3 gene in head and neck squamous cell carcinoma ③ Role of Wnt signaling in bone homeostasis

Area of Research	Professor, etc.	Details of main research work
Dental and Biomedical Materials Science	WATANABE Ikuya (Professor)	① Development of low-elasticity, highly corrosion-resistant titanium alloy for bone replacement material ② Optical characteristics of all-ceramic repair porcelain ③ Cellular suitability evaluation of biomaterials for dental or biological implant ④ Abrasion resistance evaluation of metallic biomaterial ⑤ Controlled drug-release system for dental materials
Molecular Bone Biology	ITO Kosei (Professor)	① Differentiation, proliferation and tumorigenesis of mesenchymal stem cells ② Functional analysis of oncogenes and anti-oncogenes using gene targeted mice ③ Molecular analysis of tumor metastasis using gene targeted mice
Forensic Pathology and Science	IKEMATSU Kazuya (Professor)	① Forensic pathology ② Child abuse and neglect ③ Forensic molecular pathology ④ Forensic genetics ⑤ Metabolic Autopsy
Clinical Epidemiology	SATO Izumi (Professor)	① Clinical epidemiological study using a large-scale medical database ② Research of pharmacoepidemiology using a large-scale medical database
Comparative Medicine	OHSAWA Kazutaka (Professor)	① Research of infectious disease in laboratory animals ② Research of human infectious diseases from laboratory animals ③ Research of infection prevention of laboratory animals ④ Research of intestinal microorganisms of laboratory animals
Functional Genomics	KISHINO Tatsuya (Associate Professor)	① Molecular analysis of genomic imprinting ② Clarification of establishment of epigenetics in early embryos and neurons ③ Production and analysis of model mice of epigenetics diseases ④ Functional analysis of responsible genes of diseases with mental retardation
Forensic Dental Science		
Frontier Oral Science	KADOWAKI Tomoko (Professor)	① Molecular and biological research on the mechanisms of progression and persistence of inflammatory diseases ② Analyses and regulation of causative inflammatory factors ③ Study on the maintenance and disorder of homeostasis system, focusing on proteolytic mechanisms
Oral Health	SAITO Toshiyuki (Professor)	① The impact of periodontal disease in arterial sclerosis, diabetes and other systemic health ② Research into the epidemiology of dental caries and periodontal disease, and their prevention ③ The impact of bite frequency on health ④ Community oral health activities and their evaluation
Ophthalmology and Visual Sciences	KITAOKA Takashi (Professor) OISHI Akio (Senior Assistant Professor)	① Research into macular disease and its treatment methods ② Research into anatomy and function of the vitreous body ③ Basic and Clinical research on retinal and choroidal circulation ④ Development of new operating methods on the vitreous body ⑤ Research and clinical practice relating to the treatment of diabetic retinopathy ⑥ Basic and clinical research on exfoliation glaucoma ⑦ Epidemiological research and treatment on HTLV-1 associated uveitis
Otolaryngology - Head and Neck Surgery	KUMAI Yoshihiko (Professor)	① Development of the innovative treatment for the radiation induced vocal fold scar in head and neck cancer patients ② Development of the innovative treatment for the aspiration caused by sarcopenia in elder patients ③ Development of the innovative treatment for the aspiration induced by irradiation in head and neck cancer patients ④ Analysis of the expression of the 53BP1 in meso-pharyngeal cancer patients ⑤ Development of the innovative system for the remote diagnosis of head and neck cancer patients in remote island ⑥ Development of the innovative marker for the prognosis of the immunotherapy for the advanced head and neck cancer patients using liquid biopsy procedure ⑦ Functional analysis of the auditory system in the brain using PET scan.
Neurosurgery	MATSUO Takayuki (Professor)	① Technological development of skull base surgery ② Development of support system for brain tumor surgery ③ Research into neuroendoscopic surgery ④ Research into radiobiological effect for brain tumor after stereotactic irradiation ⑤ Analysis of mechanism in blood brain barrier
Anesthesiology and Intensive Care Medicine	HARA Tetsuya (Professor)	① Pathology of acute heart failure and its control ② Control of molecular pathology in ischemia/reperfusion injury ③ Intestinal pathology of septic shock ④ Neural mechanism of chronic pain and its control
Cardiovascular Surgery	MIURA Takashi (Associate Professor)	① Research into valvuloplasty ② Research into video-assisted minimally invasive cardiac surgery ③ Research into microscopic bypass surgery with permanent graft patency ④ Robotic surgery ⑤ Research into aortic root anatomy in patients with aortic regurgitation using 4D-CT ⑥ Research into the surgical anatomy of mitral valve complex in hypertrophic obstructive cardiomyopathy ⑦ Research into surgery for secondary tricuspid regurgitation due to leaflet tethering
Urology	MIYATA Yasuyoshi (Associate Professor)	① Research into chemo-prevention of genitourinary cancers using animal models ② Development of molecular targeted therapies for genitourinary cancers ③ Analysis of prognostic factors in genitourinary cancers ④ Research into lower urinary tract symptoms ⑤ Renal transplantation and surgery related to renal failure ⑥ Prevention of dialysis complications

Area of Research	Professor, etc.	Details of main research work
Surgical Oncology	NAGAYASU Takeshi (Professor)	<ul style="list-style-type: none"> <li>① Development of diagnosis and treatment methods for pulmonary and digestive organ cancer using a molecular biological approach</li> <li>② Decision-making regarding surgical responses to pulmonary and digestive organ cancer depending on malignancy, and establishing accurate surgical methods</li> <li>③ Establishing malignancy and appropriate treatment methods based on the cellular biological analysis of breast cancer</li> <li>④ Research into lung transplants and organ preservation</li> <li>⑤ Research into pulmonary function preservation surgery and reconstructive surgery</li> <li>⑥ Research into lung and tracheal regeneration</li> <li>⑦ Development of innovative medical equipment with collaboration between medical and engineering</li> <li>⑧ Research and development of new diagnostic method regarding lymph node metastasis</li> <li>⑨ Research into prevention for perioperative infection</li> </ul>
Surgery	EGUCHI Susumu (Professor)	<ul style="list-style-type: none"> <li>① Research into digestive organ transplantation (liver, pancreas, islets, small bowel, etc.)</li> <li>② Research into digestive organ regenerative medicine (digestive tract, liver, pancreas, islets, etc.)</li> <li>③ Research into digestive organ cancer (digestive tract, hepatobiliary pancreatic)</li> <li>④ Research into laparoscopic and robot and AI surgery</li> <li>⑤ Research into thyroid and breast surgery and cancer</li> <li>⑥ Research into development of new strategy for pediatric surgery</li> <li>⑦ Research into immunotherapy for malignant tumors and organ transplantation</li> </ul>
Obstetrics and Gynecology	MIURA Kiyonori (Professor)	<ul style="list-style-type: none"> <li>① Research into Placental and Fetal Functions</li> <li>② Research into Clinical Significance of Perinatal Stem Cell in Obstetrics and Gynecology</li> <li>③ Research into Mother-to-Child Infections</li> <li>④ Research into Reproductive Medicine</li> <li>⑤ Research into Gynecologic Oncology</li> <li>⑥ Research into Women's Healthcare</li> <li>⑦ Research into Laparoscopic and Robot Surgery in Obstetrics and Gynecology</li> </ul>
Orthopaedic Surgery	OSAKI Makoto (Professor)	<ul style="list-style-type: none"> <li>① Bone metabolism research using bone marrow adipocyte</li> <li>② Epidemiological research into osteoarthritis, osteoporosis, dialytic spondylosis</li> <li>③ Research into biofilms</li> <li>④ Research into clinical application of photocatalysts in antibacterial material development</li> <li>⑤ Bone structure and mechanical analysis using CT and MRI</li> <li>⑥ Research into preventing sports injury</li> <li>⑦ Analysis of joint kinematics</li> <li>⑧ Pathological analysis of osteonecrosis of femoral head</li> </ul>
Plastic and Reconstructive Surgery	TANAKA Katsumi (Professor)	<ul style="list-style-type: none"> <li>① Research into reconstructive surgery</li> <li>② Research into microsurgical research and clinical application</li> <li>③ Basic and clinical research of keloids in wound</li> <li>④ Development of new operating methods in the hand surgery</li> <li>⑤ Research into the application of adipose tissue derived stem cells in the reconstructive surgery</li> <li>⑥ Application of amniotic membrane and placenta-derived stem cells for tissue repair</li> </ul>
Neuropsychiatry	OZAWA Hiroki (Professor)	<ul style="list-style-type: none"> <li>① Research into post-mortem human brains relating to brain signal transmission in mood disturbance and integration disorder syndromes</li> <li>② Investigation into genetic factors behind integration disorder syndrome and mood disturbance (in twins and families)</li> <li>③ Neuropsychological and imaging research into psychiatric conditions</li> <li>④ Development of new treatment methods for neuropsychiatric disorders from the perspective of regenerative medicine (Neuroplasticity/role of neural stem cells)</li> <li>⑤ Stress check system</li> </ul>
Dermatology	MUROTA Hiroyuki (Professor)	<ul style="list-style-type: none"> <li>① Anatomical, molecular biological, and physiological functional analysis of sweat glands to establish a novel therapy for anhidrosis, hyperhidrosis, and dermatoses with abnormal sweating</li> <li>② Survey for epidemiology, actual condition, and patients' burden of allergic and investigation to establish new treatment based on scientific evidences</li> <li>③ Survey for actual condition and epidemiological investigation of skin infection (e.g. fungal disease, acid-fast bacteria, and bacterial infection, etc.)</li> <li>④ Diagnosis of rare intractable diseases and development of new treatments for those diseases (e.g. pseudoepitheliomatous hyperplasia, Fabry disease, and neurofibromatosis, etc.)</li> <li>⑤ Investigation for biomarkers and microbiomes which are of benefit to involved in treatment options for skin diseases (e.g. psoriasis, atopic dermatitis, etc.)</li> <li>⑥ Establishment of novel therapeutic strategies focusing on the microenvironment and matrix in the origin of skin tumors</li> <li>⑦ Establishment of treatment with immune cell transfusion for both skin cancer and cutaneous lymphomas</li> <li>⑧ Pathological analysis of sensory abnormalities (e.g. pruritus and pain) and tactile dysfunction to establish novel treatment</li> </ul>
Cardiovascular Medicine	MAEMURA Koji (Professor)	<ul style="list-style-type: none"> <li>① Basic and clinical research into mechanisms of arteriosclerosis and pulmonary hypertension</li> <li>② Development of biomarkers of cardiovascular disease and its clinical application</li> <li>③ Research into the application of chronotherapy to cardiovascular disease</li> <li>④ Genetic analysis of cardiomyopathy and lethal arrhythmia</li> <li>⑤ Epidemiology of acute myocardial infarction in Nagasaki</li> <li>⑥ Research into the relationship between cancer and cardiovascular disease</li> <li>⑦ Research into the application of adipose tissue derived stem cells in cardiovascular regenerative medicine</li> </ul>
Gastroenterology and Hepatology	NAKAO Kazuhiko (Professor)	<ul style="list-style-type: none"> <li>① Molecular biology, mutations and pathology of hepatitis virus</li> <li>② Interferon signals within hepatic cells</li> <li>③ Life and death of hepatic cells</li> <li>④ Early diagnosis and carcinogenic inhibition of hepatic cell cancer</li> <li>⑤ Development of new treatment methods for digestive organ cancer</li> <li>⑥ Digestive organ disorders and metabolic syndrome</li> <li>⑦ Pathological analysis and development of new treatment methods for autoimmune hepatitis</li> <li>⑧ Pathological analysis and development of new diagnostic methods for D198:D205 hypersensitivity pneumonia</li> </ul>

Area of Research	Professor, etc.	Details of main research work
Respiratory Medicine	MUKAE Hiroshi (Professor)	<ul style="list-style-type: none"> <li>① Pathogenesis of fungi and mechanisms of antifungal resistance</li> <li>② Development of novel diagnosis and therapeutic strategies for respiratory fungal infections</li> <li>③ Elucidating the pathogenesis and development of novel immunological treatments for invasive bacterial pneumonia</li> <li>④ Development of new molecularly-targeted treatment for pulmonary fibrosis</li> <li>⑤ New evaluation of environmental risks of obstructive pulmonary diseases (COPD and bronchial asthma)</li> <li>⑥ Clarification of molecular targeted drug-resistant mechanisms in driver-mutation positive lung cancer</li> <li>⑦ Genetic analysis associated with oncogenesis and complications of thymic tumors</li> <li>⑧ Analysis of adverse events in the immune checkpoint inhibitors</li> <li>⑨ Development of new cell therapy for pulmonary fibrosis</li> </ul>
Laboratory Medicine	YANAGIHARA Katsunori (Professor)	<ul style="list-style-type: none"> <li>① Research into new methods of diagnosing infectious diseases</li> <li>② Clarification of drug-resistant mechanisms and research into drug resistant bacteria control</li> <li>③ Clarification of severe infection mechanisms and development of new treatment methods</li> <li>④ Research about the role of microbiota on human health</li> <li>⑤ Clarification of ATL pathology and development of new treatment methods</li> <li>⑥ Establishment of custom-made diagnostics for neoplasm and infection</li> <li>⑦ Development of new antimicrobials</li> </ul>
Pediatrics	MORIUCHI Hiroyuki (Professor) DATEKI Sumito (Associate Professor)	<ul style="list-style-type: none"> <li>① Epidemiological and clinical research into mother-to-child infections</li> <li>② Epidemiological and clinical research into pediatric respiratory infections</li> <li>③ Investigation on pathophysiology of thrombomodulin</li> <li>④ Investigation on prevalence of antimicrobial resistant bacteria among infants in the community</li> <li>⑤ Research into hereditary diseases and genetic diagnosis</li> <li>⑥ Clinical and Genetic research into short statures</li> <li>⑦ Clinical and Genetic research into pediatric endocrinologic disorders</li> <li>⑧ Research into genetic etiologies of undiagnosed congenital diseases</li> </ul>
Radiological Science	SUEYOSHI Eijun (Associate Professor)	<ul style="list-style-type: none"> <li>① Research into new blood flow evaluation methods using diagnostic imaging</li> <li>② Prognostic study of cardiovascular diseases using diagnostic imaging</li> <li>③ Investigation on hemodynamic and mechanical evaluation using MRI</li> <li>④ Research into diagnostic imaging method using 4D images</li> </ul>
Clinical Oncology	ASHIZAWA Kazuto (Professor)	<ul style="list-style-type: none"> <li>① Research into management of pulmonary nodules using diagnostic imaging</li> <li>② Research into molecular imaging for use in determining effectiveness of cancer treatments</li> <li>③ Cutting edge clinical cancer research involving clinical trials on cancer drug treatments in multi-organ cancer cases</li> <li>④ Molecular biological research including biomarkers, aiming for "order-made treatments"</li> </ul>
Clinical Physiology	AYUSE Takao (Professor)	<ul style="list-style-type: none"> <li>① Research into management upper airway patency during sleep and anesthesia</li> <li>② Investigation on influence of anxiety on pain perception</li> <li>③ Research into functional role of opioid receptor</li> <li>④ Investigation on ischemia reperfusion injury of liver circulation</li> <li>⑤ Investigation on swallowing disorder</li> </ul>
Orthodontics and Dentofacial Orthopedics	YOSHIDA Noriaki (Professor)	<ul style="list-style-type: none"> <li>① Biomechanical analysis of orthodontic tooth movement</li> <li>② Effect of soft diet feeding on masticatory function development and craniofacial growth</li> <li>③ Etiology and pathogenesis of stomatognathic function disorders</li> <li>④ Mechanisms of root resorption induced by orthodontic tooth movement</li> <li>⑤ Development of orthodontic diagnosis and treatment support system using AI</li> <li>⑥ Development of treatment system for achieving efficient tooth movement</li> <li>⑦ Mechanisms of osteoclast differentiation and its control</li> </ul>
Pediatric Dentistry	TANOUE Naomi (Associate Professor)	<ul style="list-style-type: none"> <li>① Molecular biological research of pathogenic factors of dental caries and periodontal disease</li> <li>② Molecular biological research of teeth and craniofacial growth and development</li> <li>③ Development of new cognitive behavioral therapy</li> <li>④ Materials-based approach to dental and oral diseases</li> </ul>
Periodontology and Endodontology	YOSHIMURA Atsutoshi (Professor) YAMADA Shizuka (Associate Professor)	<ul style="list-style-type: none"> <li>① Physical properties and clinical results of endodontic tools and materials</li> <li>② Wound healing mechanism in pulpitis and apical periodontitis</li> <li>③ Pulp regenerative medicine and biomaterials</li> <li>④ Analysis of alveolar bone resorption mechanism</li> <li>⑤ Role of immune system in periodontal tissue breakdown</li> <li>⑥ Epidemiological study of periodontal diseases</li> <li>⑦ Analysis of virulence factors of periodontopathic bacteria</li> </ul>
Applied Prosthodontics	SAWASE Takashi (Professor) KUROSHIMA Shinichiro (Associate Professor)	<ul style="list-style-type: none"> <li>① Biocompatibility and biodynamics of dental implants</li> <li>② Etiology and treatment strategy of ONJ</li> <li>③ Manufacture, clinical application and evaluation of polymers/composite materials/ceramics</li> <li>④ Surface modification of dental materials</li> </ul>
Prosthetic Dentistry	MURATA Hiroshi (Professor)	<ul style="list-style-type: none"> <li>① Research into the development and clinical application of dental materials such as soft denture liners and denture adhesives</li> <li>② Research into mastication function and jaw movement</li> <li>③ Clinical research of prosthetic dentistry</li> <li>④ Maintenance of dentures</li> <li>⑤ Clinical research on effect of oral rehabilitation for oral hypofunction</li> </ul>
Clinical Oral Oncology	UMEDA Masahiro (Professor)	<ul style="list-style-type: none"> <li>① Clinico-pathological study of oral cancer</li> <li>② Research of cancer-related genetics relating to the onset, invasion, and metastasis of oral cancer</li> <li>③ Basic research of molecular targeted therapy for oral cancer</li> </ul>
Regenerative Oral Surgery		

Area of Research	Professor, etc.	Details of main research work
Radiology and Biomedical Informatics	SUMI Misa (Professor) TAKAGI Yukinori (Associate Professor)	① Diagnostic imaging of head and neck tumors ② Diagnosis and treatment of Sjögren's syndrome ③ Deep learning approach for imaging diagnosis ④ DNA damage and repair mechanisms
Medical Research and Development for Oral Disease		
Pharmacotherapeutics	TSUKAMOTO Kazuhiro (Professor) HIRAYAMA Tatsuro (Associate Professor)	① Research into DNA-based diagnostic methods for personalized medicine ② Research into association studies on susceptibility genes for diseases, progression, drug effectiveness, adverse effects, and prognosis using genetic polymorphic markers ③ Research on the interaction between chronic liver diseases and gut microbiome ④ Research into antifungal drug-resistance mechanisms of pathogenic fungi
Pharmaceutical Informatics	KAWAKAMI Shigeru (Professor)	① Research into targeted DDS using external stimuli from medical equipment ② Research into medical applications of nanobiotechnology ③ Development of ligand modified liposomes for targeting ④ Evaluation of medicines for efficacy and safe use ⑤ Research on pharmacokinetic properties of medicines
Pharmaceutics	NISHIDA Koyo (Professor)	① Research on drug delivery system aiming to develop new administration forms ② Development of control method for distribution of genetic medicine in the body and its pharmaceutical formulation with the purpose of optimizing treatment ③ Research on kinetic analysis of drug disposition in the body and dosage regimen under diseased state
Pharmacy Practice	NAKASHIMA Mikiro (Professor) OHYAMA Kaname (Associate Professor)	① Basic and clinical pharmaceutical research of generic drugs and their proper use ② Practical scientific research based on drug preparation and medical communication in the clinical setting ③ Development and clinical application of a novel therapeutic drug monitoring method ④ Screening and application of disease-specific immune response points for drug development
Nursing Sciences	ETO Hiromi (Professor) HONDA Sumihisa (Professor) SAWAI Terumitsu (Professor) ISHIMATSU Yuji (Professor) KURODA Hiromi (Professor) MATSUURA Emi (Professor)	① Research on midwifery and women's health ② Research on sleep of mother and child ③ Research on health promotion for the community citizens ④ Research into ostomy rehabilitation ⑤ Research into prevention for perioperative complication ⑥ Research on chronic respiratory nursing ⑦ Research on infection control nursing ⑧ Research on cardiovascular nursing ⑨ Research on people with sleep disturbance ⑩ Research on chronic disease nursing ⑪ Research on collagen disease nursing
Physical Therapy Sciences	KOZU Ryo (Professor) OKITA Minoru (Professor) ORIGUCHI Tomoki (Professor) SAKAMOTO Junya (Associate professor)	① Clarification of the mechanism for locomotive disorders (joint contracture, muscle atrophy, pain, etc) ② Research and development in rehabilitation for musculoskeletal diseases ③ Research and development in rehabilitation for cancer ④ Clinical research on rehabilitation for acute and chronic cardiorespiratory disorders ⑤ Epidemiological study for early detection and secondary prevention of chronic obstructive pulmonary disease ⑥ Research into rehabilitation for rheumatic diseases ⑦ Fundamental and clinical research on pain in rehabilitation
Occupational Therapy Sciences	IWANAGA Ryoichiro (Professor) TANAKA Goro (Professor)	① Research for assessment of children with developmental disabilities ② Research for dysfunction of sensory and motor in the individuals with autism spectrum disorder ③ Research on stigma against mental disorders ④ Research on psychiatric rehabilitation
Health Sciences	OHNISHI Mayumi (Professor) HIGASHI Toshio (Professor) KOSEKI Hironobu (Professor) SATO Katsuya (Professor)	① Research on health promotion for the community citizens ② Research in improving the health of people living under disadvantaged conditions ③ Research on rehabilitation for the disabled ④ Kinematic analysis and research of arthroplasty for gonarthrosis ⑤ Microstructure analysis and strength measurement of disuse bone atrophy ⑥ Joint kinetic analysis of wrist and ankle ⑦ Research and development in rehabilitation for neurological disease and muscle disease ⑧ Research and development in diagnose for dementia disease and rehabilitation for the prevention of dementia disease
Preventive Medicine	KOBAYASHI Masakazu (Associate Professor)	① Research into the effects of lifestyle on physical and mental health in young adults ② Research into the effects of lifestyle factors on physical and mental health in workers
Medical Innovation	TANAKA Yoshimasa (Professor)	① Development of novel combination cancer therapy harnessing PD-1 immune checkpoint inhibitors ② Development of novel cancer immunotherapy harnessing gd T cells ③ Development of novel cancer immunotherapy harnessing nanobodies ④ Development of novel cancer immunotherapy harnessing natural products
Community Network for Health Welfare		
Endocrinology and Metabolism		

Area of Research	Professor, etc.	Details of main research work
Clinical Neuroscience	TSUJINO Akira (Professor)	① Development of new diagnostic and therapeutic techniques for the neurological diseases ② Research on molecular, pathological and physiological mechanisms underlying the neurological diseases ③ Epidemiological and statistical analysis of omics and clinical data in the neurological diseases ④ Biomarker development for precision medicine in the neurological diseases ⑤ Translational research and clinical research of regenerative medicine in the neurological diseases
Nephrology	NISHINO Tomoya (Professor)	① Research into mechanisms of kidney diseases and development of new treatment methods ② Basic and clinical research into renal replacement therapy including hemodialysis, peritoneal dialysis and kidney transplantation ③ Epidemiological and clinical research into chronic kidney disease ④ Research into mechanisms and new treatment for complication of chronic kidney disease
Clinical Pharmacokinetics	KODAMA Yukinobu (Associate Professor)	① Research into optimization of drug therapy and appropriate use of drug preparations ② Development of drugs and genetic delivery systems
Emergency Medicine	TASAKI Osamu (Professor)	① Pathophysiological clarification of septicemia, and research into the development of treatment ② Pathophysiological clarification of ischemia-reperfusion injury, and research into the development of treatment ③ Pathophysiological clarification of severe trauma, and research into the development of treatment ④ Pathophysiological clarification of heatstroke, and research into the development of treatment ⑤ Research into nutrition management of critically ill patients
Neurological Science		
Neuroimmunology	HIGUCHI Osamu (Professor)	① Development of targeted drug for neurological diseases ② Development of drug discovery platform targeting protein kinases ③ Development of measurement technology for neurological disease biomarkers
Comprehensive Community Care	MINE Takashi (Professor) ICHIKAWA Tatsuki (Professor)	① Research into comprehensive community care system ② Research into the policy for community health ③ Research into network system for comprehensive community care ④ Research into primary health care in local community ⑤ Research into dementia and mild cognitive impairment in community ⑥ Research into assessment for sarcopenia ⑦ Viral hepatitis and metabolic syndrome
Comprehensive Oncology	GOTO Koichi (Professor) KONDO Tadashi (Professor) IGAKI Hiroshi (Professor) WATANABE Keisuke (Associate Professor)	① Research into fundamental causes and prevention of cancer ② Research into diagnosis and treatment for cancer ③ Research into cancer pathophysiology and survivorship ④ Research into precision medicine for cancer patients ⑤ Development of cellular immunotherapies for cancers

②Areas of Research in Department of Infection Research

Area of Research	Professor, etc.	Details of main research work
Immunology	INOUE Shin-Ichi (Associate Professor)	① Induction of IL-27 producing regulatory T cells (Tr27 cells) and their roles in the regulation of chronic infection ② IL-27-related regulation of immunological memory during malaria infection ③ Molecular mechanism of memory CD4+ T cell-differentiation and their persistence during malaria infection ④ Mechanism underlying immune response of $\gamma\delta$ T cells and their roles in malaria infection ⑤ Mechanism of complicated Plasmodium vivax malaria in India
Cellular and Molecular Biology	NISHIDA Noriyuki (Professor)	① Analysis of prion pathogen behavior and infection/proliferation mechanisms ② Anthropological research into skeletal transformation in archeological remains excavated in western Japan ③ Research into development of viral infection and prion infection diagnosis methods ④ Research into development of new drug treatments for pathogens
Infectious Diseases	IZUMIKAWA Koichi (Professor)	① Analysis of antifungal resistance mechanisms and virulence, and development of novel diagnostic tools and treatments for the infections caused by pathogenic fungi (Aspergillus, Candida, and Cryptococcus) ② Investigation of the molecular basis of host-pathogen interaction for bacteria causing the respiratory infection ③ Investigation of epidemiology and pathogenesis of the emerging, re-emerging infectious diseases as well as diseases caused by drug-resistant pathogens ④ Intervention for the preventing the spread of hospital-acquired infection
Microbiology and Oral Infection	NAITO Mariko (Professor) SHOJI Mikio (Associate Professor)	① Analysis of transport and secretion system of pathogenic factors in periodontal pathogen ② Molecular biological analysis of pathogenic factors of periodontal and relative bacteria ③ Search and development of antibacterial drugs targeting periodontal pathogen
Molecular Virology	TAKAMATSU Yuki	① Research on pathogenesis of dengue hemorrhagic fever ② Sero-epidemiology/molecular epidemiology of arboviruses ③ Pathogenic analysis of flavivirus using reverse genetics ④ Development of vaccines for flaviviruses such as West Nile virus ⑤ Research on viral pathogenesis and the development of diagnostics, therapeutics and vaccines against COVID-19 ⑥ Development of rapid diagnostic methods
Bacteriology	KODAMA Toshio (Professor)	① Research on pathogenesis of enteropathogenic bacteria ② Immune response and host defense mechanism to enteropathogenic bacteria ③ Molecular epidemiological study on enteropathogenic bacteria in endemic areas
Medical Protozoology	KANEKO Osamu (Professor)	① Molecular mechanisms of erythrocyte invasion and modification by malaria parasite ② Molecular epidemiology of malaria vaccine candidate antigens and drug-resistance genes ③ Evolution of malaria parasites ④ Understanding the biology of the dormant liver stage of malaria parasites ⑤ Development of vaccines, drugs and diagnostic tools for malaria
Medical Helminthology	HAMANO Shinjiro (Professor)	① Cohorts study and sapacio-temporal epidemiology of parasitic diseases under intervention in Africa ② Development and validation of new vaccines and diagnoses ③ Immune response and host defense mechanism to parasites (Schistosomiasis, Amoebiasis, Leishmaniasis, Trypanosimiasis, Filariasis and other parasitic diseases) ④ Survival strategies and pathogenicity of parasites
Immunogenetics		
Clinical Investigation		
Ecoepidemiology and Epidemiological Informatics in Tropical Medicine	KANEKO Satoshi (Professor)	① Research on the establishment of a large-scale surveillance system for neglected tropical diseases ② Research on the linkage between environmental DNA and epidemiological data on tropical diseases ③ Research on the application of biometrics to regional medical information systems ④ Epidemiological study on growth retardation (stunting) in children in developing countries ⑤ Study on electronic resident registration and maternal and child registration in developing countries ⑥ Epidemiological study on fungal mycosis
International Health and Medical Anthropology	YAMAMOTO Taro (Professor)	① Research into international health policy (G8 and the Conference on African Development) ② Reassembly of infectious disease on a time axis (study of ancient infectious diseases) ③ Molecular evolutionary research into maternal-child HTLV-1 infection ④ Infectious diseases and climate change (the environment)/changes to ecosystems ⑤ Research into the history of medicine relating to the history of tropical medicine in Japan ⑥ Research into factors in the spread of AIDS in the Greater Mekong Economic Corridor and China ⑦ High altitude medicine from evolutionary perspective ⑧ Field research in microbiome and modern epidemic ⑨ Study on Mathematical Infection Model of STIs ⑩ Application of Game Theory to Drug Resistance Drugs

Area of Research	Professor, etc.	Details of main research work
Vector Ecology and Environment	MINAKAWA Noboru (Professor)	① Biology of malaria vector mosquitoes in tropical regions ② Biology of viral disease vector mosquitoes in tropical regions ③ Malaria and dengue vector control tools ④ Impacts of environmental changes and climate variability on insect vectors ⑤ Ecology and control of non-mosquito vectors such as tsetse flies, sandflies, ticks, etc.
Clinical Tropical Medicine	MORIMOTO Konosuke (Professor)	① Clinical epidemiology of acute respiratory tract infection among adults ② HIV and AIDS in developing countries ③ Clarification of acute respiratory infection in developing countries, and countermeasures ④ Pathological clarification of other tropical infectious diseases in developing countries, and countermeasures
Tropical Pediatric Infectious Diseases	YOSHIDA Lay-Myint (Professor)	① Clinical epidemiology and microbiology of paediatric infectious diseases in tropical regions ② Clinical epidemiological and modelling studies on impact of vaccination and other interventions ③ Statistical analysis of disease surveillance data ④ Environmental factors and infectious diseases
Clinical Product Development		
Tropical Bacteriology		
Tropical Microbiology	HASEBE Futoshi (Professor)	① Epidemiological study on arbovirus infectious diseases in the tropical area and pathogenic analysis ② Investigation of emerging viral diseases in the tropical area and development of quick diagnostic methods ③ Epidemiological and ecological study on viral infectious diseases in Southeast Asia
Emerging Viral Diseases	YASUDA Jiro (Professor)	① Molecular mechanisms of replication of hemorrhagic fever viruses ② Development of novel anti-viral strategies against highly pathogenic viruses (especially influenza, SFTS, Ebola, Marburg and Lassa viruses) ③ Development of diagnostic methods for emerging viral diseases ④ Analyses of the pathogenicity of SARS-CoV-2 and development of treatments for COVID-19 ⑤ Epidemiological and ecological studies on viral diseases in Africa
Cellular and Molecular Virology	NANBO Asuka (Professor)	① Molecular mechanism of infection and pathogenesis of Filovirus ② Characterization of extracellular vesicles released from tumor virus-infected cells ③ Molecular mechanism of development of Epstein-Barr virus-associated epithelial tumors ④ Development of therapeutics and diagnosis for Filovirus and tumor virus-associated diseases
Viral Ecology	YOSHII Kentaro (Professor)	① Persistence and transmission of arthropod-borne viruses in hosts ② Pathogenic mechanisms of arthropod-borne viruses ③ Development of diagnostic methods and epidemiological research of arthropod-borne viruses ④ Development of vaccines and therapeutics for arthropod-borne viruses
Integrative Regulation		
Healthcare Research		
Viral Hepatitis	YATSUHASHI Hiroshi (Professor)	① Clinical research of hepatitis C and B, and research into the development of treatment methods ② Research into analysis of medical and genetic information using data mining ③ Research into the genetic mutation, pathology and treatment of hepatitis virus ④ Studies on the pathophysiology and treatment of liver fibrosis and cirrhosis ⑤ Clinical research on the development of liver cancer and its suppression
Advanced Research	NAKAMURA Minoru (Professor)	① Development of molecular target therapy for refractory autoimmune liver diseases (primary biliary cholangitis, autoimmune hepatitis) ② Development of order-made treatment for chronic viral hepatitis based on individual analysis of immune-response ③ Development of regenerative medicine for diseases in the liver/bile duct based on molecular mechanisms for cellular damage/regeneration
Molecular Immunology		
Function and Morphology	KUROKI Tamotsu (Professor)	① Diagnosis and surgical treatment for liver cancers: hepatic cancer, intrahepatic bile duct cancer, etc. ② Clinical and experimental research into regenerative capacity and mechanisms in liver diseases ③ Development of the novel assessment method for hepatic functional reserve: hepatic cell transplant methods ④ Clinical and experimental research into the relationship between hepatocellular carcinoma and lifestyle diseases
Clinical Pathology	ITO Masahiro (Professor)	① Clinical and pathological research into viral hepatitis/hepatic neoplasm ② Clinical and pathological research into refractory autoimmune hepatic disease ③ Molecular pathological research into neoplastic disorders ④ Clarification of occurrence mechanisms for radiation-induced neoplasm
Basic Mycobacteriosis	MITARAI Satoshi (Professor) KEICHO Naoto (Professor) OHKADO Akihiro (Associate Professor)	① Research on the development and evaluation of bacteriological diagnostic methods for tuberculosis ② Research into drug-resistant mechanisms in mycobacteria and their diagnosis/treatment ③ Epidemiological research on Mycobacterial diseases including molecular analysis ④ Analytical research on the relationship between mycobacterial function and its microstructure ⑤ Functional analyses of mycobacteria with OMICS information ⑥ Research on mycobacterial infection, development and recurrence of the disease at genetic, molecular and cellular levels
Clinical Mycobacteriosis	SHIRAISHI Yuji (Professor) SENJU Hideaki (Professor) KIMURA Hiroshi (Professor)	① Clinical research into treatment of susceptible pulmonary tuberculosis ② Research into DOTS (Directly Observed Treatment Short-course) ③ Clinical research into multi-resistant tuberculosis ④ Clinical research (including clinical trials) into the effectiveness of new antituberculosis drug treatments ⑤ Research into non-tuberculous mycobacterial disease ⑥ Research into pulmonary rehabilitation for patients with mycobacterial disease ⑦ Pathophysiological analyses of systemic inflammation and sarcopenia in pulmonary mycobacteriosis ⑧ Pulmonary rehabilitation and nutritional strategies for pulmonary mycobacteriosis



③Areas of Research in Department of Life Sciences and Radiation Research

Area of Research	Professor, etc.	Details of main research work
Radiation Medical Sciences	MITSUTAKE Norisato (Professor) SUZUKI Keiji (Associate Professor)	① Molecular mechanisms of thyroid cancer development ② Elucidation of mechanisms of ionizing radiation-induced carcinogenesis
Radiation Molecular Epidemiology		
Radiation Biology and Protection		
Radiation and Environment Health Effects	HAYASHIDA Naomi (Professor)	① Epidemiological research in local population ② Researches on health effects due to radiation ③ Clinical and epidemiological research on thyroid
Genome Repair		
Stem Cell Biology	LI Tao-Sheng (Professor)	① Translational studies on stem cells (cardiovascular diseases, wound healing, cancer, aging...) ② Understand how low dose radiation exposure affects the health by viewing the stem cells ③ Characterize cancer stem cells and uncover the mechanism on therapeutic resistance ④ Investigate the role of autophagy on genomic instability
Hematology	MIYAZAKI Yasushi (Professor)	① Development of new diagnostic methods and treatments for hematopoietic diseases ② Molecular analysis for the pathogenesis of hematopoietic neoplasms ③ Epidemiology and pathological research for radiation-induced hematopoietic diseases ④ Molecular analysis for hematopoietic stem cells ⑤ Development of treatments for hematological disorders using hematopoietic stem cell transplantation
Radioisotope Medicine	KUDO Takashi (Professor)	① Research into the clinical/pre-clinical use of radioisotopes ② Research into measurement of human low dose internal radiation ③ Research into risk/benefit assessment of the medical radiation and occupational radiation related to medical radiation usage
International Hibakusha Medical Sciences		

④ Areas of Research in Division of Advanced Preventive Medical Sciences

Area of Research	Professor, etc.	Details of main research work
Neurobiology and Behavior	[SHINOHARA Kazuyuki] (Professor) NAKAHATA Yasukazu (Associate Professor)	① Successful aging in human by revealing molecular mechanisms of how the circadian clock regulates aging process ② Alternative medical treatment aiming to use odorous and high frequency sound to improve mental or endocrine functions ③ Identification of factors to activate dermal cell functions ④ Exercise-mediated regulation of neural functions via myokines ⑤ Human physiological functions and sound effects
Public Health	AOYAGI Kiyoshi (Professor)	① Community health based on health promotion science ② Prevention of bone/joint disease ③ Industrial health ④ Prevention of lifestyle-related disease ⑤ Physiological polymorphism based on physiological anthropological research
Medical Informatics		
Community Medicine	NAGATA Yasuhiro (Professor)	① Research in community medicine ② Research into the epidemiology of life-style related disease ③ Research into community medical information and partnerships ④ Research into community-based medical education ⑤ Research into comprehensive community care system
Immunology and Rheumatology	KAWAKAMI Atsushi (Professor)	① Research into causes and pathology of autoimmune disease, and autoinflammatory disease, and development of new treatment ② Integrated analysis of arthritis: Etiology, Pathology and Therapy ③ Genetic and environmental analysis of autoimmune disease, and autoinflammatory disease ④ Onset mechanisms for autoimmune disease brought on by viral infection ⑤ Multimodal investigation of Pre-RA by genomic · immunological · environmental approach ⑥ Research into causes and pathology of refractory autoimmune neural disease ⑦ Research into causes and pathology of lifestyle-related disease, and development of new treatment methods ⑧ Radiation exposure and thyroid cancer ⑨ Research of osteoporosis: pathological aspect and advanced treatments
General Medicine	MAEDA Takahiro (Professor)	① Epidemiological study for prevention of lifestyle-related diseases ② Research into pathophysiology and prevention/treatment regarding functional somatic syndrome ③ Research into medical information sharing in community ④ Research into pathophysiology and prevention regarding sarcopenia/frailty ⑤ Research into rare diseases in primary care
Global Health, Medicine and Welfare	TAKAMURA Noboru (Professor)	① Epidemiological study of victims around Chernobyl Nuclear Power Plant ② Environmental evaluation of Fukushima ③ Evaluation of exposure doses in Fukushima ④ Risk perception of residents in Fukushima
Human Genetics	YOSHIURA Koichiro (Professor)	① Identification of the genes responsible for onset of disease ② Research into the relationship between human genetic polymorphism and disease ③ Research into the control of genetic expression through epigenetics mechanisms ④ The creation of disease model mice and pathophysiological analytical research thereof ⑤ Development of methods to quantify radiation damage
Molecular Medicine	[NAGAYAMA Yuji] (Professor)	① Research into thyroid cancer using genetically-modified mice ② Thyroid and autophagy ③ Metabolic reprogramming in thyroid cancer
Tumor and Diagnostic Pathology	NAKASHIMA Masahiro (Professor)	① Research into molecular pathological specificity of neoplasms in atomic bomb Hibakusha ② Research into late-onset radiation-induced disorders ③ Creation of Hibakusha neoplasm tissue bank ④ Pathology of thyroid neoplasm ⑤ Research into pathological diagnostics and new molecular pathological diagnostics

Doctoral Course [3 years]

① Areas of Research in Department of Pharmaceutical Sciences

Area of Research	Professor, etc.	Details of main research work
Cell Regulation	TAKEDA Kohsuke (Professor)	① Roles of mitochondrial sensing and stress response ② Mitochondrial functions in the regulation of inflammation ③ Mechanisms of inflammatory death of macrophage lineage cells ④ Molecular mechanisms of cell motility
Pharmacology and Therapeutic Innovation	KANEKO Masayuki (Professor) TSUKAHARA Tamotsu (Associate Professor)	① Physiological roles and drug discovery of ubiquitin ligases ② Analysis of gene function and drug discovery using genome editing ③ Drug discovery based on the translation, transport, and metabolism of protein ④ Lipid mediators in inflammation disorders ⑤ Lysophosphatidic acid signaling in the nervous system ⑥ Drug discovery and development; From Lipid molecules to medicine
Pharmaceutical Chemistry	TANAKA Masakazu (Professor) UEDA Atsushi (Associate Professor)	① Design and synthesis of non-proteinogenic amino acids and their use in pharmaceutical chemistry ② Development of helical peptides as an asymmetric organocatalyst ③ Design of cell-penetrating foldamers and their application to drug delivery system
Pharmaceutical Organic Chemistry	ISHIHARA Jun (Professor)	① Synthesis of biologically active natural products ② Development of highly effective formation of carbon framework ③ Development of reaction diversity catalysts
Synthetic Chemistry for Pharmaceuticals	ONOMURA Osamu (Professor)	① Development of highly selective organic reactions for synthesis of pharmaceuticals ② Exploitation of reactions for efficient synthesis of unnatural amino acids ③ Development of environmentally friendly oxidation reactions for production of bulk chemicals
Genome-based Drug Discovery	IWATA Nobuhisa (Professor) SHIROTANI Keiro (Associate professor)	① Analysis of molecular mechanisms underlying the pathogenesis of Alzheimer's disease ② Development of disease-modifying therapy and biomarker of Alzheimer's disease ③ Analysis of pathophysiological roles of convulsive neurological disease-causing gene PRRT2 in the synapse ④ Analysis of tissue-specific gene expression mechanism in eukaryotes
Natural Product Chemistry	[TANAKA Takashi] (Professor) SAITO Yoshinori (Associate professor)	① Isolation and structure elucidation of functional natural products ② Study on structures and functions of plant polyphenols and its application to health food ③ Dynamic chemistry of polyphenols in plants and biomimetic molecular conversion ④ Chemical diversity of plant secondary metabolites
Medicinal Plant Biochemistry	YAMADA Koji (Associate Professor)	① Research into the bioactive constituents of medicinal plants ② Drug development research into the physiologically active component substances in marine invertebrates ③ Drug development research into physiologically active component substances derived from marine microorganisms
Structure Analysis for Chemicals	MAKI Toshihide (Associate Professor)	① Design and development of photofunctional molecules ② Research into structure-activity relationship of bioactive compounds based on organic chemistry ③ Exploitation of practical synthetic methodologies and their application for medicinal chemistry
Chemistry of Biofunctional Molecules	YAMAYOSHI Asako (Professor) YAMAMOTO Tsuyoshi (Associate professor)	① Development of nucleic acid drugs for functional regulation of non-coding RNAs ② Novel drug delivery system using circulating extracellular vehicles ③ Development of novel photodynamic regulation system for regulation of epigenetic gene expression ④ Development of therapeutic oligonucleotides for the treatment of cardiovascular diseases ⑤ Development of novel drug discovery platform technology based on chemistry of nucleic acids
Hygienic Chemistry	TORIBA Akira (Professor)	① Environmental dynamics analysis for atmospheric organic pollutants ② Studies on human exposure and health effects of environmental pollutants ③ Investigation of trace elements in biological systems ④ Synthesis of biologically active nanosphere containing metallic elements
Analytical Chemistry for Pharmaceuticals	KURODA Naotaka (Professor)	① Development of luminescence reagent and its application to biomedical analyses ② Development of ultra sensitive analytical method for trace biologically active substances and pharmaceuticals ③ Development of new derivatization methods for mass spectrometry ④ Development of rapid separation method for biologically active substances