

Admission 2024

GUNMA UNIVERSITY Graduate School of Medicine

Course of Biomedical Sciences

(Master's Program)



# C o n t e n t s

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Dean, Course of  
Biomedical Sciences

**Yoshihiko Kominato**

## A Message from the Dean

Course of Biomedical Sciences (Master's Program) was installed in 2007 at Graduate School of Medicine. Due to rapid development of life science, medicine, and information science, a possibility of utilizing the advance in bio-medical fields, in such as a bio-correlative industry, drug design, and advanced medicine, has increased. Therefore, Course of Biomedical Sciences was established in order to grow researcher, educator and high-level medical person, who can exercise leadership in life science, medicine and medical field.

In Course of Biomedical Sciences, the interdisciplinary field of medicine and life science is set as the main object of education and research. Namely, it aims at advancing a life process for analysis from a medical viewpoint, promoting the education and research of the interdisciplinary field in medicine and medical treatment, learning and developing new medicine and medical technology which aimed at improvement of health and the quality of life, raising advanced medical person, etc.

Although the graduates of this Course would be divided into the advanced profession people in each field, such as researcher, educator, medical person, and industrial person, or into those who go on to Course of Medical Sciences (Doctoral Program), playing an active part as a leader in each field will be expected, taking advantage of having learned at Course of Biomedical Sciences.

〈Special Educational Course and Program〉

Medical Physics Course

In Gunma University, heavy-ion cancer therapy was started from 2010 in Heavy-Ion Medical Center uniquely installed in Japan. Medical physicist, who takes charge of the cancer medical treatment using radiation, such as heavy-ion, is very insufficient in Japan. So, Medical Physics Course that aimed at cultivation of medical physicist was installed.

## Outline of Biomedical Sciences (Master's Program)

### 1 Aim of Master's Program for Biomedical Sciences

Recent advances in life sciences and information sciences have opened up abundant prospects for applying the achievements of basic research within bio-related industries and new medical services, including drug discovery and regenerative medicine. At the same time, there is a need to solve many challenges, such as medical ethics and information security that are associated with advanced medical technology, and community healthcare support in our aging society, which are opening up a wide range of potential roles for medical researchers and health professionals. Many doors are being opened to non-medical school graduates and trained researchers, educators, and/or highly skilled workers who can exercise leadership in the life sciences and medical fields. However, there is a looming shortage of researchers/educators able to respond to the needs of society and who can take an active role in Biomedical Sciences, this new interdisciplinary field between life sciences and medicine.

There is also a growing number of non-medicine, non-veterinary, and non-dentistry graduates who are hoping to pursue their interest in life science research or medical fields; however, before these graduates can enter a graduate school of medicine to take a PhD course, they either need to have obtained a Master's Degree or must have more than two years' research experience at a university or research institute. Gunma University Graduate School of Medicine has been shifting its focus of interest to new interdisciplinary fields. For example, in 2003, we re-organized our Medical Sciences Course (Doctoral Program) and our research and educational system into a basic plus clinical integrated style, and established a PhD program in health sciences, now being run by the Graduate School of Health Sciences. The implementation of a day/evening course system for both programs allowed us to offer the course to mature students not from only the medical and health science fields, but also from related fields. However, we were still unable to accept graduates from facilities other than medicine, veterinary, or dentistry directly to our medical sciences course.

In response to increasing demand, and to broaden our intake of graduates from other faculties, we have established a Biomedical Science Course (Master's program) within the Graduate School of Medicine. Furthermore, we will begin the Day/Evening course system in some major fields from April, 2022. This program aims to educate non-medical school graduates in the fundamental knowledge and skills needed to engage in the type of independent research that increasingly underpins medical and life sciences, and to foster leadership in medical-related fields on the part of health professional experts.

### 2 Research conducted in Biomedical Sciences

Biomedical Sciences is a general term for the life sciences field, which overlaps medicine, life sciences, and other medical interdisciplinary fields. The Biomedical Sciences Course is designed to draw together life sciences and traditional basic medicine/clinical medicine as educational and research subjects to promote the elucidation of biological processes from a medical perspective and to establish Biomedical Sciences as a discipline that is aimed at the creation of new medical care: not only diagnosis and treatment, but also the promotion of health and improvement of quality of life.

### 3 Career options after earning Master's Degree

This Master's course will train students in the biomedical sciences. It is hoped they will acquire basic knowledge of medicine, and come to understand the relationship between medicine and life sciences. We hope graduates will become researchers who can propose and conduct original research in biomedical sciences and academic medicine.

Graduates of this Master's Program can expect to become:

1. Educators and/ or researchers in the area of biomedical sciences (eg. life sciences or medical science related fields)
2. Highly trained experts in the fields of medicine, welfare, pharmacology, biology-related industries
3. Those who continue their education in Medical Sciences (Doctoral program) course

–Educators and researchers in biomedical sciences  
–Highly trained experts in respective fields

**(Career possibilities)**

Research institutions, educational institutions, clinical pathology facilities, health care facilities, pharmaceutical companies, clinical research and development companies, biotechnology associated industries, hospital and medical facilities, etc.

–Educators and researchers in medical and/or life science fields  
–Health care providers

Course of Medical Sciences  
(Doctoral Program)

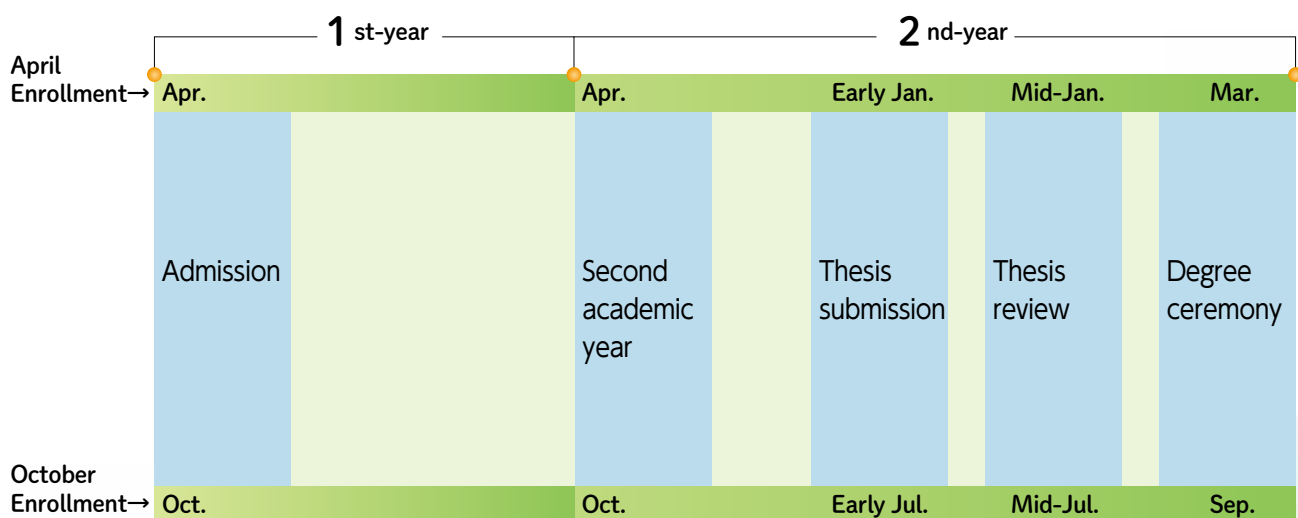
Course of Biomedical Sciences  
(Master's Program)

## 4 Curriculum

- 1) Subjects are categorized as Basic Subjects, Practical Subjects, and Research Subjects.
- 2) Basic Subjects are taken in the 1st year. In “required subjects”, basic knowledge on life sciences and medical sciences, and basic techniques necessary in biomedical research will be acquired. In “required elective subjects,” basic biomedical knowledge needed in multiple fields will be acquired (11 credits of required subjects, 4 credits of required elective subjects ).
- 3) Practical Subjects are electives selected according to research theme and/ or postgraduate career. Practical and applied knowledge needed for specialization and/ or research in chosen fields will be acquired (4 or more credits of Practical Subjects).
- 4) In Research Subjects, students will conduct biomedical research in their chosen field and compose a master’s thesis. They will acquire knowledge and techniques needed to propose and conduct research, and present research findings (13 credits of Research Subjects).

\*Please note that entrance is in April or October.

In principle, all classes for students entering in October are conducted in English.



### Requirements for degree award

- Acquisition of the credits listed in the Curriculum Table on Page 5.
- Successful completion of Master’s thesis review process and passing final examination

# Graduation Requirements

| Curriculum   |  |                  |                   |                            |                   |                  |                       |                  |  |
|--|--|------------------|-------------------|----------------------------|-------------------|------------------|-----------------------|------------------|--|
| Subdivision  | Subject                                    | An academic year | Credits           |                            |                   | Teaching methods |                       |                  | Remarks  |
|  |  |                  | Required subjects | Required Elective subjects | Elective subjects | Lecture          | Seminar               | Technical Course |  |
| Basic  | Research Ethics                            | 1                | 1                 |                            |                   | ○                | ○                     |                  | Take all these required subjects   |
|  | Research Ethics(e-learning)                | 1                | 1                 |                            |                   | ○                | ○                     |                  |  |
|  | Introduction to Clinical Sciences          | 1                | 2                 |                            |                   | ○                |                       |                  |  |
|  | Philosophy                                 | 1                | 2                 |                            |                   | ○                |                       |                  |  |
|  | Basic Scientific Language                  | 1                | 2                 |                            |                   | ○                |                       |                  |  |
|  | Statistical Informatics                    | 1                | 2                 |                            |                   |                  | ○                     |                  |  |
|  | Bio-Scientific Training                    | 1                | 1                 |                            |                   |                  |                       | ○                | Take more than 2 out of 5 subjects for 4 credits or more.<br>※[Analytical Physiology] corresponds to "Integrative Physiology" or "Neurophysiology" |
|  | Anatomy                                    | 1                |                   | 2                          |                   | ○                |                       |                  |  |
|  | Analytical Physiology                      | 1                |                   | 2                          |                   | ○                |                       |                  |  |
|  | Biomolecular Chemistry                     | 1                |                   | 2                          |                   | ○                |                       |                  |  |
|  | Socio-Environmental Medicine               | 1                |                   | 2                          |                   | ○                |                       |                  |  |
|  | Laboratory Animal Science                  | 1                |                   | 2                          |                   |                  | ○                     |                  |  |
| Subtotal (12 subjects)   | —  | 11               | 10                | 0                          |                   |                  |                       |                  |  |
| Practical  | Molecular and cellular biology             | 2                |                   |                            | 2                 | ○                |                       |                  | Take 2 subjects for 4 credits or more.   |
|  | An Introduction to Pathology               | 2                |                   |                            | 2                 | ○                |                       |                  |  |
|  | Bacteriology & Infection Control           | 2                |                   |                            | 2                 | ○                |                       |                  |  |
|  | Neuroscience lecture                       | 2                |                   |                            | 2                 | ○                |                       |                  |  |
|  | Reproduction, Regeneration and Development | 2                |                   |                            | 2                 | ○                |                       |                  |  |
|  | Informational Management                   | 2                |                   |                            | 2                 | ○                |                       |                  |  |
|  | International Public Health                | 2                |                   |                            | 2                 | ○                |                       |                  |  |
|  | Ion beam technology for bioengineering     | 2                |                   |                            | 2                 | ○                |                       |                  |  |
|  | Drug Discovery                             | 2                |                   |                            | 2                 |                  | ○                     |                  |  |
|  | Clinical Trial and Research                | 2                |                   |                            | 2                 |                  | ○                     |                  |  |
|  | Exercises in Genomic Medicine              | 2                |                   |                            | 2                 |                  | ○                     |                  |  |
|  | Rihabilitation Medicine & Sociology        | 2                |                   |                            | 2                 |                  | ○                     |                  |  |
| Subtotal (12 subjects)   | —  | 0                | 0                 | 24                         |                   |                  |                       |                  |  |
| Research   | Biomedical Sciences Methodology            | 1~2              | 2                 |                            |                   |                  | ○                     |                  | Required subjects  |
|  | Biomedical Sciences Research               | 1~2              | 10                |                            |                   |                  | ○                     |                  |  |
|  | Research Discussion Seminar                | 2                | 1                 |                            |                   |                  | ○                     |                  |  |
|  | Subtotal (3 subjects)                      | —                | 13                | 0                          | 0                 |                  |                       | —                |  |
| Total (27 subjects)  |  | —                | 24                | 10                         | 24                |                  |                       | —                |  |
| Degree   | Master (Biomedical Science)                |                  |                   |                            |                   |                  |                       |                  |  |
| Required   |  |                  |                   |                            |                   |                  | terms                 |                  |  |
| Students should 1) obtain credits described above, 2) write a dissertation with mentors' guidance, and 3) pass the thesis defense. |  |                  |                   |                            |                   |                  | terms per year        |                  | two terms  |
|  |  |                  |                   |                            |                   |                  | school weeks per term |                  | 15 weeks   |
|  |  |                  |                   |                            |                   |                  | time of one class     |                  | 60-90 minutes  |

## Admission Policy

Course of Biomedical Sciences in Graduate School of Medicine, Gunma University (Master's Program)

### <Aims in Human Resources Development>

Our program aims to cultivate scientists who will pursue medical science, medical ethics, and medical skills. We hope our graduates will integrate these pursuits and contribute to the progress of medical research and education, and become leaders in health care and medical science.

### <Attributes of Desired Candidate>

We will accept students who wish to gain knowledge and skills in biomedical sciences through our program, and become highly-skilled professionals or researchers. Specifically, we will accept those who:

1. strive to gain the ability to perform research independently based on high ethical values and profound academic knowledge.
2. strive to contribute to the society in medical science, health care and welfare filed as highly-skilled professionals by making use of the knowledge and skills they acquired.
3. strive to further develop the knowledge and skills they acquire, and continue to the PhD program to become researchers and/or educators in Biomedical Sciences field.
4. have English skills sufficient for reading basic academic literature.

### <Basic Policy for Admission Selection>

In order to select applicants with the above qualities, we will make comprehensive evaluation based on the results of the entrance examination (English test and interview) and undergraduate academic transcripts. We offer October admission in addition to the traditional April admission, to expand learning opportunities.

English examination will evaluate "reading comprehension of literature in English" (Attributes of Desired Candidate 4). The oral examination (interview) will evaluate the applicant's basic academic knowledge related to the major field of study and the willingness to engage in research (Attributes of Desired Candidate 1-3). Furthermore, the transcripts will be added for a comprehensive judgment.

## Admission Information

### 1 Qualifications for Application

The main applicants are those who have been conferred a bachelor's degree (or expected to be conferred) or who have completed a specialised course at a vocational school. However, other persons may also be eligible to apply (qualification screening may be required). Please refer to the application guidelines for information on application requirements. For any questions, feel free to contact the admissions office.

### 2 Acceptance of Application

For more information on the application process, please refer to the website of the Graduate School of Medicine and the Faculty of Medicine, Gunma University. (<https://www.med.gunma-u.ac.jp/>). The Application forms are also available here.

### 3 Selection Method and the Number of Students to be Admitted

Selection Method :The evaluation for acceptance is based on an Academic examination(including oral examination), and the academic transcripts submitted by the applicants.

Number of Students to be Admitted:15

### 4 Examination Date

Examinations for April 2024 entrants are scheduled for September 2023. For more information, please refer to the application guidelines on the website.

### 5 The Aim of Each Examination Subject

Foreign Language (English) ..... English skills sufficient for reading basic academic literature will be examined.

Oral Examination of Desired Major Field ..... Basic academic ability necessary for engaging in studies in major field and willingness to study will be examined.

### 6 Fees following entrance

Entrance and tuition fees

(1) Entrance fee: ¥282,000 (JPY 282,000)

(2)Tuition fee: (first-semester) ¥267,900 (JPY 267,900) (Annual tuition fee: ¥535,800 (JPY 535,800))

\*If the fees are revised at the time of enrollment or during the course of study, the revised amount will be applied.

### 7 Exemption and Postponement of Entrance and Tuition Fee, Scholarship

The admission fee or the tuition fee may be waived for admitted students who have difficulty paying due to special circumstances. Additionally, the collection of the admission fee or tuition fee can be postponed for a certain period for students who have difficulty paying by the specified deadline. A scholastic loan and benefit system for learning support is provided by Japan Student Services Organization (JASSO) for those with difficulty in paying the tuition fee.

For more information, please contact Education and Student Support Section, Educational Affairs Office, Administration Division, Showa Campus of Gunma University.

For exemptions and postponements : TEL. +81-27-220-7796 For Scholarships: TEL. +81-27-220-7792

### 8 Information sessions for applicants

An admissions information session is planned for those wishing to enrol in the coming year. For more information on dates and locations, please check our website.

Contact details:

Admissions Section, Educational Affairs Office, Administration Division, Showa Campus of Gunma University

3-39-22 Showa-machi, Maebashi City, Gunma 371-8511, Japan

TEL. +81-27-220-7797 E-mail: [kk-mgakumu5@jimu.gunma-u.ac.jp](mailto:kk-mgakumu5@jimu.gunma-u.ac.jp)





## Introduction of Major Field

### Basic Medicine



The basic medicine consists of 14 fields.

Research and education of biomedical sciences will be conducted based on basic medicine.

Anatomy  
 Anatomy and Cell Biology  
 Molecular and Cellular Neurobiology  
 Biochemistry  
 Integrative Physiology  
 Neurophysiology and Neural Repair  
 Pharmacology  
 Developmental Genetics and Behavioral Neuroscience  
 Bacteriology  
 Infectious Diseases and Host Defense  
 Public Health  
 Legal Medicine  
 Medical Philosophy and Ethics  
 Medical Education and Development

### Clinical Medicine



The clinical medicine consists of 36 fields (Including 8 Internal Medicine and 6 General Surgical Science). Research and education of biomedical sciences will be conducted based on clinical medicine.

(Internal Medicine)  
 Cardiovascular Medicine  
 Respiratory Medicine  
 Gastroenterology and Hepatology  
 Endocrinology and Metabolism  
 Nephrology and Rheumatology  
 Hematology  
 Neurology  
 Medical Oncology  
 (General Surgical Science)  
 Cardiovascular Surgery  
 General Thoracic Surgery  
 Gastroenterological Surgery  
 Breast and Endocrine Surgery  
 Hepatobiliary and Pancreatic Surgery  
 Pediatric Surgery  
 Radiation Oncology  
 Diagnostic Radiology and Nuclear Medicine  
 Psychiatry and Neuroscience  
 Anesthesiology  
 Emergency Medicine  
 General Practice Medicine  
 Rehabilitation Medicine  
 Clinical Laboratory Medicine  
 Human Pathology  
 Diagnostic Pathology  
 Pediatrics  
 Obstetrics and Gynecology  
 Urology  
 Neurosurgery  
 Ophthalmology  
 Otolaryngology Head and Neck Surgery  
 Dermatology  
 Plastic Surgery  
 Orthopaedic Surgery  
 Clinical Pharmacology and Therapeutics  
 Oral and Maxillofacial Surgery  
 Quality and Safety in Healthcare

### Cooperative and joint Department



The cooperative department and joint department consist of 9 fields of Institute for Molecular and Cellular Regulation, 2 clinical division of University Hospital, 2 fields of Heavy Ion Medical Center, 1 field of Center for Food Science and Wellness, 1 field of Center for Mathematics and Data Science and 1 field of Takasaki Advanced Radiation Research Institute, Japan Atomic Energy Agency.

(University Hospital)  
 Clinical Trials and Regulatory Science  
 Medical Informatics  
 (Institute for Molecular and Cellular Regulation)  
 Molecular Traffic  
 Epigenetics and Metabolism  
 Molecular Membrane Biology  
 Metabolic Regulation and Genetics  
 Developmental Biology and Metabolism  
 Diabetes and Metabolic Disorders  
 Mucosal Ecosystem Design  
 Genome Sciences  
 Metabolic Signaling  
 (Heavy Ion Medical Center)  
 Medical Physics and Biology for Ion Therapy  
 Heavy Ion Clinical Medicine  
 (Center for Food Science and Wellness)  
 Food Science and Wellness  
 (Center for Mathematics and Data Science)  
 Mathematics and Data Science  
 (Takasaki Advanced Radiation Research Institute, National Institute for Quantum and Radiological Sciences and Technology)  
 Quantum Biology

Note : Inquiries about admission should be made directly to supervisors in desired Major Field of Study prior to the actual application process. Furthermore, If you would like to change your major field, you would change it at the end of the 1<sup>st</sup> semester of the 1<sup>st</sup> year.

## Description of Research Objectives (Key Words)

\*The Day/Evening course will be begun. (It based on the special divisions on education methods by Article 14 of the Standards Act for Establishment of Graduate School and conducts the selection. )

### Basic Medicine

#### Anatomy\*

Hirohide Iwasaki

Neuronal circuit, connectome, synapse remodeling, development, vesicle transport, imaging technology, light microscopy, electron microscopy

#### Anatomy and Cell Biology\*

Toshiyuki Matsuzaki

cell membrane, water channels, transporters, microscopy, immunohistochemistry, electron microscopy

#### Molecular and Cellular Neurobiology

Kenichiro Hata

genomics, epigenomics, microbiome, single-cell analysis, DOHaD, early development, congenital disorders

#### Biochemistry\*

Yoji Andrew Minamishima

Hypoxic response, energy metabolism, DNA damage & repair, cell cycle, cellular senescence, lipid mediators, proteomics, metabolomics, and lipidomics <http://biochemistry.med.gunma-u.ac.jp/en/>

#### Integrative Physiology\*

Noriyuki Koibuchi

hormone, development, plasticity, regeneration, environmental factors, endocrine disruption

#### Neurophysiology and Neural Repair\*

Hirokazu Hirai

memory; learning; motor control; regenerative medicine; viral vector; neurodegenerative disease; marmoset; non-human primate model; aging; stem cell therapy; gene therapy; patch clamp.

#### Pharmacology\*

Hiroshi Kawabe

Ultrastructure of Synapses, Superresolution Microscopy, Psychiatric and Neurological Disorders, Cytoskeleton, Posttranslational Modification, Protein Degradation

#### Developmental Genetics and Behavioral Neuroscience

Goichi Miyoshi

Neural development, Inhibitory circuits, Mouse genetics, Social behavior, Autism spectrum disorder, Neurodevelopmental disorder

#### Bacteriology\*

Haruyoshi Tomita

multi-drug resistant bacteria, VRE, MDRP, enterococcus, bacteriocin, conjugative plasmid, transposon

#### Infectious Diseases and Host Defense\*

Wataru Kamitani

Coronavirus, Molecular biology, Reverse genetics of Virus, Host-Pathogen interaction, Malaria, Infectious immunity

#### Public Health\*

Kei Hamazaki

micronutrient, maternal and child health, lifestyle related diseases, public health nutrition, epidemiological studies



## Description of Research Objectives (Key Words)

|   |                                       |                            |
|---|---------------------------------------|----------------------------|
| <b>Legal Medicine*</b>  | Yoshihiko Kominato                    |                            |
| legal medicine, personal identification, ABO blood group, enhancer  |                                       |                            |
| <b>Medical Philosophy and Ethics*</b>   | Kenji Hattori                         |                            |
| clinical ethics, medical ethics, philosophy of medicine, medical ethics education   |                                       |                            |
| <b>Medical Education and Development</b>  | Mikiko Kishi                          |                            |
| Medical Education, Lesson Planning, Teaching Material, Curriculum Development   |                                       |                            |
| <b>Clinical Medicine</b>  |                                       |                            |
| <b>Cardiovascular Medicine</b>  | Hideki Ishii                          | (Internal Medicine)        |
| arrhythmia, heart failure, ischemic heart disease, ultrasonic echocardiography, molecular biology, translational research   |                                       |                            |
| <b>Respiratory Medicine</b>   | Toshitaka Maeno (Associate Professor) | (Internal Medicine)        |
| lung cancer, allergic respiratory disease, COPD, lung fibrosis, infectious lung disease   |                                       |                            |
| <b>Gastroenterology and Hepatology*</b>   | Toshio Uraoka                         | (Internal Medicine)        |
| gastrointestinal tumor, endoscopy, esophageal motility disorder, inflammatory bowel disease, hepatocarcinogenesis, non-alcoholic steatohepatitis, hepatic fibrosis, viral hepatitis |                                       |                            |
| <b>Endocrinology and Metabolism*</b>  | Yoshio Ikeda                          | (Internal Medicine)        |
| lifestyle diseases, endocrine disorders, diabetes mellitus, molecular biology, gene mutation  |                                       |                            |
| <b>Nephrology and Rheumatology*</b>   | Keiju Hiromura                        | (Internal Medicine)        |
| nephrology, glomerulonephritis, tubulointerstitial injury, rheumatology, lupus nephritis, vasculitic syndrome   |                                       |                            |
| <b>Hematology*</b>  | Hiroshi Handa (Associate Professor)   | (Internal Medicine)        |
| hematologic malignancy, genome, epigenome, coagulation disorder, next generation sequencer  |                                       |                            |
| <b>Neurology*</b>   | Yoshio Ikeda                          | (Internal Medicine)        |
| Alzheimer disease, dementia, amyotrophic lateral sclerosis (ALS), spinocerebellar ataxia (SCA), microsatellite-repeat   |                                       |                            |
| <b>Medical Oncology</b>   | (Under process of selection)          | (Internal Medicine)        |
| <b>Cardiovascular Surgery*</b>  | Tomonobu Abe                          | (General Surgical Science) |
| surgery, heart, brain, ischemia, reperfusion injury, organ protection   |                                       |                            |

|  |                                     |                            |
|--|-------------------------------------|----------------------------|
| <b>General Thoracic Surgery</b>  | Ken Shirabe                         | (General Surgical Science) |
| surgical oncology, mechanism of proliferation, invasion and metastasis, driver gene, diagnosis and treatment   |                                     |                            |
| <b>Gastroenterological Surgery*</b>  | Hiroshi Saeki                       | (General Surgical Science) |
| carcinogenesis and cancer progression, gastrointestinal motility, novel diagnostic method, development of novel diagnostic and therapeutic method, surgical education      |                                     |                            |
| <b>Breast and Endocrine Surgery</b>  | Takaaki Fujii (Associate Professor) | (General Surgical Science) |
| breast cancer, biomarkers, lymph node metastasis, TILs, microRNA, PET  |                                     |                            |
| <b>Hepatobiliary and Pancreatic Surgery*</b>   | Ken Shirabe                         | (General Surgical Science) |
| cancer microenvironment, hepato-biliary and pancreatic cancer, sarcopenia, and laparoscopic surgery for hepato-biliary and pancreatic disease                              |                                     |                            |
| <b>Pediatric Surgery</b>   | Ken Shirabe                         | (General Surgical Science) |
| surgical oncology, circulating tumor cells, minimally invasive surgery, gastro-intestinal motility, enterobacterial flora  |                                     |                            |
| <b>Radiation Oncology</b>  | Tatsuya Ohno                        |                            |
| Precision medicine, DNA repair, anti-tumor immunity, high precision radiotherapy, image-guided, brachytherapy, carbon ion radiotherapy, multidisciplinary cancer treatment |                                     |                            |
| <b>Diagnostic Radiology and Nuclear Medicine*</b>  | Yoshito Tsushima                    |                            |
| diagnostic radiology, nuclear medicine, CT, MRI, US, SPECT, PET, interventional radiology  |                                     |                            |
| <b>Psychiatry and Neuroscience*</b>  | Masato Fukuda                       |                            |
| psychiatric disorder, neuroimaging, stress, mental illness, brain function   |                                     |                            |
| <b>Anesthesiology*</b>   | Shigeru Saito                       |                            |
| anesthesia, neuroimaging, consciousness, pain, brain function  |                                     |                            |
| <b>Emergency Medicine</b>  | Kiyohiro Oshima                     |                            |
| cardiopulmonary arrest, cardiopulmonary resuscitation, severe trauma, reperfusion injury, coagulation  |                                     |                            |
| <b>General Practice Medicine</b>   | Keiko Kowase                        |                            |
| General medicine, Primary care, community medicine, atherosclerosis, Japanese oriental medicine, diagnostic inference  |                                     |                            |
| <b>Rehabilitation Medicine*</b>  | Naoki Wada                          |                            |
| rehabilitation medicine, disability studies, motion analysis, autonomic nervous system, virtual reality  |                                     |                            |

**Clinical Laboratory Medicine\***

Takao Kimura (Associate Professor)

Clinical laboratory medicine, gene analysis, diabetes mellitus, thyroid disease, atherosclerosis, infectious diseases, sports medicine, lifestyle-related disease, infection control and prevention

**Human Pathology\***

Hideaki Yokoo

neuropathology, brain tumor, molecular and cytogenetics of tumor, glial cells, translational research

**Diagnostic Pathology\***

Tetsunari Oyama

cancer morphology, multi-step carcinogenesis, oncogene, tumor suppressor gene, protein expression

**Pediatrics**

Takumi Takizawa

allergic diseases, neurodegenerative disorder, acute leukemia, nephrosis, inflammatory bowel diseases.

**Obstetrics and Gynecology\***

Akira Iwase

Reproductive medicine and biology, Reproductive endocrinology, Gynecologic oncology, Perinatal medicine, Endometriosis, Minimally invasive surgery

**Urology\***

Kazuhiro Suzuki

urological tumor, prostate cancer, androgen dependency, screening

**Neurosurgery**

Masahiko Tosaka(Associate Professor)

micro-neurosurgery, interventional radiology, endoscopic neurosurgery, intraoperative imaging, intraoperative neurophysiology

**Ophthalmology\***

Hideo Akiyama

Optical coherence tomography, Ocular circulation, Minimally invasive surgery

**Otolaryngology Head and Neck Surgery\***

Kazuaki Chikamatsu

head and neck cancer, immunosuppression, cancer immunotherapy, tumor microenvironment

**Dermatology**

Sei-ichiro Motegi

Skin, skin sclerosis, cutaneous malignant tumors, wound healing, hereditary skin diseases

**Plastic Surgery**

Satoshi Yokoo

reconstruction, free flap, wound healing, breast reconstruction

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**Orthopaedic Surgery** Hiroataka Chikuda

osteoarthritis, spondyloitic deformans, joint arthroplasty, sports injury, musuclo-skeletal tumor

**Clinical Pharmacology and Therapeutics\*** Koujirou Yamamoto

clinical pharmacology, pharmacokinetics, genetic polymorphisms, individualization of drug therapy

**Oral and Maxillofacial Surgery** Satoshi Yokoo

oral mucous wound healing, oral and maxillofacial reconstruction, oral cancer, salivary gland, jaw deformity

**Healthcare Quality and Safety\*** Kazumi Tanaka

healthcare quality, patient safety, quality indicator, shared decision making, interprofessional collaboration, Patient Engagement

Cooperative Department  
(University Hospital)

**Clinical Trials and Regulatory Science\*** Yoshiaki Ohyama

clinical research, study design, statistics

**Medical Informatics\*** Yuichiro Saito (Associate Professor)

medical information, health care, hospital information system

(Institute for Molecular and Cellular Regulation)

**Molecular Traffic** Ken Sato

membrane trafficking, secretion, metabolism, development, *C. elegans*, knockout mouse

**Epigenetics and Metabolism\*** Takeshi Inagaki

Epigenetics and Metabolism, Obesity, Diabetes, Energy Metabolism, Transcription Factors, Chromatin Conformation, Histone Modifications

**Molecular Membrane Biology** Miyuki Sato

*C. elegans*, organelle, autophagy, endocytosis, mitochondria, maternal inheritance

**Metabolic Regulation and Genetics\*** Takashi Nishimura

*Drosophila*, metabolic homeostasis, sugar metabolism, insulin signaling, inter-organ communication, growth regulation

**Developmental Biology and Metabolism\*** Yoshio Fujitani

diabetes, glucose metabolism, developmental biology, pancreatic beta cells, genetically engineered mice, beige adipocyte, zinc biology, zinc transporter

**Diabetes and Metabolic Disorders\*** Jun Shirakawa

human islets, biomarkers, organ networks, diabetes, fatty liver, adipose tissue inflammation

**Mucosal Ecosystem Design\*** Nobuo Sasaki

Adult tissue stem cell, Organoid, Human development, Gut microbiota, Symbiosis, Infection disease

**Genome Sciences\*** Izuho Hatada

epigenetics, epigenome, DNA methylation, microarray, genome-wide analysis, ageing

**Metabolic Signaling** Tadahiro Kitamura

diabetes, obesity, metabolic syndrome, transcription factor, knockout mouse, insulin, glucagon

(Heavy Ion Medical Center)

**Medical Physics and Biology for Heavy Ion Therapy** Akihisa Takahashi (Medical Biology)  
Mutsumi Tashiro (Medical Physics)

radiotherapy, heavy ion radiotherapy, medical physics, accelerator, radiation biology, space environmental medicine

**Heavy Ion Clinical Medicine\*** Hidemasa Kawamura

heavy ion radiotherapy, multimodality, cancer therapy, biological response, high LET, hypofractionation, Image-guided adaptive radiotherapy

(Center for Food Science and Wellness)

**Food Science and Wellness\*** Seiji Torii

cancer, metabolism, endocrine, cell biology, peptide hormones, insulin, reactive oxygen species, ferroptosis

(Center for Mathematics and Data Science)

**Mathematics and Data Science\*** Yuki Aoki

Mathematical Analysis, Machine Learning, Database, Image Analysis, Python

Joint Department

(Takasaki Advanced Radiation Research Institute, National Institute for Quantum and Radiological Sciences and Technology)

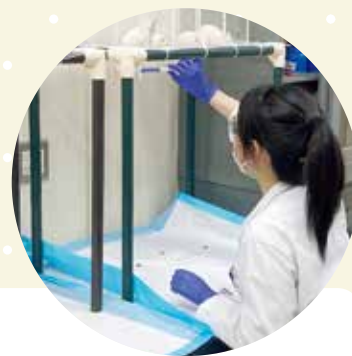
**Quantum Biology** Yasuyuki Ishii Yasuhiko Kobayashi Kazuo Funayama

ion beam, microbeam, micro-PIXE, single-ion hit, irradiation of targeted cell, radiomicrosurgery, bystander effect

# interview

**HE XIN** (September 2022, completed)

October 2022, enrolled in Graduate School of Medicine (Doctoral Program)



## 1 Research Theme

An increasing number of patients suffer from chronic pain each year. In particular, the prevalence of neuropathic pain (one of the most severe chronic pain conditions) is increasing. It has been reported that chronic pain patients and attention deficit hyperactivity disorder (ADHD) and its analogues are commonly comorbid. Ineffectiveness of analgesics is one of the features of both ADHD and chronic pain, and is thought to be one of the mechanisms by the chronicity of pain. Based on the animal model of neuropathic pain, we are trying to understand the mechanism of ineffectiveness of analgesics via behavioral and histological experiments, so as to clarify the mechanisms of pain chronicity.

## 2 The motive for going on to Biomedical Sciences in Graduate School of Medicine, Gunma University.

When I practiced at the hospital during university, I found that there are many patients that are in great distress caused by pain, which made me realized that pain must be considered as an even more important problem. Japan is one of the most advanced countries in the world in terms of science and technology, and many fields, including medicine, remain at the forefront of the world. After graduating from university, I decided to study in Japan to further my education in the field of pain. About two years after I came to Japan, I majored in the Biomedical Sciences course in Gunma University, performing research on neuropathic pain. With the kind support of everyone here, I graduated with a Master's degree in September of 2022. Now I am continuing my PhD studies for further detailed research.

## 3 Please tell us about campus life.

Since starting the master's program, my daily life has been very challenging and enjoyable. In the laboratory, I mainly do basic experiments and data analysis, etc., and participate in some specialized courses. Additionally, through regular research seminars with my teachers, I get a lot of instructions and suggestions.

Not only studying my major, but also actively participating in various international and cultural

communication activities. It is a great opportunity for me to communicate with Japanese and international students, experiencing different cultures and enjoying the international campus life.

## 4 Please tell us the good points and the struggles in school. In addition, please tell us how you overcome many difficulties?

The University offers specialized courses and lectures, as well as various research requirements. The professors gave me a lot of instructions and suggestions on academic research. Moreover, the opportunities to communicate with international students helped to improve my cross-cultural communication skills.

However, there were also some difficulties such as language barriers and the stress of academic research. Thus, I attended language lessons to improve my communication skills. And, I also received much help and support from my tutors and other teachers.

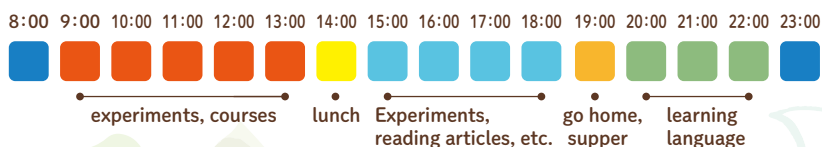
## 5 Please tell us your future goals.

My major is anesthesiology and now I am studying in the field of pain. It is considered that the treatment of pain is an extremely important area of the modern anesthesiology. Although there has been remarkable progress in contemporary medicine, there is still a lack of progress in chronic pain. For the future, I would like to contribute to the alleviation of pain for those patients with chronic pain. At present, my research is focused on fundamental mechanisms. In the future, I will study both pathological mechanisms and clinical pharmacotherapy.

## 6 Please tell us your message to the applicants for admissions.

Biomedical science is an evolving field for better understanding and improving of human health. Studying biomedical science offers the opportunity to learn about the fundamentals of biology, the mechanisms of disease, and innovative medical technologies. While there are many difficulties in this field, it also provides us with many opportunities to participate in scientific research to advance medical science. Let's all do our best to work hard and to contribute to the development of medical science for mankind in the future.

### 《Schedule for a day》





# interview

**Ayane Ninomiya** (September 2018, completed)

(September 2022, completed in Graduate School of Medicine (Doctoral Program))



## 1 Research Theme

The involvement of endocrine system in brain function

## 2 The motive for going on to Biomedical Sciences in Graduate School of Medicine, Gunma University.

I think 4 years in undergraduate is too short to learn the speciality. I simply needed more time to explore my curiosity and enrolling graduate school was my best choice.

## 3 Please tell us about campus life.

The biggest difference between undergraduates and graduates is the role of lecture. My undergraduate life consisted of lectures all day long, but here we have few lectures throughout the year. Lectures become more supplemental for your own research and you are required to study independently. But at the same time, I've got colleagues and supervisors who help me work on my research. You may feel like time flies in your 2 years, but I bet it will become one of the most intensive and full-of-memories moments in your life!

## 4 Please tell us the good points and the struggles in school. In addition, please tell us how you overcome many difficulties?

The good thing is that I got realized the significance of the basic research. Clinical researches reflect the frontline

of the medical sciences, but they are always based on the basic researches. Therefore, I've noticed the indispensable role of the basic research so many times. This keeps me motivated all the time even though I know that my research won't be immediately applied to clinical scenes. On the other hand, sometimes I find it difficult to keep the motivation high especially when I face some difficulties in my experiments. Whenever I feel low, I always share the feeling (and negative data) with the other lab members (Special thanks!).

## 5 Please tell us your future goals.

I would like to balance between research and education in academic. I hope my research will contribute to medical education someday.

## 6 Please tell us your message to the applicants for admissions.

If you come up with a question in your life and want to dig into it or share it with someone, jumping into the graduate school may be a good idea. Just a mere dairy-life question could become an introduction of the big finding. Here Gunma University is where you can explore your curiosity!

### 《Schedule for a day》





群馬大学  
GUNMA UNIVERSITY



大学院 医学系研究科 HP

## *Location*

*(Showa Campus)*

|  |  |  |
|--|--|--|
| <i>Graduate School of Medicine<br/>Faculty of Medicine</i> | <i>3-39-22, Showa-machi, Maebashi City,<br/>Gunma 371-8511</i> | <i>Telephone</i><br><b>+81-27-220-7111</b> |
| <i>University Hospital</i>                                 | <i>3-39-15, Showa-machi, Maebashi City,<br/>Gunma 371-8511</i> |  |