

## Outline of the Laboratory, Graduate School of Pharmaceutical Sciences, Kyushu University

### Clinical Pharmacokinetics

Teaching staff	Professor Naoya Matsunaga, Ph.D. Lecturer Kengo Hamamura, Ph.D. Assistant Professor Yuya Yoshida, Ph.D.
Research	The following topics are currently under investigation in our laboratory: <ul style="list-style-type: none"> <li>• Pathological analysis focusing on pharmacokinetics-related genes (Cytochrome P450, Transporter)</li> <li>• Analysis of organ or cell linkage mechanism under pathological conditions</li> <li>• Investigation of new therapeutic agents and pharmacodynamic and pharmacokinetic analysis</li> <li>• Drug development based on structural analysis of proteins by cryo-electron microscopy</li> <li>• Development of technology for the treatment of various diseases using DDS and lipid nanoparticle formulations</li> </ul>

### Pharmaceutics

Teaching staff	Professor Satoru Koyanagi, Ph.D. Lecturer Akito Tsuruta, Ph.D. Assistant Professor Tomoaki Yamauchi, Ph.D.
Research	<ul style="list-style-type: none"> <li>• Development of time-dependent drug delivery strategies for anticancer agents based on the molecular mechanisms of the circadian clock</li> <li>• Elucidation of the circadian mechanisms underlying pharmacodynamics (target enzymes and receptors) and pharmacokinetics (CYP activity and transporters), and development of time-dependent drug delivery systems</li> <li>• Pathophysiological analysis of pain and inflammation based on circadian clock mechanisms and identification of therapeutic target molecules</li> <li>• Chrono-drug discovery research based on clinical data</li> </ul>

### Clinical Pharmacy and Pharmaceutical Care

Teaching staff	Associate Professor Daisuke Kobayashi, Ph.D. Assistant Professor Shunsuke Fujita, Ph.D.
Research	<ul style="list-style-type: none"> <li>• Research on improving medication adherence and quality of life</li> <li>• Study on development of simultaneous determination of clinically used drugs for therapeutic drug monitoring</li> <li>• Studies on mechanisms and prevention of chemotherapy-induced peripheral neuropathy</li> <li>• Drug repositioning research for cancer and sarcopenia therapies</li> <li>• Establishment of pharmaceutical education system</li> </ul>

### Molecular and System Pharmacology

Teaching staff	Professor Makoto Tsuda, Ph.D. Assistant Professor Keita Kohno, Ph.D. Assistant Professor Kazuki Fujimori, Ph.D.
Research	Work in my laboratory is primarily directed to elucidating glia-neuron interactions in the spinal cord and brain and to understanding the cellular and molecular mechanisms of pain and itch signaling (in particular pathological chronic pain and itch) with the goal of counteracting these mechanisms in order to devise strategies for new types of pain and itch relieving medications.

### Physiology

Teaching staff	Professor Motohiro Nishida, Ph.D. Lecturer Yuri Kato, Ph.D. Assistant Professor Tomoya Ito, Ph.D. Assistant Professor Mi Xinya, Ph.D. Assistant Professor Yara Mohamed Atef Ahmed Sayed Ahmed, Ph.D.
Research	<ol style="list-style-type: none"> <li>1. Comprehensive understanding the diversity of heart failure and its application for precision medicine</li> <li>2. Elucidation of the physiological role of reactive sulfur species and its therapeutic application</li> <li>3. Establishment of therapeutic strategies for curing intractable diseases targeting mitochondrial quality control</li> <li>4. Promotion of Green-Pharma research by collaborating with National Institutes</li> </ol>

## Pathophysiology

Teaching staff	Associate Professor Yuta Kohro, Ph.D.
Research	Our laboratory focuses on understanding the role of astrocytes, a type of glial cell that is distributed throughout the brain and spinal cord, to uncover the mechanisms that maintain homeostasis and the pathogenesis of nervous system disorders. Our goal is to identify molecules and cell populations that contribute to the novel therapeutic targets and drug development for neurological diseases.

## Global Pharmacy

Teaching staff	Professor Katsumi Maenaka, Ph.D.
Research	The research is focused on follows (1) Structural analysis of drug target proteins (2) Interaction analysis between disease-specific molecules and drugs (3) Design and development of next-generation biopharmaceuticals (e.g. antibodies and vaccines)

## Protein Drug Discovery

Teaching staff	Professor Jose Caaveiro, Ph.D. Assistant Professor Akinobu Senoo, Ph.D. Assistant Professor Keisuke Kasahara, Ph.D.
Research	<ul style="list-style-type: none"><li>• Protein Drug Discovery (PDD)</li><li>• Novel therapeutic approaches to fight human disease (infectious diseases, neurodegeneration, cancer, etc...)</li><li>• Antibody engineering: Novel antibody modalities and molecular mechanisms.</li><li>• Vaccines: Characterization of antibodies and antigen design.</li><li>• Biomolecular recognition between proteins and drugs.</li><li>• Drug discovery in challenging targets: membrane proteins and protein-protein interaction.</li><li>• Drug discovery for pain and itch.</li><li>• Fundamental Protein Science in Pharmacy.</li><li>• Elucidation of the molecular dynamics and new design of proteins through computational analysis.</li></ul>

## Molecular Biology

Teaching staff	Professor Tsutomu Katayama, Ph.D. ※will retire on March, 2027 Associate Professor Shogo Ozaki, Ph.D. Assistant Professor Kazutoshi Kasho, PhD.
Research	In the cell cycle progression, chromosomal DNA is replicated only once at a specific time by the carefully controlled molecular switch for replicational initiation. If this regulation is interfered with, various cell defects occur, such as abnormal chromosomes, inhibition of cell division, and growth of abnormal cells. Thus, a study on this regulatory mechanism is of significance as a basis for the developments of antibiotics and anticancer drugs. We have shown that a protein (DnaA) initiating E. coli chromosomal replication is inactivated by timely and direct interaction with a subunit of chromosomal replicase (DNA polymerase III holoenzyme). This interaction depends on loading the subunit onto DNA. This conformational change occurs for the nucleotide-polymerizing action of the replicase after the initiation reaction by DnaA. Thus, during the cell cycle, the initiation protein is most likely inactivated just after initiation of chromosomal replication in this manner. We have termed this regulatory system RIDA (Regulatory inactivation of DnaA). Reactivation of DnaA will occur before the next round of the replication cycle. We are investigating the molecular mechanisms in this DnaA-activity cycle including timely inactivation and activation.

## Pharmaceutical Cell Biology

Teaching staff	Professor Yuji Ishii, Ph.D. Assistant Professor Yuko Hirota, Ph.D.
Research	Our research interests: 1. Environmental toxicology and drug metabolism <ul style="list-style-type: none"><li>• Mechanisms of sexual immaturity fixation in offspring by maternal exposure to environmental chemicals.</li><li>• Mechanisms by which environmental chemicals attenuate dams' nursing.</li><li>• Functional interaction of drug-metabolizing enzymes.</li><li>• Alteration of the function of xenobiotic detoxifying enzymes in response to changes in physiological mechanisms.</li><li>• Metabolisms and analysis of illicit drugs.</li></ul> 2. Biology of lysosomes <ul style="list-style-type: none"><li>• Cellular and molecular mechanisms regulating lysosomal biogenesis and functions by comprehensive functional analysis of lysosomal membrane proteins.</li><li>• Molecular regulatory mechanisms of intracellular protein degradation.</li><li>• Molecular mechanisms for ageing and neurodegenerative diseases.</li></ul>

## Cellular Biochemistry

Teaching staff	Professor Masatoshi Fujita, M.D., Ph.D. Assistant Professor Yoko Katsuki, Ph.D. Assistant Professor Miyako Shiraishi, Ph.D.
Research	We have been clarifying molecular mechanisms of chromosomal DNA regulations, deregulation of which would lead to chromosomal instability and eventually cancer. Now, we have been especially focusing on: 1. Function and cell cycle regulation of DNA replication initiation proteins, ORC, CDC6, Cdt1, MCM and related factors. 2. Molecular mechanisms for SLX4-mediated cellular responses to replication stress. 3. Relationship between chromatin regulations and regulations of replication initiation and replication stress response. 4. Development of MCM8-9 inhibitors as novel anti-neoplastic agents.

## Pharmacognosy

Teaching staff	Associate Professor Seiichi Sakamoto, Ph.D. Assistant Professor Poomraphie Nuntawong, Ph.D.
Research	<ul style="list-style-type: none"><li>• Research on allelopathy</li><li>• Evaluation of doping risks of crude drugs and Kampo products</li><li>• Quality control and standardization of crude drugs and Kampo products</li><li>• Plant tissue culture for medicinal plant breeding</li></ul>

## Drug Discovery Structural Biology

Teaching staff	Lecturer Kouta Mayanagi, Ph.D. Lecturer Tomohiro Yamashita, Ph.D. Assistant Professor Tomohito Tanihara, Ph.D.
Research	<ul style="list-style-type: none"><li>• Structural biology</li><li>• Cryo-electron microscopy of macromolecular assemblies</li><li>• Structural analysis of DNA-Protein complexes</li><li>• Structural study of intrinsically disordered region (IDR)</li><li>• Drug discovery research to alleviate pain or itch by strategy of Green Pharma</li><li>• Discovery of new target molecules related to sensation</li></ul>

## Molecular Pathobiology

Teaching staff	Professor Ken-ichi Yamada, Ph.D. Assistant Professor Mirinthorn Jutanom, Ph.D. Assistant Professor Masami Abe, Ph.D. Assistant Professor Lerksaipheng Pakawit, Ph.D. Assistant Professor Eisho Kozakura, Ph.D.
Research	<ul style="list-style-type: none"><li>• Identification of Bioactive Oxidized Lipids and Elucidation of the Molecular Targets</li><li>• Molecular Mechanisms of Cell Death Caused by Lipid Peroxidation</li><li>• Molecular Mechanisms of Oxidized Lipids-related Diseases such as AMD, Dementia, and NASH</li><li>• Structural Analysis of Oxidized Lipids Produced in Pathological Conditions</li><li>• Drug Discovery Research Targeting Lipid Peroxidation</li></ul>

## Analytical Chemistry

Teaching staff	Professor Kenji Hamase, Ph.D. Associate Professor Takeyuki Akita, Ph.D. Assistant Professor Manabu Nakazono, Ph.D. Assistant Professor Chiharu Ishii, Ph.D. Assistant Professor Abedin Nuren, Ph.D.
Research	Drug discovery and diagnosis using chiral amino acid analysis. Anti-aging research focusing on isomerization of proteins. Industrial-academic-government cooperation research on heart, renal and metabolic disorders. Development of analytical reagents, materials and instruments. Development of novel functional foods, beverages and cosmetics including D-amino acids.

### Medicinal Chemistry & Chemical Biology

Teaching staff	Professor Akio Ojida, Ph.D. Lecturer Naoya Shindo, Ph.D. Assistant Professor Shohei Uchinomiya, Ph.D.
Research	1) Development of Covalent Drug We are challenging drug discovery from chemical biology point of the view. We consider that drug discovery is research that creates a superior molecule for treatment of disease. In particular, we are actively promoting medicinal chemistry of covalent drug, which exert its function by forming covalent bond with targeted proteins. Throughout the covalent drug research, we explore new organic chemistry that robustly operates in biological systems. 2) Development of Fluorescent Probe We are promoting chemical biology research to elucidate biological functions by utilizing the developed molecule as chemical tool. We particularly focus on cell metabolism, and are thus developing a new fluorescent probe that can detect activity of intracellular metabolism. Throughout this research, we try to open the new way of cell metabolism analysis based on chemical biology approach.

### Green Pharmaceutical Chemistry

Teaching staff	Professor Takashi Ohshima, Ph.D. Assistant Professor Takuma Tagami, Ph.D. Assistant Professor Keitaro Umeno, Ph.D.
Research	The following topics are currently under investigation in our laboratories: 1. Digitalization-driven Transformative Organic Synthesis (Digi-TOS) 2. Development of New Environmentally Benign Catalytic Processes 3. Development of New Chemoselective Catalyses 4. Synthesis of Biologically Active Natural Products Using One-Pot Multistep Catalysis 5. Development of New Molecularly-Targeted Anticancer Drugs 6. Promotion of "Green Pharma"

### Pharmaceutical Synthetic Chemistry

Teaching staff	Professor Go Hirai, Ph.D. Lecturer Makoto Yoritake, Ph.D. Assistant Professor Hiroaki Matoba, Ph.D.
Research	In our group, several research projects based on synthetic organic chemistry are in progress: 1. To develop fields of pseudo-natural product chemistry and pseudo-glycoconjugates with new biological functions 2. Creation of biologically active and functional molecules based on lipids 3. Development of synthetic methods for novel natural product-like molecular scaffolds 4. Drug discovery research based on glycans or glycoconjugates

### Molecular Transformation Chemistry

Teaching staff	Professor Takashi Niwa, Ph.D. Assistant Professor Satoshi Kurumada, Ph.D. Assistant Professor Kazuki Terashima, Ph.D.
Research	Our group aims for developing novel reaction chemistry to create new transformation methodologies and molecular structures that can contribute to promoting interdisciplinary fields, such as life and medicinal sciences. For this purpose, we focus on synthetic organic and organometallic chemistry, functional molecule synthesis, and mechanistic studies. The research themes can be summarized below: 1. Exploring reaction chemistry that enables novel transformations 2. Developing late-stage modification methods with various external stimuli 3. Developing practical synthetic methods for functional molecules

### International Chemical and Physical Pharmacy

Teaching staff	Associate Professor Mariko Aso, Ph.D. ※will retire on March, 2027
Research	The research activities of our laboratory have focused on the following topics: 1. Design of artificial nucleic acids with useful functions 2. Site specific protein modification for development of biodrugs 3. Development of reactive molecules for protein functionalization

## Reaction-Driven Drug Discovery

Teaching staff	Lecturer Ayumi Osawa, Ph.D.
Research	Through the exploration of novel chemical reactions, we are dedicated to creating new molecules that no one has ever laid hands on before, with the vision of making a transformative impact on drug discovery and process chemistry. Our group particularly focus on the followings: <ol style="list-style-type: none"><li>1. Development of catalytic methodologies for the generation of highly reactive species</li><li>2. Development of direct transformations of biomolecules</li><li>3. Drug discovery based on unexplored molecular scaffolds</li></ol>

## Clinical Pharmacology and Biopharmaceutics

Teaching staff	Professor Mayako Uchida, Ph.D. Associate Professor Takehiro Kawashiri, Ph.D.
Research	The landmark of our research is to establish the rational and efficient personalized pharmacotherapy with sufficient safeness. The efficacy and safety of drug therapy is closely related to each pharmacokinetics, pharmacodynamics and toxicology. Therefore, we developed the various research techniques and intelligences as follows: <ol style="list-style-type: none"><li>1. Clinical pharmacology research to optimize cancer chemotherapy</li><li>2. Research on drug safety evaluation using medical databases</li><li>3. Clinical application of biomarkers reflecting pharmacological and toxicological responses in pharmacotherapy.</li><li>4. Establishment of countermeasures against drug-induced neurotoxicity and nephrotoxicity based on clarification of their molecular mechanisms.</li><li>5. Pharmacogenomics in personalized immunosuppressive therapy in organ transplant patients.</li><li>6. Clarification of pathophysiological role of renal drug transporters in patients with acute kidney injury and/or chronic kidney disease.</li><li>7. Establishment of personalized anticancer chemotherapy by pharmacokinetic, pharmacodynamics and pharmacogenomic analyses.</li><li>8. Pharmaceutical informatics to improve pharmaceutical practice by epidemiological approach.</li></ol>

## Molecular Synthetic Pharmaceutical Chemistry

Teaching staff	Associate Professor Ryo Yazaki, Ph.D. Lecturer Ayumi Osawa, Ph.D.
Research	We aim to develop synthetic methods for previously inaccessible molecules, thereby revealing new functions and properties. <ol style="list-style-type: none"><li>1. Development of catalytic reaction for the synthesis of unique molecules</li><li>2. Creation of functional molecules utilizing catalytic reactions</li><li>3. Drug discovery research on medium-sized peptides</li></ol>

## Information Analytics in Pharmacology

Teaching staff	Associate Professor Hiroaki Hamano, Ph.D.
Research	<ul style="list-style-type: none"><li>• Elucidation of the mechanisms underlying adverse effects and exploration of therapeutic target molecules through the utilization of real-world data.</li><li>• Prediction of drug efficacy and adverse effects using real-world data and machine learning and their application to healthcare.</li><li>• Establishment of personalized medicine and disease risk evaluation by leveraging genetic information in community healthcare.</li></ul>

## Drug Delivery System

Teaching staff	Professor Yasunari Michinaka, Ph.D. Associate Professor Hiroyuki Kojima, Ph.D. Associate Professor Kenji Hyodo, Ph.D.
Research	The role of drug delivery system (DDS) is to provide optimized drug therapy for patients, enhancing the efficacy and safety by controlling drug release rate and the amount to be absorbed in body. Together with this, recent research effort is targeted at making drugs easier to administer to patients. Further role of employing DDS for companies is product value maximization, including life cycle management.

### Translational Pharmaceutical Sciences

Teaching staff	Professor Yoshiro Saito, Ph.D. Professor Susumu Nakade, Ph.D. Professor Junko Kurokawa, Ph.D.
Research	<ul style="list-style-type: none"><li>• Regulatory science research to promote the development of radiopharmaceuticals (Prof. Saito)</li><li>• Research on the discovery and validation of biomarkers for adverse effects and their regulatory application (Prof. Saito)</li><li>• Clinical pharmacology research in drug development (Prof. Nakade)</li><li>• Advances in sex-difference pharmacology in the cardiovascular diseases (Prof. Kurokawa)</li><li>• Applications of human iPS cells in drug discovery (Prof. Kurokawa)</li></ul>

### R&D Laboratory for Innovative Biotherapeutics Science

Teaching staff	Professor Yoshikazu Yonemitsu, M.D., Ph.D. Associate Professor Yosuke Morodomi, M.D., Ph.D. Assistant Professor Noriko Yasuda, Ph.D.
Research	<ul style="list-style-type: none"><li>• Development of novel and highly efficient RNA viral drug for treatment of peripheral arterial disease (SeV vector)</li><li>• Development of the new adoptive immunity-based medicine for cancer ~ NK cells</li><li>• Research of the rational targets for the development of therapeutics to manage malignancies</li><li>• High-throughput 3D tumor spheroid screening model for drug discovery</li><li>• Development of iPS-derived cell based extracorporeal-circulating artificial liver support</li><li>• Collaborations with industries (university-launched venture, pharmaceutical companies)</li><li>• Exploring the role of platelets in inflammation control mechanisms</li><li>• Elucidation of the mechanism of tumor malignancy through platelet interactions</li><li>• Development of novel therapeutic strategies utilizing immune cells to overcome highly fibrotic cancer</li><li>• Targeting senescent cells by immune cells</li></ul>

For further information, please visit the following website.  
<http://www.phar.kyushu-u.ac.jp/eng/index.php>