Faculty of Pharmacy

The Faculty of Pharmacy administratively incorporates the Department of Pharmacy. The Department of Pharmacy was established in 2006, with newly built premises and specialist facilities. In contrast to the other departments and faculties, graduation requires six years of study.

The department aims to foster pharmacists with specialist knowledge and practical skills to meet the medical needs of society today. In addition, the curriculum is also designed so that students attain a moral sensitivity and sense of mission. In order that these aims may be achieved, the department is equipped with the latest research facilities and organizes special lectures by pharmacists who are presently active in the field.

The six year course of study can be divided into three phases of study. In the first two years, students are expected to study the basics of pharmacy and obtain an overview of the various fields within pharmacological sciences, as well as acquire a moral sense through the study of common core subjects. In addition, student motivation is enhanced through an early exposure to experiential learning.

In the next two years, 3rd and 4th year students heighten their specialist knowledge through applied pharmacological subjects and practical classes such as the ‘Science of Pharmaceutical Production’. Knowledge and skills in business practice are also fostered.

In the final two years of study, students gain long term direct experience of the clinical aspects of both hospitals and pharmacies so as to heighten further their pharmacological skills. In addition, students’ knowledge and skills are enhanced and confirmed by completing graduation research reports. These precede the students’ final challenge of the national examinations.

Additional Features

The Department of Pharmacy also offers various support facilities for the students. These include a Learning Support Center for Pharmacy Education an internet-based study support system and an advisor system for small groups of students.

Message from the Dean

Prof. Toru Nishinaka
Dean, Faculty of Pharmaceutical Sciences

“Hōon kansha” (repaying gratitude), the founding spirit of Osaka Ohtani university, involves forging human relationships where students respect life as well as treat each other with gratitude. This is consistent with the mission of the Faculty of Pharmaceutical Sciences, which is to contribute to "health and welfare." To this end, the faculty provides a systematic course of professional education from admission to graduation, as well as individualized guidance through an advisor system, in order to train pharmacists to understand their mission and to realize their ethical responsibilities as medical professionals. Students are also trained to acquire advanced knowledge of pharmaceutics and to have excellent clinical skills.

The curriculum is structured so that students can acquire the basics of pharmaceutics such as physics, chemistry, and biology in the lower grades, followed by advanced knowledge in the specialized fields of pharmaceutics such as hygiene, pharmacology, medicine, drug therapy, and practical pharmaceutics. In addition to regular classes, supplementary lectures and tuition are offered to provide students with opportunities for learning in smaller groups.

In the second half of their fourth year, students are assigned to a course, and from their fifth year, they improve their scientific thinking and problem-solving skills through full-scale graduation research and research presentations. Additionally, in their fifth year, students develop an awareness of their role as future pharmacists and learn about the preciousness of life as well as the responsibility of handling medicines through practical training at pharmacies and hospitals.

Our department will continue to provide highly specialized education so that students, who have been awakened to their own potential, can play an active role in society as medical professionals. We hope that as many people as possible will take an interest in our department and offer us their understanding and support.

List of Laboratories

- ◆ Laboratory of Organic Chemistry
- ◆ Laboratory of Molecular Chemistry
- ◆ Laboratory of Biochemistry
- ◆ Laboratory of Molecular Biology
- ◆ Laboratory of Environmental Science and Microbiology
- ◆ Laboratory of Pharmacology
- ◆ Laboratory of Pharmaceutics
- ◆ Laboratory of Toxicology
- ◆ Laboratory of Medicinal Chemistry
- ◆ Laboratory of Immunology
- ◆ Laboratory of Clinical Pharmacology
- ◆ Laboratory of Pathophysiology and Pharmacotherapeutics
- ◆ Laboratory of Clinical Pharmaceutics
- ◆ Laboratory of Clinical Pharmacy and Therapeutics
- ◆ Laboratory of Practical Pharmacy and Pharmaceutical Care
- ◆ Laboratory of Drug Metabolism & Pharmacokinetics
- ◆ Laboratory of Drug Development
- ◆ Laboratory of Natural Medicines

Laboratory of Organic Chemistry

Principal Investigator: Masahiro Ikejiri, Ph.D.

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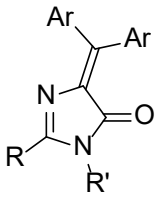
Research fields: Organic Chemistry, Bioorganic Chemistry, Photochemistry

Introduction

Our group focuses on the development and application of novel fluorescent compounds. Based on the fluorophore structure of the green fluorescent protein (GFP) isolated from jelly fish by Professor Shimomura, a Nobel laureate, we have designed and synthesized a novel fluorescent structure, namely, diarylmethyleneimidazolinones (DAINs) as by our own unique synthetic method. Utilizing the DAINs, we are engaged in the following research works.



DAINs

1) Investigation of fluorescent properties of DAINs:

Fluorescent properties (fluorescent intensity and color) depend on not only chemical structure but also molecular assembly. We are now systematically investigating a relation between chemical structure, molecular assembly and fluorescent properties by constructing a DAIN library.

2) Application of DAINs to a variety of sensor molecules:

In general, DAINs show fluorescence in solid and aggregated states, but do not show it in a solution state. This means that conformational restriction can work as a fluorescent switch. Employing this character, we have already developed several sensor molecules by conjugation or hybridization of DAINs with biomolecules. More effective and highly sensitive sensor molecules for biological events are now under investigation.

Selected publications

- Design and concise synthesis of a novel type of green fluorescent protein chromophore analogue. M. Ikejiri, M. Tsuchino, Y. Chihara, T. Yamaguchi, T. Imanishi, S. Obika, K. Miyashita, *Org. Lett.*, **14**, 4406-4409 (2012).
- A hybrid molecule of a GFP chromophore analogue and cholestene as a viscosity-dependent and cholesterol-responsive fluorescent sensor. M. Ikejiri, K. Mori, R. Miyagi, R. Konishi, Y. Chihara, K. Miyashita, *Org. Biomol. Chem*., **15**, 6948-6958 (2017).
- Synthesis and environment-dependent fluorescence behavior of a biaryl-conjugated (diphenylmethylene)imidazolinone. M. Ikejiri, R. Nishiguchi, C. Kubota, A. Fujisaka, K. Miyashita, *Org. Biomol. Chem*., **17**, 8443-8449 (2019).
- Viscosity-Induced Emission of 5-(Diarylmethylene)imidazolone with Extended Conjugation via Attachment of *N*-Methylpyrrole at the 2-Position. M. Ikejiri, A. Yoshimizu, F. Shiota, A. Nagayama, A. Fujisaka,Y. Kuboki, and K. Miyashita, *Chem. Pharm. Bull.* **72**, 518-523 (2024).

Laboratory of Molecular Chemistry

Principal Investigator: Shotaro Morimoto, Ph.D.

Contact: morimos (at) osaka-ohtani.ac.jp

Research fields: Physical Chemistry, Radiochemistry, Crystallography, Magnetic Science.

Introduction

In our laboratory, we are focusing on molecules, atoms and ions, which are the basic structures of matter, and physical chemistry, which is the basis of chemical, physical, and biological phenomena. We are working to elucidate the basic phenomena of physical chemistry, focusing mainly on magnetic properties. In addition, in order to elucidate clinical questions in actual clinical settings, we are conducting research using analytical chemistry and instrumental analytical methods, as well as other statistical methods. We aim to train pharmacists who can guide scientific evidence for phenomena in the medical field. Specifically, we are working on the following themes.

1) Magnetic field effect on chemical reactions and reaction mechanism using the magnetic field effect
2) Clinical support for clinical questions through statistical and chemical analysis
3) Structural study of proteins by crystallographic methods
4) Medical statistics
5) Physical properties of contained metal compounds

Selected publications

- Discovery and structural analysis to improve the enantioselectivity of hydroxynitrile lyase from Parafontaria laminata millipedes for (R)-2-chloromandelonitrile synthesis, A. Nuylert, M. Nakabayashi, T. Yamaguchi, and Y. Asano, *ACS Omega*, **5(43)**:27896-27908 (2020).
- Construction of the thermostable cellobiohydrolase from the fungus Talaromyces cellulolyticus by protein engineering, M. Nakabayashi, S. Kamachi, D. Malle, T. Yanamoto, S. Kishishita, T. Fujii, H. Inoue, and K. Ishikawa, *Protein Eng. Des.* Sel. **32(1)**:33-40. (2019).
- Magnetic Field Effects on Electroless Deposition of Lead Metal -Lorentz Force Effects-., C. Udagawa, M. Ueno, T. Hisaki, M. Maeda, S. Maki, S. Morimoto, and Y. Tanimoto, *Bulletin Chem. Soc. Japan* **91(2)**:165-172 (2018).
- Crystal structure of a hypothetical protein, TTHA0829 from Thermus thermophilus HB8, composed of cystathionine-beta-synthase (CBS) and aspartate-kinase chorismate-mutase tyrA (ACT) domains, M. Nakabayashi, N. Shibata, E. Ishido-Nakai, M. Kanagawa, Y. Iio, H. Komori, Y. Ueda, N. Nakagawa, S. Kuramitsu, and Y. Higuchi, *Extremophiles*, **20(3)**:275-282 (2016).

Laboratory of Biochemistry

Principal Investigator: Toru Nishinaka, Ph.D.

Contact: nisinat (at) osaka-ohtani.ac.jp

Research fields: Biochemistry, Molecular Biology, Cell Biology, Gene Therapy

Introduction

Biochemistry deals with a broad range of chemistry and biology of living cells including the properties and metabolisms of biological molecules. It is a very important basic science for understanding biological mechanisms of human body as well as therapeutic mechanisms of various drugs. Our laboratory is in charge of classes of "Biochemistry A", "Biochemistry B", "Molecular signaling", and so on for acquiring fundamental biological knowledge of human being.

Current research projects of our laboratory are 1) Elucidation of gene expression mechanisms of drug metabolizing enzymes and their involvements in the cancer development, and 2) Regulation of signal transduction by the oligomerization of G-protein coupled receptors. We are encouraging students to attend scientific meetings.

Selected publications

- Overexpression of lysophospholipid acyltransferase, LPLAT10/LPCAT4/LPEAT2, in the mouse liver increases glucose-stimulated insulin secretion. (Shimizu K, Ono M, Mikamoto T, Urayama Y, Yoshida S, Hase T, Michinaga S, Nakanishi H, Iwasaki M, Terada T, Sakurai F, Mizuguchi H, Shindou H, Tomita K, Nishinaka T) *FASEB J*, 38, e23425 (2024)
- Liver-specific overexpression of lipoprotein lipase improves glucose metabolism in high-fat diet-fed mice (Shimizu K, Nishimuta S, Fukumura Y, Michinaga S Egusa Y, Hase T, Terada T, Sakurai F, Mizuguchi H, Tomita K, Nishinaka T) *PLoS One **17**,* e0274297 (2022)
- Porcine aldo-keto reductase 1C subfamily members AKR1C1 and AKR1C4: Substrate specificity, inhibitor sensitivity and activators. (Endo S, Morikawa Y, Matsunaga T, Hara A, Nishinaka T) *J. Steroid. Biochem. Mol. Biol.* 221, 106113 (2022)
- The Role of AKR1B10 in Physiology and Pathophysiology (Endo S, Matsunaga T, Nishinaka T) *Metabolites* **11**, 332 (2021)
- Cooperative regulation of mouse aldose reductase (AKR1B3) gene transcription by Nrf2, TonEBP, and c-jun. (Nishinaka T, Shimizu K, Miura T, Yabe-Nishimura C, Terada T) *Chem. Biol. Interact.* **302**, 36-45 (2019)

Laboratory of Molecular Biology

Principal Investigator: Koji Tomita, MD, PhD

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Research fields: Molecular Biology

Introduction

In everyday life, food is constantly consumed in order to sustain life and maintain good health. Various nutrient components from our daily food source are metabolized into energy, which we utilize. We are interested in the discovery of these various and unknown genetic regulatory pathways that are important for our body function.
Various organs and cells work individually or synergistically in order to maintain homeostasis. Understanding these various organs and cells, how are they formed, their function and regulatory signals, are still in their infancy. We are interested in the fields of organogenesis / developmental biology and the maintenance of the differentiated states of various cell-types. Specifically, we are focusing on liver development and the differentiation mechanisms of blood cells.
The following are research projects currently be addressed at our laboratory:

1. Nutrient and hormonal regulation of pyruvate kinase gene expression.

The glycolytic pathway is a fundamental system for energy metabolism in organisms and glycolytic enzymes are present in all mammalian cells or tissues. Mammalian pyruvate kinase (PK) is a key rate-controlling glycolytic enzyme which catalyses the formation of pyruvate and ATP from phosphoenolpyruvate and ADP. In mammals, PK exists as four isoenzymes, which are referred to as the L-, R-, M1-, and M2-types respectively. Mammalian PK isoenzymes are encoded by two genes, the *PKL* or *PKM* genes respectively. Whereas the R- and L-PK isoenzymes are encoded by the *PKL* gene, the M1- and M2-PK isoenzymes are encoded by the *PKM* gene.

2. Role of homeobox gene *Hex* in mouse development

We accidentally isolated this new and interesting gene called hematopoietically expressed homeobox gene (*Hex*) during screening of transcription factors interacting with the transcriptional regulatory regions of the liver-specific L-type pyruvate kinase gene. Further analysis revealed that Hex was not a transcription factor of the *L-PK* gene.

Selected publications

- Melatonin stimulates transcription of the rat phosphoenolpyruvate carboxykinase gene in hepatic cells.
  Asano K, Tsukada A, Yanagisawa Y, Higuchi M, Takagi K, Ono M, Tanaka T, Tomita K, Yamada K.FEBS Open Bio. 2020 Dec;10(12):2712-2721.

Laboratory of Environmental Science and Microbiology

Principal Investigator: Kimiko Uchii, Ph.D.

Contact: utiikimi(at) osaka-ohtani.ac.jp

Research fields: Environmental DNA Science, Microbial Ecology, Environmental Virology, Space Microbiology,

Introduction

We study the ecology of microorganisms using molecular technologies and culture methods, with a particular focus on diverse environmental contexts. Our research spans a wide range of settings, including space, extreme environments, and urban ecosystems. Additionally, we develop and apply environmental DNA methods to investigate the ecology and biodiversity of macroorganisms. Through our work, we aim to contribute to conserving biodiversity and ecosystems, as well as advancing human health.

Selected publications

- Wakimura K, Yonekura R, Yamanaka H, Uchii K (2025) Environmental DNA haplotyping reveals dispersal patterns of invasive bluegill sunfish, *Lepomis macrochirus*, in Japan. *Environmental DNA*
- Tsugeki N, Hashimoto I, Nakane K, Honjo MN, Uchii K (2024) Establishment success of alien Daphnia in the ancient Lake Biwa: Insights from sedimentary archives. *Hydrobiologia* 851: 3591-3602
- Wakimura K, Uchii K, Kikko T (2023) Evaluation of genetic diversity in an endangered fish *Gnathopogon caerulescens* using environmental DNA and its potential use in fish conservation. *Environmental DNA* 5: 973-986
- Ichijo T*, Uchii K*, Sekimoto K, Minakami T, Sugita T, Nasu M, Yamazaki T (2022) Bacterial bioburden and community structure of potable water used in the International Space Station. *Scientific Reports* 12: 16282 (*Co-first autors)
- Uchii K, Wakimura K, Kikko T, Yonekura R, Kawaguchi R, Komada H, Yamanaka H, Kenzaka T, Tani K (2021) Environmental DNA monitoring method of the commercially important and endangered fish *Gnathopogon caerulescens*. *Limnology* 23: 49-56
- Minamoto T, Miya M, …, Uchii K (2020) An illustrated manual for environmental DNA research: Water sampling guidelines and experimental protocols. *Environmental DNA* 3: 8-1

Laboratory of Pharmacology

Principal Investigator: Hiroyuki Mizuguchi, Ph.D

Contact: mizuguhiro (at) osaka-ohtani.ac.jp

Research fields: Molecular Pharmacology

Introduction

We are working on the following themes to elucidate pathogenesis of allergic diseases and also develop new therapeutics; (1) Transcriptional mechanism of allergic disease-sensitive genes such as histamine H_1 receptor gene, and development of drugs that suppress their expressions; (2) Exploration of natural resources for anti-allergic compounds that suppress the expression of allergic disease-sensitive genes, and identification of their target proteins; (3) Evaluation of Hsp90 inhibitors as targets for allergic disease; (4) Development of new therapy for eosinophilic inflammation using compounds that suppress IL-33 gene expression. (5) Elucidation of the mechanism of suppression of allergic rhinitis by narrowband-UVB phototherapy.

Selected publications

- Wakugawa T, Nagamine K, Hiramatsu M, Takeda M, Kawata C, Kashiwada Y, Shinohara K, Sawada E, Yabumoto M, Fujino H, Kitamura Y, Fukui H, Takeda N, Hiroyuki Mizuguchi H. Identification and characterization of the anti-allergic compound from lotus root. Trad & Kampo Med. 2020; 7: 85–95.
- Nakano T, Ikeda M, Wakugawa T, Kashiwada Y, Kaminuma O, Kitamura N, Yabumoto M, Fujino H, Kitamura Y, Fukui H, Takeda N, Mizuguchi H. Identification of pyrogallol from Awa-tea as an anti-allergic compound that suppresses nasal symptoms and IL-9 gene expression. J Med Invest. 2020; 67: 289-297.
- Mizuguchi H, Orimoto N, Kadota T, Kominami T, Das AK, Sawada A, Tamada M, Miyagi K, Adachi T, Matsumoto M, Kosaka T, Kitamura Y, Takeda N, Fukui H. Suplatast tosilate alleviates nasal symptoms through the suppression of nuclear factor of activated T-cells-mediated IL-9 gene expression in toluene-2,4-diisocyanate-sensitized rats. J Pharmacol Sci. 2016; 130: 151-158.
- Kitamura Y, Mizuguchi H, Okamoto K, Kitayama M, Fujii T, Fujioka A, Matsushita T, Mukai T, Kubo Y, Kubo N, Fukui H, Takeda N. Irradiation with narrowband-ultraviolet B suppresses phorbol ester-induced up-regulation of H_1 receptor mRNA in HeLa cells. Acta Otolaryngol. 2016; 136: 409-413.
- Nariai Y, Mizuguchi H, Ogasawara T, Nagai H, Sasaki Y, Okamoto Y, Yoshimura Y, Kitamura Y, Nemoto H, Takeda N, Fukui H. Disruption of heat shock protein 90 (Hsp90)-protein kinase Cδ (PKCδ) interaction by (-)-maackiain suppresses histamine H_1 receptor gene transcription in HeLa cells. J Biol Chem. 2015; 290: 27393-27402.
- Mizuguchi H, Miyagi K, Terao T, Sakamoto N, Yamawaki Y, Adachi T, Ono S, Sasaki Y, Yoshimura Y, Kitamura Y, Takeda N, Fukui H. PMA-induced dissociation of Ku86 from the promoter causes transcriptional up-regulation of histamine H_1 receptor. Sci Rep. 2012; 2: 916.

Laboratory of Toxicology

Principal Investigator: Fumitoshi Sakazaki, Ph.D.

Contact: sakazato (at) osaka-ohtani.ac.jp

Research fields: Toxicology, Hygienic Sciences

Introduction

In order to prevent and cure diseases, first we must understand what causes diseases. In our laboratory, we offer studies about diseases caused by food or toxic pollutants. Besides, from another perspective about food and diseases, we are also in charge of learning about food supplements and preparing for certification exams for advisory staffs of food supplements.

We are investigating food pollutants which exacerbate allergies. From reviewing various research papers, we focus the suppressing effects of Lactobacillus on allergies. Lactobacillus is suggested reducing allergic rhinitis while the mechanism has not been revealed. We suspect that Lactobacillus evokes the innate immune system and phagocytes digest allergens, result into suppression of the necessity of the acquired immune system including allergy. These ideas have been arisen from our previous research whether food pollutants exacerbate allergies.

We are also developing how we can inform healthy food habitats and appropriate use of food supplements. We hold information meetings of food supplements at the festival held in November by our university.

Laboratory of Medicinal Chemistry

Principal Investigator: Naoyoshi Maezaki, Ph.D.

Contact: maezan (at) osaka-ohtani.ac.jp

Research fields: Medicinal Chemistry, Organic Chemistry

Introduction

Our laboratory aims to develop new reactions and synthetic methods for the synthesis of natural products and their analogues, to elucidate structure-activity relationships, and to develop biologically active compounds.

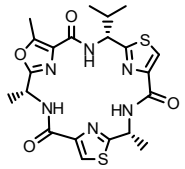
Present main research projects:

1) Synthesis and evaluation of azole-containing peptides and their analogs

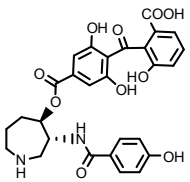
Dendroamide A is a unique cyclic peptide with azole rings produced by cyanobacteria. We synthesized analogs in which the orientation of each azole ring is inverted, and clarified the structure-activity relationship in the P-glycoprotein inhibitory activity. In the course of this research, we also discovered a unique long-range halogen dance reaction.

2) Development of novel protein kinase C inhibitors

We are designing new protein kinase C inhibitors based on the structure of balanol, a fungal metabolite and potent inhibitor of cAMP-dependent protein kinases C and A.



Dendroamide A



Balanol

3) Development of rare sugar derivatives

D-Allulose, one of rare sugar that exists in small amounts in nature, is attracting attention as not only a low-calorie sweetener, but also potential for the suppression of postprandial hyperglycemia. For the development of pharmacologic rare sugar derivatives, we research a glycosylation method of D-allulose and synthesis of its sugar chains.

Selected publications

- Long-Range Halogen Dance Reaction in 4,5-Dihalogeno-2-(Sulfur-Containing Heterocyclyl)thiazole, Hirokawa Y., Arimitsu K., Ikegawa Y., Kashihara T., Kosuda M., Miura A., and Maezaki N., *Chem. Pharm. Bull.*, *72*, 1061-1064 (2024).
- Synthesis of 2',4-Dibromo-2,4'-bithiazole Using Novel Long-range Halogen Dance Reaction, Arimitsu K., Hirokawa Y., Ikegawa Y., Tanba A., Ueda Y., Kashihara T., Atarashi N., Yoshida R., Matsuo Y., and Maezaki N., *ChemistrySelect*, *8*, e202302632 (2023).
- Synthesis and evaluation of dendroamide A and three regioisomeric analogs having a reversed azole ring as P-glycoprotein inhibitors, Magata T., Hirokawa Y., Rokuhara Y., Nakayama R., Takahashi R., Nogami M., Tai Y., Imahori T., Hashizume T., and Maezaki N., *Heterocycles*, 102 (5), 900-919 (2021).

Laboratory of Immunology

Principal Investigator: Michio Tomura, PhD

Contact: tomuramiti (at) osaka-ohtani.ac.jp

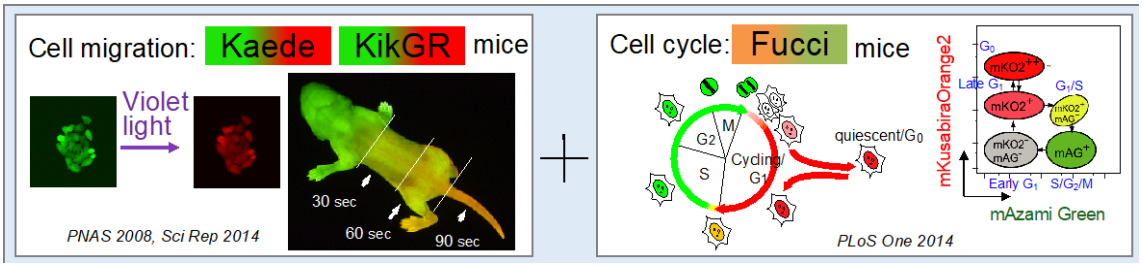
Research fields: Immunology

Introduction

The immune system protects the body by preventing infections and by eliminating cancer cells in the body, while it causes pollen allergies and asthma. The immune system is composed of many types of immune cells that move within and between organs. In our laboratory, we have been attempting to understand immune responses by elucidating migration and proliferation of immune cells at whole body level. We are using a novel assay system to track immune cells in mice expressing the photoconverting proteins Kaede or KikGR. Exposure to violet light changes the color of immune cells from green to red and allows for labeling and tracking of immune cells. While proliferation is detected using the cell cycle indicator Fucci-transgenic mice.

In addition, recently we established a method to revealing fate of migrating cells at the single cell level by combining information on tracking inter-tissue migration after *in situ* labeling of cells in KikGR mice with molecular expression analysis at single cell level.

Students and faculty members are working together with the latest measurement equipment to conduct research that is useful for maintaining good health, such as removing cancer cells by strengthening the immune system and preventing allergies with sublingual immunity.



Selected publications

- Monitoring cellular movement *in vivo* with photoconvertible fluorescence protein "Kaede" transgenic mice, (Tomura M. et.al), *Proc Natl Acad Sci* 105, 10871–10876 (2008).
- Contrasting Quiescent G_0 Phase with Mitotic Cell Cycling in the Mouse Immune System, (Tomura M. *et. al*), *PLoS One* 8, 1–10 (2013).
- Tracking and quantification of dendritic cell migration and antigen trafficking between the skin and lymph nodes, (Tomura M. *et. al*), *Sci. Rep*. 4, 1–11 (2014).
- Functional Phenotypic Diversity of Regulatory T Cells Remaining in Inflamed Skin (Ikebuchi R., Tomura M. *et. al*), *Front Immunol* (2019).

Laboratory of Clinical Pharmacology

Principal Investigator: Yasuhisa Tamura Ph.D.

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Research field: Biological Sciences, Neuroscience

Introduction

Neuroinflammation is involved in the onset and progression of neurodegenerative diseases, such as Alzheimer's disease and Parkinson's disease, as well as psychotic syndrome, involving depression and schizophrenia. It is well-known that neuroinflammation is concerned with activation of microglia and astrocytes and excessive production of proinflammatory cytokines by these cells. However, brain cells that participate in anti-inflammatory responses are unclear until now. Recently, we have found that NG2 glia, is called the fourth glial cells have anti-inflammatory activities and maintain brain function via regulation of microglial activation. NG2 glia are ubiquitously present throughout the gray and white matter in the adult brain of mammals, such as rodents, monkeys and humans. NG2 glia have proliferative activity and can give rise to oligodendrocytes as well as themselves throughout life. We focus on

1. molecular mechanisms of anti-inflammatory action of NG2 glia
2. roles of NG2 glia in the onset and progression of Alzheimer's dementia
3. exploration of healthy foods and physical stimulus with anti-inflammatory responses

The goal of our study is to slow down progress of alzheimer's dementia using anti-inflammatory diets or physical stimulus.

Selected publications

- Animal models for neuroinflammation and potential treatment methods. Tamura Y., Yamato M., Kataoka Y. *Front Neurol.* 13, 890217 (2022)
- In vivo monitoring of hair cycle stages via bioluminescence imaging of hair follicle NG2 cells. Tamura Y., Takata K., Eguchi A., Kataoka Y. *Sci Rep.* 8, 393 (2018)
- NG2 glial cells regulate neuroimmunological responses to maintain neuronal function and survival. Nakano M., Tamura Y., Yamato M., Kume S., Eguchi A., Takata K., Watanabe Y., Kataoka Y. *Sci Rep.* 7, 42041 (2017)
- Noninvasive evaluation of cellular proliferative activity in brain neurogenic regions in rats under depression and treatment by enhanced [^{18}F]FLT-PET imaging. Tamura Y., Takahashi K., Takata K., Eguchi A., Yamato M., Kume S., Nakano M., Watanabe Y., Kataoka Y. *J Neurosci.* 36, 8123-8131 (2016)

Laboratory of Clinical Pharmaceutics

Principal Investigator: Tokio Obata

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Research fields: Clinical Pharmaceutics, Pharmaceutical Health Care and Sciences, Basic Life Support

Introduction

Our laboratory aims to provide a scientific basis that will improve the outcome by facilitating the proper and safety use of pharmaceutical products in the clinical fields. Our research topics include a variety of f basic research at the cellular and the whole-animal level, and clinical study collaborating closely with clinicians and clinical pharmacists to address a wide range of clinical questions. As another project, we hold a workshop on basic life support (BLS) called PUSH course to promote the diffusion of standard skills for the BLS. Through these researches, we will develop scientific basis which can be moved from the laboratory bench, into the clinical research setting, into clinical care at the patient's bedside, and back into the research setting.

The Main Research Topics

- Basic research to clarify the mechanism for the pharmacokinetic interaction between antiepileptic drugs and various enteral nutrition.
- Basic research to investigate the role of scaffold protein in the cell surface localization of immune checkpoint molecules as targets of cancer immunotherapy.
- Clinical research on evaluation of redispersibility of suspended pharmaceuticals and drug administration guidance to patients Questionnaire survey to promote the diffusion of standard skills for the BLS changes before and after taking PUSH course.

Selected publications

- Study on enteral nutrient components causing decreased gastric phenytoin absorption. Urashima Y., Kobori T., Obata T. et.al. JPEN J Parenter Enteral Nutr. 47(7),(2023)
- Semisolid enteral nutrients alter the pharmacokinetics of orally administered levetiracetam in rats, Amadutsumi T., Urashima Y., M., Kobori T., Obata T., et.al. Pharmazie 78 117-121 (2023)
- Effect of storage temperature on the dispersibility of commercially available 0.1% fluorometholone ophthalmic suspension. Obata T., Urashima Y., Kobori T., Nakada Y. et.al. PLoS ONE 17(11): e0277311. (2022).

Laboratory of Clinical Pharmacy and Therapeutics

Principal Investigator: Katsuhito Nagai, Ph.D.

Contact: nagaika (at)osaka-ohtani.ac.jp

Research fields: Pharmacokinetic interaction, Biochemical Pharmacology

Introduction

Our laboratory aims at establishing the scientific basis for proper drug use in clinical practice. We have been undertaking research on adverse events and drug interactions from the perspectives of pharmacology and pharmacokinetics for disseminating information to address the appropriate use of drugs, especially anticancer agents.

Chemotherapy plays an essential role in cancer treatment, but development of resistance to anticancer drugs is responsible for therapeutic failure such as withdrawal of the drugs. In addition, the intake of specific supplements can lead to drug resistance to anticancer agents. To achieve appropriate therapy with anticancer drugs, we are exploring substances which induce acquired resistance in cancer cells under in vitro level. Furthermore, we have also examined the molecular mechanisms underlying acquired resistance focused on drug accumulation, apoptosis, oxidative stress, and DNA repair factor.

Pharmacokinetic interactions are one of the most common issues encountered in clinical settings and likely to cause unexpected side effects or not produce the desired therapeutic outcome. Therefore, using experimental animals, we are trying to investigate the relation of pharmacokinetic interactions to the dosing regimen and to examine the underlying mechanisms of interactions to construct strategies for their prediction and avoidance.

Selected publications

- Development of multi-drug resistance to anticancer drugs in HepG2 cells due to MRP2 upregulation on exposure to menthol. Nagai K, Tamura M, Murayama R, Fukuno S, Ito T, Konishi H. *PLoS One,* 18: e0291822 (2023).
- Doxorubicin alters the disposition of phenytoin by reducing its metabolic elimination and binding affinity to serum albumin in rats. Fukuno S, Nagai K, Yamaoka S, Yamada F, Mizumoto H, Ito T, Konishi H. *J Pharm Pharmacol,* 74: 200-207 (2022).

Laboratory of Practical Pharmacy and Pharmaceutical Care

Principal Investigator: Michiaki Myotoku, Ph.D.

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Research fields: Clinical Pharmacy

Introduction

The proper and safe use of medicines is one of the most important tasks entrusted to pharmacists. However, in clinical practice, there are many things that are carried out empirically despite the lack of evidence. The Laboratory of Practical Pharmacy and Pharmaceutical Care discovers these various pharmaceutical problems that may occur in clinical settings and searches for solutions that enable the proper and safe use of medicines from the perspective of hospital pharmacists.

Selected publications

- Drug-induced lung disease adverse effect with Ledipasvir Acetonate / Sofosbuvir. Omotani S, Ishizaka T, Inoue M, Nishida K, Yasui Y, Hatsuda Y, Mukai J, Myotoku M. *J Pharm Health Care Sci*, 6, 1-6 (2020)
- Outcomes of Pharmacotherapeutic Intervention Provided by Hospital Pharmacists at Geriatric Health Service Facilities, Oare M, Masuda H, Hisaoka K, Myotoku M, *Jpn J Drug Inform*, 22, 17-23 (2020)
- Influence of Analysis Conditions for Antimicrobial Susceptibility Test Data on Susceptibility Rates, Hatsuda Y, Ishizaka T, Koizumi N, Yasui Y, Saito T, Maki S, Omotani S, Mukai J, Tachi T, Teramachi H, Myotoku M, *PLoS One*, 15, doi: 10.1371/ journal.pone.0235059. eCollection (2020)
- Medication Compliance Status inferred from Surveillance of Medicines brought to Hospital by Inpatients, Omotani S, Ikejima T, Shibano M, Katsui Y, Hatsuda Y, Mukai J, Hatanaka Y, Kikuuchi A, Seki G, Myotoku M, *Jpn J Pharm Health Care Sci*, 46(9), 522-530 (2020)
- Survey on Enteral Formula Use among Patients on Enteral Nutrition Receiving Home Care and Drug Administration, Myotoku M, Nakata H, Koyama Y, Hagika A, Hotta T, Ishizaka T, Miyagawa M, Omotani S, Hatsuda Y, Mukai J, *J Community Pharm Pharm Sci*, 12, 135-143 (2020)

Laboratory of Drug Metabolism & Pharmacokinetics

Principal Investigator: Takanori Hashizume, Ph.D.

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Research fields: Drug Metabolism, Pharmacokinetics, Toxicology, Drug Development

Introduction

Processes in pharmacokinetics, including drug absorption, distribution, metabolism, and excretion, are influenced by many factors, such as the properties of the drug, the physiological or genetic variables of individual patients, and the effects of other drugs and foods taken concurrently.

We are currently involved in research areas related to interindividual differences in xenobiotic biotransformation, particularly intestinal cytochrome P450 3A4- and 2J2-mediated first-pass drug metabolism.

Selected publications

- Terada T, Bunai T, Hashizume T, Matsudaira T, Yokokura M, Takashima H, Konishi T, Obi T, Ouchi Y. Neuroinflammation following anti-parkinsonian drugs in early Parkinson's disease: a longitudinal PET study. *Sci Rep*., 2024, 14(1), 4708.
- Magata T, Hirokawa Y, Rokuhara Y, Nakayama R, Takahashi R, Nogami M, Tai Y, Imahori T, Hashizume T, and Maezaki N: Synthesis and Evaluation of Dendroamide A and Three Regioisomeric Analogs Having a Reversed Azole Ring as P-Glycoprotein Inhibitors, *Heterocycles,* 2021, 102(5), 900-919.
- Oki M, Kaneko S, Morise S, Takenouchi N, Hashizume T, Tsuge A, Nakamura M, Wate R, Kusaka H. Zonisamide ameliorates levodopa-induced dyskinesia and reduces expression of striatal genes in Parkinson model rats. *Neurosci Res*., 2017, 122, 45-50.
- Uehara S, Murayama N, Nakanishi Y, Nakamura C, Hashizume T, Zeldin DC, Yamazaki H, Uno Y. Immunochemical quantification of cynomolgus CYP2J2, CYP4A and CYP4F enzymes in liver and small intestine. *Xenobiotica*, 2015, 45(2), 124-30.
- Wang Z, Wong T, Hashizume T, Dickmann LZ, Scian M, Koszewski NJ, Goff JP, Horst RL, Chaudhry AS, Schuetz EG, Thummel KE. Human UGT1A4 and UGT1A3 conjugate 25-hydroxyvitamin D_3: metabolite structure, kinetics, inducibility, and interindividual variability. *Endocrinology*, 2014, 155(6), 2052-2063.

Laboratory of Drug Development

Principal Investigator: Yuichiro Nakada, Ph.D.

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Research fields: Ophthalmic Solution, Drug Development, Quality Assurance, Halal Drug

Introduction

Drug development studies begin with the search for new drug seeds and are related to nonclinical trials, clinical trials, applications, approvals, post-marketing surveillance, and marketing. Based on the experience of major pharmaceutical companies, the laboratory of drug development conducts not only evaluation research on eye drops, but also research and analysis of strategies and tactics of each company from non-clinical studies to sales. At the same time, our laboratory is conducting a survey on the unique cultural and religious factors necessary for global market development, especially halal medicines.

Selected publications

- Evaluation of Redispersibility between Original and Generic Drugs of Brinzolamide Ophthalmic Suspension, Obata T., Ootake Y., Deguchi S., Urashima Y., Hosomi K., Nagai N., Nakada Y., Japanese Journal of Pharmaceutical Health Care and Sciences, 50, 135-142 (2024)
- The impact of Halal certification on pharmaceutical products (Ⅲ), Nakada Y., BULLETIN of OSAKA OHTANI UNIVERSITY, 58, 43-54 (2024)
- Bioconversion and P-gp-Mediated Transport of Depot Fluphenazine Prodrugs after Intramuscular Injection, Ohura K., Nakada Y., Imai T., Journal of Pharmaceutical Sciences, 112, 1975-1984 (2023)
- Effect of storage temperature on the dispersibility of commercially available 0.1% fluorometholone ophthalmic suspension, Obata T., Deguchi S., Yoshitomi J., Inaba K., Urashima Y., Kobori T., Hosomi K., Nagai N., Nakada Y., PloS ONE, 17, 1-13 (2022)
- Status of Drug Recalls, Nakada Y., Seiriki M., RSMP, 12, 153-160 (2022)
- Effect of Shelf Life on the Physical Stability of Suspended Ophthalmic Solutions, Nakada Y., Yamaguchi M., Deguchi S., Inaba K., Nagai N., YAKUGAKU ZASSHI, 141, 869-876 (2021)
- Formulation Data and Safety of Medical Eye Drops, Nakada Y., Mukai K., Sonetaka S., Sasa K., Mukai J., Atarashii Ganka (J. Eye), 38, 699-704 (2021)

Laboratory of Natural Medicines

Principal Investigator: Takuya Ito, Ph.D.

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Research fields: Natural Products, Pharmacognosy, Traditional Medicines, Streptomyces, Biosynthesis

Introduction

A large number of bioactive compounds has been found from animal, plants and microorganisms. Some of them have been used as pharmaceuticals and pharmaceutical candidates. Consequently, natural products are still promising and important source for new drug discovery.

We focus on the effectiveness of Southeast Asian medicinal plants used in traditional medicine and the useful substances derived from these medicinal plants. Furthermore, order to create new unnatural natural products, biosynthetic studies on bioactive compounds of medicinal plants and microorganisms have been carried out.

Selected publications

1. Nguyen, H. M., **Ito, T.**, Win, N. N., Vo, H. Q., Ngyuen, H. T., Morita, H. A new sterol from a Vietnamese marine sponge *Xestospongia testudinaria* and their biological activities. *Nat. Prod. Res*. **2019**, *33(8)*, 1175-1181.

2. **Ito, T.**, Rakainsa, S. K., Nisa, K., Morita, H. Three new abietane-type diterpenoids from the leaves of Indonesian *plectranthus scutellarioides*. Fitoterapia, **2018**, *127*, 146-150.

3. **Ito, T.**, Hien, N. M., Win, N. N., Hung, V. Q., Hoai, N. T., Morita, H.: Three new sesquiterpene aminoquinones from a Vietnamese Spongia sp. and their biological activities, *J. Nat. Med.* **2018**, *72(1)*, 298-303.

4. **Ito, T.**, Nisa, K., Rakainsa, S. K., Lallo S., Morita, H., New phloroglucinol derivatives from Indonesian *Baeckea frutescens*. *Tetrahedron*, **2017**, *73*, 1177−1181.