

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. Yuichiro Nakada
Dean, Faculty of Pharmaceutical Sciences

“Ho-on kansha” (deep gratitude), the founding spirit of Osaka Ohtani university, involves forging human relationships where respects "life" as well as treats 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 who understand their mission and ethics as medical professionals, have acquired advanced knowledge of pharmaceuticals, and who also have excellent clinical skills.

The curriculum is structured so that students can acquire the basics of pharmaceuticals such as physics, chemistry, and biology in the lower grades, followed by advanced knowledge in the specialized fields of pharmaceuticals such as hygiene, pharmacology, medicine, drug therapy, and practical pharmaceuticals. 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 ego 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
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- ◆ 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



Professor name: Kazuyuki Miyashita, Ph.D.

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Research fields: Organic Chemistry, Bioorganic Chemistry, Synthetic Organic Chemistry, Development and Application of Novel Fluorescent Compound, Synthesis of Biologically Active Heterocyclic Compound

Introduction

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

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 DAIN library.

2) Application of DAINs to a variety of sensor molecules

In general, DAINs show fluorescence in solid and frozen solution states, but 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 some sensor molecules sometimes 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).
- Synthesis and properties of 4-(diarylmethylene)imidazolinone-conjugated fluorescent nucleic acids. T. Okuda, S. Mori, Y. Kasahara, K. Morihiro, M. Ikejiri, K. Miyashita, S. Obika, *Tetrahedron Lett.*, **57**, 3129-3132 (2016).
- Synthesis and properties of geometrical 4-diarylmethylene analogs of the green fluorescent protein chromophore. M. Ikejiri, H. Kojima, Y. Fugono, A. Fujisaka, Y. Chihara, K. Miyashita, *Org. Biomol. Chem.*, **16**, 2397-2401(2018).
- 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).

Laboratory of Molecular Chemistry



Professor name: Shotaro Morimoto, Ph.D.

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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 celluloliticus* 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



Professor name: Toru Nishinaka, Ph.D.

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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 adverse effects of therapeutic drugs, and 2) development of gene therapies for lifestyle diseases. We are encouraging students to attend scientific meetings.

Selected publications

- ZFAND3 overexpression in the mouse liver improves glucose tolerance and hepatic insulin resistance. (Shimizu K, Ogiya Y, Yoshinaga K, Kimura H, Michinaga S, Ono M, Taketomi A, Terada T, Sakurai F, Mizuguchi H, Tomita K, Nishinaka T.) *Exp. Clin. Endocrinol. Diabetes* in press. (2021)
- Adenovirus vector-Induced IL-6 promotes leaky adenoviral gene expression, leading to acute hepatotoxicity. (Shimizu K, Sakurai F, Iizuka S, Ono R, Tsukamoto T, Nishimae F, Nakamura S, Nishinaka T, Terada T, Fujio Y, Mizuguchi H.) *J. Immunol.* **206**, 410-421 (2021)
- Dietary calamondin supplementation slows the progression of non-alcoholic fatty liver disease in C57BL/6 mice fed a high-fat diet. (Shimizu K, Egusa Y, Nishimuta S, Fukumura Y, Yoshimura M, Inomoto T, Terada T, Tomita K, Nishinaka T.) *Int. J. Food Sci. Nutr.* in press. (2021)
- Cranberry attenuates progression of non-alcoholic fatty liver disease induced by high-fat diet in mice. (Shimizu K, Ono M, Imoto A, Nagayama H, Tetsumura N, Terada T, Tomita K, Nishinaka T.) *Biol. Pharm. Bull.* **42**, 1295-1302 (2019)
- 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



Professor name: 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



Professor name: Katsuji Tani, Ph.D.

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Research fields: Microbial Ecology, Environmental DNA, Space Microbiology

Introduction

Novel pathogens and antibiotic-resistant microbes suddenly emerge and spread throughout the world. Human activities and globalization, as well as ecological processes such as bird migration, would be responsible for such emergence. We investigate the evolution and ecology of emerging microorganisms based on molecular information. We are also engaged in the development and implementation of innovative techniques using environmental DNA to reveal the distribution and genetic diversity of large organisms. Through these studies, we aim to realize human health and biodiversity conservation.

Selected publications

- Minamoto T, Miya M, ..., Uchii K (2020) An illustrated manual for environmental DNA research: Water sampling guidelines and experimental protocols. *Environmental DNA*
- Uchii K, Doi H, Okahashi T, Katano I, Yamanaka H, Sakata MK, Minamoto T (2019) Comparison of inhibition resistance among PCR reagents for detection and quantification of environmental DNA. *Environmental DNA* 1: 359-367
- Kenzaka T, Yasui M, Baba T, Nasu M, Tani K (2018) Positive selection in F-Box domain (lpp0233) encoded in *Legionella pneumophila* strains. *Biocontrol Science* 23(2):53-59
- Kenzaka T & Tani K (2018) Draft genome sequence of carbapenem-resistant *Pseudomonas fluorescens* strain BWKM6, Isolated from feces of *Mareca penelope*. *Genome Announcements* 6: e00186-00118
- Kenzaka T & Tani K (2018) Public health implications of intestinal microbiota in migratory birds. *Metagenomics for Gut Microbes London: IntechOpen* 35-51
- Uchii K, Doi H, Yamanaka H, Minamoto T (2017) Distinct seasonal migration patterns of Japanese native and non-native genotypes of common carp estimated by environmental DNA. *Ecology and Evolution* 7(20): 8515–8522

Laboratory of Pharmacology



Professor name: Hiroyuki Mizuguchi, Ph.D

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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 H₁ 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 H₁ 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 C δ (PKC δ) interaction by (-)-maackiain suppresses histamine H₁ 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 H₁ receptor. *Sci Rep.* 2012; 2: 916.

Laboratory of Pharmaceutics



Professor name: Masahiro Murakami, Ph.D.

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Research fields: Biopharmaceutics, Drug Delivery System, Oral Bioavailability Improvement

Introduction

The mission of this laboratory is to develop medications as well as human resources in the field of health care, contributing to the improvement of people's quality of life (QOL). To achieve this, professors and staff with experience in pharmaceutical product development and formulation research in pharmaceutical companies as well as practice in pharmacy are engaged in education and research providing practical guidance to students. In addition, collaboration with various institutions and companies in different fields is encouraged.

‘Where there’s a will there’s a way’

We have currently challenged the research and development of an effective DDS technology that enables oral administration of biopharmaceuticals, such as nucleic acids and peptide drugs. Conceivably, this leads to the promotion of a drastic paradigm shift to biologic medications in pharmacotherapy for intractable diseases, including chronic diseases and cancers.

Selected publications

- Enteral siRNA delivery technique for therapeutic gene silencing in the liver via the lymphatic route. Murakami M, Nishina K, Watanabe C, Miyata K, Nishiyama N, Kataoka K, Yokota T, *Scientific Reports*, 5, 17035-17047 (2015).
- Fabrication of porous ethyl cellulose microspheres based on the acetone-glycerin-water ternary system: Controlling porosity via the solvent-removal mode. Murakami M, Matsumoto A, Watanabe C, Kurumado Y, Takama M, *Drug Discoveries & Therapeutics*, 9(4), 303-309 (2015).
- Improved systemic delivery of insulin by condensed drug loading in a dimpled suppository. Matsumoto A, Murakami K, Watanabe C, Murakami M, *Drug Discoveries & Therapeutics*, 11(6), 293-299 (2017).
- Janus microspheres for enhanced enteral drug delivery: Preparation and orientated attachment to a Caco-2 monolayer. Matsumoto A, Watanabe C, Murakami M, *Drug Discoveries & Therapeutics*, 13, 343-353 (2019).
- Preparation and *in vitro* tumor growth inhibitory effect of oligo(L-lactate) nanoparticles. Matsumoto A, Murao S, Watanabe C, Murakami M, *Drug Discoveries & Therapeutics*, 14(6), 296-303 (2020).

Laboratory of Toxicology



Professor name: Fumitoshi Sakazaki, Ph.D.

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

Research fields: Toxicology, Hygienic Sciences

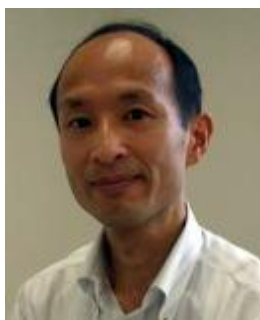
Introduction

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



Professor name: Naoyoshi Maezaki, Ph.D.

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Research fields: Medicinal Chemistry, Organic Chemistry

Introduction

Nature produces a variety of natural products, which possess unique structure and biological activities. Our research interests are development of novel synthetic methods to synthesize them and the analogs with diversity of structures, and elucidation of relevant structure for biological activities is also one of our goal.

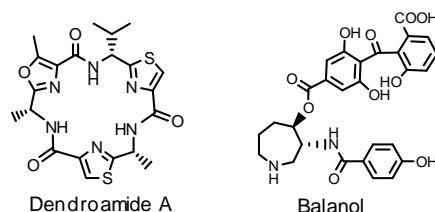
Present main research projects:

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

Cyanobacteria produces variety of azole-containing peptides. We are attempting to synthesize analogs to reveal structure–activity relationship. Recently, we have focused our attention on synthesis of dendroamide A analogs, which possess a reversed azole ring to elucidate a role of orientation of azole rings on P-glycoprotein inhibitory activity. We are also attempting to synthesize novel analogs with consecutive thiazole moieties.

2) Development of novel protein kinase C inhibitors

We have designed novel protein kinase C inhibitors based on the structure of natural product, balanol, which is a fungal metabolite and a potent inhibitor against cAMP-dependent protein kinase C and A. We have investigated structure–activity relationship of balanol derivatives to develop selective protein kinase C inhibitors.



Selected publications

- 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).
- Concise and stereoselective synthesis of 2,5- and 2,4-disubstituted thiazole amino acid subunits for synthesizing thiazole-containing peptides, Magata T., Hirokawa Y., Moriguchi Y., Yokoi R., Nojiri S., Miyazaki R., Akasako S., Takahashi R., Nishida M., Hakoda J., Nakayama R., Tanaka A. and Maezaki N., *Tetrahedron Lett.*, 60 (10), 718-720 (2019).
- Highly diastereoselective synthesis of 2-(1-*N*-Boc-aminoalkyl)thiazole-5-carboxylates by reduction of *tert*-butylsulfinyl ketimines, Magata T., Hirokawa Y., Furokawa A., Takeuchi K., Ohtomo Y., Kino T., Kominami J., Nakai Y., Kitamura M., Maezaki N., *Chem. Pharm. Bull.*, 66 (4), 416-422 (2018).

Laboratory of Immunology

Professor name: Michio Tomura, PhD



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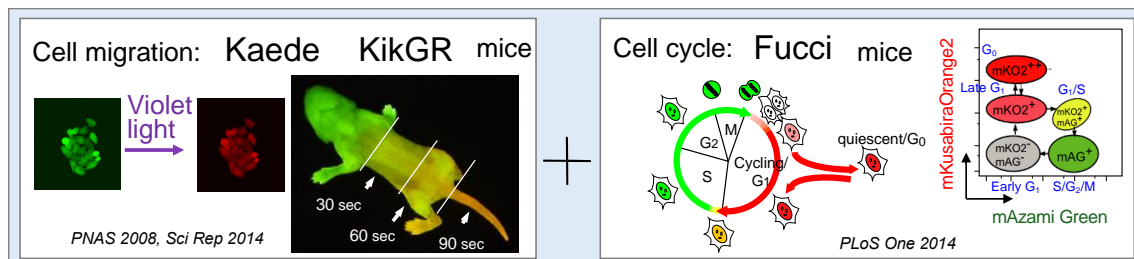
Research fields: Immunology

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 G₀ 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



Professor name: Kozo Yoneda, MD, PhD

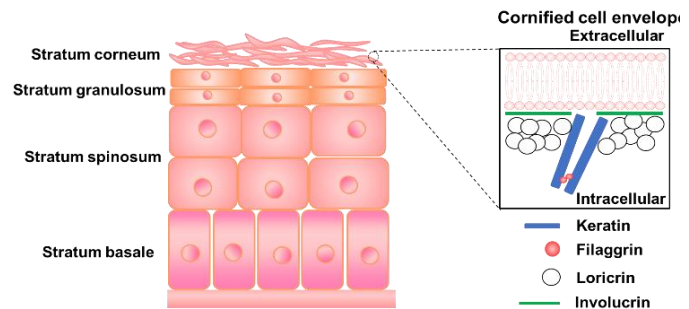
Contact: yonedakou(at)osaka-ohtani.ac.jp

Research fields: Pharmacology, Dermatology

Introduction

Our department goal is to clarify the pathology of diseases that are difficult to treat, such as atopic dermatitis, keratosis, and acute and chronic renal disease, as well as to develop diagnostic and treatment modalities for these diseases. Our research focuses on developing novel diagnostic methods by generating and analyzing gene expression patterns in mouse and cell culture models of human disease and on discovering drugs that can be used in real clinical settings by testing the disease models with seed candidates.

Skin structure



In the outermost layer of the epidermis, the **cornified envelope** functions as a mechanical and permeability barrier.

Selected publications

- The human loricrin gene (Yoneda K et al), *J Biol Chem* 267: 18060-18066, 1992
- Overexpression of human loricrin in transgenic mice produces a normal phenotype, (Yoneda K and Steinert PM), *Proc Natl Acad Sci USA* 90: 10754-10758, 1993
- An autocrine/paracrine loop linking keratin 14 aggregates to tumor necrosis factor α -mediated cytotoxicity in a keratinocyte model of epidermolysis bullosa simplex. (Yoneda K et al), *J Biol Chem* 279: 7296-7303, 2004
- Activation of vascular endothelial growth factor receptor 2 in a cellular model of loricrin keratoderma. (Yoneda K et al), *J Biol Chem* 285: 16184-16194, 2010
- Interaction of the profilaggrin N-terminal domain with loricrin in human cultured keratinocytes and epidermis. (Yoneda K et al), *J Invest Dermatol* 132: 1206-1214, 2012
- Inhibition of α 2-adrenoceptor is renoprotective in 5/6 nephrectomy-induced chronic kidney injury rats. (Hayashi K, Shimokawa T, Yamagata M and Yoneda K), *J Pharmcol Sci* 145: 79-87, 2021

Laboratory of Clinical Pharmaceutics



Professor name: 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 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 seminar 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 to identify the humoral factors responsible for ascites formation in the ascites collected from patients with cancerous peritoneal metastasis.
- Questionnaire survey to promote the diffusion of standard skills for the BLS changes before and after taking PUSH seminar.

Selected publications

- Contribution of Ezrin on the Cell Surface Plasma Membrane Localization of Programmed Cell Death Ligand-1 in Human Choriocarcinoma JEG-3 Cells, Tameishi M., Kobori T., Tanaka C., Urashima Y., Ito T., Obata T., *Pharmaceutics*, 14, 963 (2021)
- Ezrin Modulates the Cell Surface Expression of Programmed Cell Death Ligand-1 in Human Cervical Adenocarcinoma Cells, Tanaka C., Kobori T., Tameishi M., Urashima Y., Ito T., Obata T., *Molecules*, 26, 5648 (2021)
- Interaction between phenytoin and enteral nutrients and its influence on gastrointestinal absorption, Urashima Y., Urashima K., Ohnishi M., Matsushita K., Suzuki K., Kurachi K., Nishihara M., Katsumata T., Myotoku M., Ikeda K., Hirofumi Y., *Pharmazie*, 74, 559-562 (2019)

Laboratory of Clinical Pharmacy and Therapeutics



Professor name: Hiroki Konishi, Ph.D.

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Research fields: Clinical Pharmacokinetics, 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.

Drug 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, we would like to investigate the relation of drug interactions to the dosing regimen and to examine the underlying mechanisms of interactions to construct the strategy for their prediction and avoidance. Since many patients receiving chemotherapy suffer from various problems and complications such as serious toxic reactions or poor response due to insufficient drug exposure by resistance, we attempt to explore substances capable of enhancing the efficacy while minimizing toxicity of anticancer drugs, focusing mainly on natural compounds, by using cultured cells and experimental animals.

In addition to accurate and rapid dispensing technique, pharmacists are required to assure the efficacy and safety of medicines as professional responsibility. To guarantee the quality of pharmaceutical products given to patients, we try to examine the presence or absence of changes in physical properties and chemical stability of drugs under a variety of dispensing and storage conditions by employing analytical instruments.

Selected publications

- Reduced cytotoxicity in doxorubicin-induced HepG2 cells pretreated with menthol due to up-regulation of P-glycoprotein. Nagai K, Fukuno S, Miura T, Uchino Y, Sehara N, Konishi H. *Pharmazie*, 75, 510-511 (2020).
- Pharmacokinetic interference of doxorubicin with tolbutamide due to reduced metabolic clearance with increased serum unbound fraction in rats. Fukuno S, Nagai K, Yamamoto K, Tanimura T, Nabe T, Konishi H. *Biopharm Drug Dispos*, 40, 225-233 (2019).
- Conflicting alterations in hepatic expression of CYP3A and enzyme kinetics in rats exposed to 5-fluorouracil: relevance to pharmacokinetics of midazolam. Fukuno S, Nagai K, Fujiike M, Sasaki Y, Konishi H. *Xenobiotica*, 49, 1470-1477 (2019).
- Prevention of doxorubicin-induced renal toxicity by theanine in rats. Nagai K, Fukuno S, Otani K, Nagamine Y, Omotani S, Hatsuda Y, Myotoku M, Konishi H. *Pharmacology*, 101, 219-224 (2018).

Laboratory of Practical Pharmacy and Pharmaceutical Care



Professor name: 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 Development



Professor name: 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

- Formulation information and safety of medical eye, Yuichiro Nakada Y., Mukai K., Sonetaka S., Sasa K., Mukai J., J.Eye, in press
- OTC Pharmaceutical Halal Survey: Providing halal information on OTC drugs to Muslims visiting Japan, Nakada Y., Bulletin of Osaka Ohtani University, 54, 41-55 (2020)
- Comparative Study of Hydrolase Activity in Skin with Liver and Intestine, and its Aging Relation of Carboxylesterase Expression in Cynomolgus Monkey and Beagle Dog, Imai T., Nakada Y., Ohura K., Yakugaku Zasshi, 139, 837-844 (2019)
- Analysis of Medical Antiallergic Eye Drop Formulation, Nakada Y., Katsuragi S., J.Eye, 35, 1683-1687(2018)
- The impact of Halal certification on pharmaceutical products, Nakada Y., Bulletin of Osaka Ohtani University, 51, 1-14 (2017)
- Japanese Pharmacopoeia (XVII) Commentary Book, Part of Ophthalmic Solution and Ophthalmic Ointment, Hirokawa Shoten (2016)
- Expression of carboxylesterase isozymes and their role in the behavior of a Fexofenadine prodrug in rat skin, Imai T., Ariyoshi S., Ohura K., Sawada T., Nakada Y., J Pharm Sci., 105, 714-721(2016)
- Design of Fexofenadine Prodrugs Based on Tissue-Specific Esterase Activity and Their Dissimilar Recognition by P-Glycoprotein, Ohura K., Nakada Y., Kotani S., Imai T., J Pharm Sci., 104: 3076-3083 (2015)

Laboratory of Natural Medicines



Professor name: 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.