

Lipid Molecules

Studies on Specific Activities and Functions of Lipid Molecules to Develop Innovative Medical Technologies



[Research and Development Objectives]
Comprehensive elucidation of functional lipid which contributes to breakthrough medicines

Program Supervisor (PS)

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Program Officer (PO)

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Lipids carry fundamental functions in living organisms as major components of biomembranes and energy-storage molecules. Numbers of their derivatives also play specific roles in regulating metabolism, immunity/inflammation, reproduction, circulation, neural network, etc, and are involved in pathogenesis of various disorders and diseases related to these systems. The objective of this research and development R&D area is to investigate novel biological functions of lipids and develop new technologies for their analysis, to elucidate molecular mechanism of lipid-associated various diseases, and finally to exploit novel developmental seeds for compounds and technologies to overcome these diseases, i.e. chemical compounds relevant to pre-clinical stage, target materials and reactions promising medical application in near future, or innovative diagnostic methods that may construct new clinical benefits, etc.

Lipid research has advanced along with numbers of discovery of new biological activities and exploitation of new analytic technologies. Therefore, more innovative research and exploitation should also be necessary in order to accomplish the goal of this program and initiative dispatch the novel results toward the world. It should be also important to gather ideas of researchers in various different fields and disciplines, such as the scientists in clinical medicine, pharmaceutical sciences, synthetic chemistry, biophysics and bioengineering, and information engineering, as well as those in lipid biology and biochemistry who have carried mainstream of lipid research. Broad viewpoints based on our interdisciplinary research team works will be indispensable for advancement of research and development in lipid research field to strengthen our international competitiveness.

We would like the program members to conduct their researches with practical translational outputs always in their mind. However, it does not necessarily mean that all the members are obliged to produce practical seeds within the term. We consider it is also important to promote fundamental basic studies that would possibly become the basis for generation of innovative technologies, diagnostics, and medicines only in not-remote future, for development and enforcement of international competitiveness of our lipid research. The research field of biological activities of lipids is continuously expanding, and this R&D area is expected to lead the world in innovative and explorative research in this field.

Because of expected medical application, target lipids are primarily set as the molecules originating in mammalian cells. However, the molecules closely related to human disorders and of nutritional importance may be included, such as omega-3 fatty acids and ceramide.

R&D Area Advisors

ISHII Ken	Professor, The University of Tokyo
UESUGI Motonari	Professor, Kyoto University
OKADA Yasushi	Team Leader, RIKEN Center for Biosystems Dynamics Research
OGAWA Yoshihiro	Professor, Kyushu University
CHIBA Kenji	Fellow, Mitsubishi Tanabe Pharma Corporation
NISHIJIMA Masahiro	Professor Emeritus, Showa Pharmaceutical University
HANDA Tetsuro	Auditor, Kyoto Pharmaceutical University
FUKAMI Kiyoko	Professor, Tokyo University of Pharmacy and Life Sciences
FUKUSHIMA Daikichi	Director, Ono Medical Research Foundation, Foundation Chairman
NISHIMAKI-MOGAMI Tomoko	National Institute of Health Sciences



Started in 2015 ••• 1st period

Development of MULTUM-PALM and its application to cell membrane biology

UEDA Masahiro

Professor, Graduate School of Frontier Biosciences,
Osaka University

Started in 2015 ••• 1st period

Elucidation of molecular mechanism of body surface barrier formation by lipids

KIHARA Akio

Professor, Faculty of Pharmaceutical Sciences, Hokkaido University

Started in 2015 ••• 1st period

Chain length of fatty acids, elucidation of mechanisms of disease control and development of fundamentals toward medical evolution

SHIMANO Hitoshi

Professor, Internal Medicine (Endocrinology and Metabolism), Faculty of Medicine, University of Tsukuba

Started in 2015 ••• 1st period

Creation of a novel technology "Optolipidomics" to identify, control and observe functional lipids using light

SETOU Mitsutoshi

Director, International Mass Imaging Center,
Hamamatsu University School of Medicine

Started in 2015 ••• 1st period

Elucidation of the mechanism of the hijacking of host lipids by pathogens and its application to pharmaceutical development

HANADA Kentaro

Director, Department of Biochemistry & Cell Biology,
National Institute of Infectious Diseases

Started in 2016 ••• 2nd period

Understanding disease mechanisms based on glucosylated lipid functions

KAMIGUCHI Hiroyuki

Deputy Director, RIKEN Center for Brain Science

Started in 2016 ••• 2nd period

Development of innovative technology for structure-based drug design targeting prostanoid receptor

KOBAYASHI-SHIMIZU Takuya

Professor, Department of Medical Chemistry,
Kansai Medical University

Started in 2016 ••• 2nd period

Elucidation of metabolic control by oxysterols and disease molecular mechanism

SATO Ryuichiro

Professor, Graduate School of Agricultural and Life Sciences, The University of Tokyo

Started in 2016 ••• 2nd period

Creation of a novel approach for drug development by elucidation of the regulation mechanism of cell migration with S1P transporters

NISHI Tsuyoshi

Associate Professor, ISIR, Osaka University

Started in 2016 ••• 2nd period

Development of novel anti-infective drugs targeting lipid metabolism

YAMASAKI Sho

Professor, Research Institute for Microbial Diseases,
Osaka University

Started in 2017 ••• 3rd period

Innovative research by control and visualization of cellular membrane phospholipids

SHINDOU Hideo

Vice Project Leader, National Center for Global Health and Medicine (NCGM)

Started in 2017 ••• 3rd period

Elucidation of roles and functions of bioactive lipids underlying stress-related dysfunctions and foundation of novel technology platforms for bioactive lipid-targeting clinical applications

FURUYASHIKI Tomoyuki

Professor, Graduate School of Medicine,
Kobe University

Started in 2017 ••• 3rd period

Elucidation of disease mechanism and study of drug discovery targeted for oxidized lipids

YAMADA Kenichi

Professor, Faculty of Pharmaceutical Sciences, Kyushu University



Started in 2015 ••• 1st period

Development of milieu-lipidomics platform for grasping metabolic crosstalk between host and intestinal bacteria

IKEDA Kazutaka

Deputy Team Leader, Laboratory for Metabolomics,
RIKEN Center for Integrative Medical Sciences (IMS)

Started in 2015 ••• 1st period

Elucidation of roles of lipids in the epithelial-mesenchymal transition

IKENOUCHI Junichi

Professor,
Faculty of Sciences, Kyushu University

Started in 2015 ••• 1st period

Control of functional lipids using optogenetics

UEDA Yoshibumi

Specially Appointed Researcher,
Department of General Systems Studies, Graduate School of Arts and Sciences, The University of Tokyo

Started in 2015 ••• 1st period

The role of lipid in the exosome derived from the inflammatory cancer

KOTANI Ai

Professor, Institute of Medical Science,
Tokai University

Started in 2015 ••• 1st period

Development of basic technologies for medical application based on oxidized phospholipid-derived bioactive fatty acids

KONO Nozomu

Associate Professor, Graduate School of Pharmaceutical Sciences, The University of Tokyo

Started in 2015 1st period

Mechanisms of lipid dynamics on plasma membranes and their application

SUZUKI Jun
Professor, Institute for Integrated Cell-Material Sciences (iCeMS), Kyoto University

Started in 2015 1st period

Unraveling a novel metabolic system orchestrated by a metabolic sensor toward development of therapeutics

SEKIYA Motohiro
Associate Professor, Department of Internal Medicine, Endocrinology and Metabolism, Tsukuba University

Started in 2015 1st period

Development of vibrational microspectroscopy to determine lipid species in live tissues derived from patients

NAGASHIMA Yu
Assistant Professor, Department of Neurology, School of Medicine, The University of Tokyo

Started in 2015 1st period

Palmitoylation-dependent regulations of membrane receptors in synapses

HAYASHI Takashi
Section Chief, National Institute of Neuroscience, National Center of Neurology and Psychiatry (NCNP)

Started in 2015 1st period

Identification of lipid metabolites controlling physiological function of the uterus

HIROTA Yasushi
Lecturer, Department of Obstetrics and Gynecology, Graduate School of Medicine, The University of Tokyo

Started in 2015 1st period

Physiological and pathological roles of cholesterol in primary cilia

MIYAMOTO Tatsuo
Associate Professor, Research Institute for Radiation Biology and Medicine, Hiroshima University

Started in 2015 1st period

Functional elucidation of bioactive alkenyl-type lysophospholipids

YAMAMOTO Kei
Associate Professor, Graduate School of Technology, Industrial and Social Science, Tokushima University

Started in 2016 2nd period

Understanding lipid-related orphan G protein-coupled receptors using activating GPCR mutations

INOUE Asuka
Associate Professor, Graduate School of Pharmaceutical Sciences, Tohoku University

Started in 2016 2nd period

Development of novel treatment strategies by regulating functional lipids involved in the pathogenesis of pulmonary hypertension

ENDO Jin
Assistant Professor, Department of Cardiology, Keio University School of Medicine

Started in 2016 2nd period

Functional analysis on cholesterol metabolizing enzyme that defines a novel T cell subset and the clinical application for disease control

TAKAHASHI Hayato
Assistant Professor, Department of Dermatology, Keio University School of Medicine

Started in 2016 2nd period

Molecular mechanism and physiological role of PI4P-driven lipid countertransport system

NAKATSU Fubito
Associate Professor, Department of Neurochemistry and Molecular Cell Biology, Graduate School of Medical and Dental Sciences, Niigata University

Started in 2016 2nd period

Understanding pathogenic mechanisms of skin diseases by focusing on polyphosphoinositide metabolism

NAKAMURA Yoshikazu
Associate Professor, Faculty of Science and Technology, Tokyo University of Science

Started in 2016 2nd period

Development of molecular tools for the clarification of metabolism and molecular interaction of glycolipids

HIRAI Go
Professor, Graduate School of Pharmaceutical Science, Kyushu University

Started in 2016 2nd period

Identification of functional lipid metabolites to control purinergic chemical transmission, and the molecular mechanism-based drug discovery research

MIYAJI Takaaki
Research Professor, Advanced Science Research Center, Okayama University

Started in 2016 2nd period

Development of novel microsystems for highly sensitive analysis of lipid transport proteins

WATANABE Rikiya
Chief Scientist, Molecular Physiology Laboratory, RIKEN

Started in 2017 3rd period

Elucidation of the immune-metabolic-regeneration systems network linked by fatty acids

OISHI Yumiko
Professor, Department of Biochemistry & Molecular Biology, Nippon Medical School

Started in 2017 3rd period

Characterization of the early steps of high-density lipoprotein (HDL) formation

KIMURA Yasuhisa
Assistant Professor, Graduate School of Agriculture, Kyoto University

Started in 2017 3rd period

The clarification of lipid-mediated mechanisms in the inflammatory and repairing process after stroke

SHICHITA Takashi
Project Leader, Stroke Renaissance Project, Tokyo Metropolitan Institute of Medical Science

Started in 2017 3rd period

Development and application of the phosphatidylinositol-specific nucleic acid drug

SUIZU Futoshi
Associate Professor, Institute for Genetic Medicine, Hokkaido University

Started in 2017 3rd period

The molecular mechanism that regulates cellular signaling pathways through organelle-specific lipid domains

TAGUCHI Tomohiko
Professor, Graduate School of Life Sciences, Tohoku University

Started in 2017 3rd period

Dissecting intracellular phospholipid traffic for understanding mitochondrial functional integrity

TAMURA Yasushi
Professor, Faculty of Science, Yamagata University

Started in 2017 3rd period

Development of enzymatic fluorometric assays for quantifying phospholipids, sphingolipids and acylglycerols and for evaluating asymmetrical distribution of membrane lipids

MORITA Shin-ya
Associate Professor, Shiga University of Medical Science

Started in 2017 3rd period

Elucidation of the molecular mechanism of dietary lipids-mediated reproductive dysfunction to develop novel drugs and treatments for infertility

YAMANASHI Yoshihide
Assistant Professor, Department of Pharmacy, the University of Tokyo Hospital