Biomedical Research Activities
University of Tsukuba

2014
## CONTENTS

<table>
<thead>
<tr>
<th>Research Fields</th>
<th>PI</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>University of Tsukuba</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anatomy and Embryology</td>
<td>Takahashi S</td>
<td>1</td>
</tr>
<tr>
<td>Laboratory Animal Science</td>
<td>Yagami K</td>
<td>2</td>
</tr>
<tr>
<td>Physiological Chemistry</td>
<td>Kanaho Y</td>
<td>3</td>
</tr>
<tr>
<td>Molecular Cell Biology</td>
<td>Irie K</td>
<td>4</td>
</tr>
<tr>
<td>Gene Regulation</td>
<td>Hisatake K</td>
<td>5</td>
</tr>
<tr>
<td>Molecular Cell Physiology / Reproductive Biochemistry</td>
<td>Okamura N</td>
<td>6</td>
</tr>
<tr>
<td>Molecular Neurobiology</td>
<td>Masu M</td>
<td>7</td>
</tr>
<tr>
<td>Medical Genetics</td>
<td>Noguchi E</td>
<td>8</td>
</tr>
<tr>
<td>Diagnostic Surgical Pathology</td>
<td>Noguchi M</td>
<td>9</td>
</tr>
<tr>
<td>Experimental Pathology</td>
<td>Kato M</td>
<td>10</td>
</tr>
<tr>
<td>Kidney and Vascular Pathology</td>
<td>Nagata M</td>
<td>11</td>
</tr>
<tr>
<td>Immunology</td>
<td>Shibuya A</td>
<td>12</td>
</tr>
<tr>
<td>Regenerative Medicine and Stem Cell Biology</td>
<td>Ohneda O</td>
<td>13</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>Miyoshi H</td>
<td>14</td>
</tr>
<tr>
<td>Environmental Medicine</td>
<td>Kumagai Y</td>
<td>15</td>
</tr>
<tr>
<td>Molecular and Genetic Epidemiology/ Public Health Medicine</td>
<td>Tsuchiya N</td>
<td>16</td>
</tr>
<tr>
<td>Occupational Psychiatry / Space Medicine *1</td>
<td>Matsuzaki I</td>
<td>17</td>
</tr>
<tr>
<td>Longevity medicine Endowed Chair *2</td>
<td>Tsuboi K</td>
<td>18</td>
</tr>
<tr>
<td>Radiation Biology</td>
<td>Kawaguchi A</td>
<td>19</td>
</tr>
<tr>
<td>Infection Biology</td>
<td>Ohniwa R</td>
<td>20</td>
</tr>
<tr>
<td>Microbiology</td>
<td>Koganezawa T</td>
<td>21</td>
</tr>
<tr>
<td>Neurophysiology</td>
<td>Ho K</td>
<td>22</td>
</tr>
<tr>
<td>Molecular Parasitology</td>
<td>Nishimura K</td>
<td>23</td>
</tr>
<tr>
<td>Cellular Reprogramming and Biotechnology</td>
<td>Matsumoto M</td>
<td>24</td>
</tr>
<tr>
<td>Cognitive and Behavioral Neuroscience</td>
<td>Yanagisawa M</td>
<td>25</td>
</tr>
<tr>
<td>Research Fields</td>
<td>PI</td>
<td>page</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>-------------</td>
<td>------</td>
</tr>
<tr>
<td><strong>University of Tsukuba</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional neuroanatomy</td>
<td>Funato H</td>
<td>26</td>
</tr>
<tr>
<td>Medicinal Chemistry, Organic Chemistry</td>
<td>Nagase H</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kutsumura N</td>
<td>27</td>
</tr>
<tr>
<td>Biochemistry and Molecular Genetics</td>
<td>Liu Q</td>
<td>28</td>
</tr>
<tr>
<td>Memory, Adult Neurogenesis, and Sleep</td>
<td>Sakaguchi M</td>
<td>29</td>
</tr>
<tr>
<td>Systems Sleep Biology</td>
<td>Lazarus M</td>
<td>30</td>
</tr>
<tr>
<td>Molecular Sleep Biology</td>
<td>Urade Y</td>
<td>31</td>
</tr>
<tr>
<td><strong>Cooperative Graduate Programs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional Genomics</td>
<td>Ishii S</td>
<td>32</td>
</tr>
<tr>
<td>International Medicine</td>
<td>Kano S</td>
<td>33</td>
</tr>
<tr>
<td>Functional Genomics</td>
<td>Kurane I</td>
<td>34</td>
</tr>
<tr>
<td>Experimental Hematology</td>
<td>Nakamura Y</td>
<td>35</td>
</tr>
<tr>
<td>Biochemistry and Molecular Cell Biology</td>
<td>Tanaka K</td>
<td>36</td>
</tr>
</tbody>
</table>
Major Scientific Interests of the Group
We are working on the functional analysis of transcription factors in the body by employing developmental engineering techniques such as the generation of transgenic mice.

Projects for Regular Students in Doctoral or Master’s Programs
1) Molecular mechanism of the development of pancreatic endocrine cells and macrophages. We are researching the molecular mechanisms of the development of pancreatic endocrine cells and macrophages. By analyzing the function of the large Maf family of transcription factors. In both human and mouse, four large Maf transcription factors, MafA, MafB, c-Maf and Nrl, have been identified.
2) Analysis about in vivo functions of sugar chains on molecules. In addition to these themes, we are also analyzing functions of sugar chains on molecules in vivo by using genetically manipulated mice.

Study Programs for Short Stay Students (one week ~ one trimester)
1) Histological analysis of genetically manipulated mice.
2) Handling skill for mouse embryos.

Recent Publications
Major Scientific Interests of the Group

The aims of our research are development, characterization and quality control of genetically induced animal models for human diseases. We focus on the following research themes:

1) We are creating a variety of mice in which genes regulating blood pressure (BP) are altered. Characterization of these mice allows us to develop hypertension models as well as to evaluate unknown functions of the genes. Additionally, quantitative trait loci (QTL) mapping of BP regulating genes is in progress by using spontaneously hypertensive mice to search novel genes associated with BP regulation.

2) In order to elucidate the molecular mechanisms associated with pathogenesis of infectious agents, such as parvovirus and Helicobacter, we are analyzing the interaction between infectious agents and host genes. Additionally, we continue to develop technology for creating genetically-induced mice and to survey microbiological infection in laboratory animals.

Projects for Regular Students in Doctoral or Master’s Programs

1) Development of embryonic stem cells in mice and rats.

2) Development of monoclonal antibody-based antigen detection methods for diagnosing infectious diseases in mice (such as Helicobacter hepaticus and murine norovirus infections).

Training Programs for Short Stay Students (one week – one trimester)

1) Manipulation of mouse preimplantation embryos.

2) Multiplex serologic tests for infectious diseases in mice and rats by microsphere fluorescent immunoassay.

Recent Publications


Physiological Chemistry

Principal Investigator  Yasunori Kanaho
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URL  http://www.md.tsukuba.ac.jp/basic-med/biochem/kanaholab/index.html

Other Faculty Members
Associate Professor Hiroshi Hasegawa  h.hasegawa@md.tsukuba.ac.jp
Assistant Professor Yuji Funakoshi  funa@md.tsukuba.ac.jp
Assistant Professor Tsunaki Hongu  thongu@md.tsukuba.ac.jp

Major Scientific Interests of the Group
Studies on regulatory mechanisms and physiological functions of cell signaling systems, especially through the phospholipid-metabolizing enzymes and the small G protein Arf6.

Projects for Regular Students in Doctoral or Master’s Programs
1) Molecular mechanisms through which the small G protein Arf6 regulates each isozyme of the lipid kinase PIP5K.
2) Physiological functions of the phospholipid-metabolizing enzymes, PIP5K and PLD, and of their regulatory protein Arf6 at cellular and whole animal levels.
3) Human diseases caused by the disruption of the signaling systems through the lipid-metabolizing enzymes and the small G protein Arf6.

Study Programs for Short Stay Students (one week ~ one trimester)
1) Enzyme assay, immunohistochemistry, and immunofluorescent staining of signaling molecules
2) Assays for cell functions such as cell proliferation, cell motility, focal adhesion, secretion, endocytosis, exocytosis, etc.

Recent Publications
Molecular Cell Biology

Principal Investigator  Kenji Irie
E-mail address  kirie@md.tsukuba.ac.jp
URL  http://www.md.tsukuba.ac.jp/public/basic-med/molecellbiol/index.html

Other Faculty Members
Assistant Professor Tomoaki Mizuno: mizuno@md.tsukuba.ac.jp
Assistant Professor Yasuyuki Suda: ysuda@md.tsukuba.ac.jp

Major Scientific Interests of the Group
Post-transcriptional regulation of gene expression by RNA-binding proteins
Molecular mechanism of mRNA localization and local translation regulating cell polarity, asymmetric cell division, and cell-fate
Regulation of myogenic differentiation by RNA-binding protein
Regulation of the endoplasmic reticulum stress response by protein kinases

Projects for Regular Students in Doctoral or Master’s Programs
1) Post-transcriptional regulation of gene expression by Khd1, Ccr4, and Pbp1 in yeast.
2) Stability control of MTL1 mRNA by the RNA-binding protein Khd1 in yeast.
3) Stau1 negatively regulates myogenic differentiation in C2C12 cells.
4) Regulation of the endoplasmic reticulum stress response by protein kinases

Study Programs for Short Stay Students (one week ~ one trimester)
1) Yeast genetic approaches including the isolation and characterization of mutants, tetrad analysis, complementation, and mitotic recombination.
2) Molecular genetic techniques including yeast transformation, gene knockout, and generation of mutations in cloned genes.
3) Imaging yeast cells using indirect immunofluorescence and GFP–protein fusions.

Recent Publications
Major Scientific Interests of the Group
Our group studies the regulation of eukaryotic gene expression, focusing on how transcription regulates cell differentiation. In particular, we are studying the roles of transcription factors and epigenetic changes in regulating iPS cell induction and adipocyte differentiation.

Projects for Regular Students in Doctoral or Master’s Programs
1) Mechanistic analyses of the roles for Oct4, Sox2, Klf4 and c-myc during iPS cell induction.
2) Analyses of epigenetic mechanisms of iPS cell induction.
3) Identification and functional analyses of transcription factors involved in adipocyte commitment.
4) Role of non-coding RNA in epigenetic regulation during adipocyte differentiation.

Study Programs for Short Stay Students (one week ~ one trimester)
1) Analysis of transcriptional regulation during white and brown adipocyte differentiation.
2) Induction of iPS cells using a Sendai virus-based vector.

Recent Publications
Molecular Cell Physiology / Reproductive Biochemistry

Principal Investigator  Naomichi Okamura
E-mail address  naooka@md.tsukuba.ac.jp
URL  http://www.md.tsukuba.ac.jp/basic-med/biochem/reproductive_biochem/index.html

Other Faculty Members
Assistant Professor: Manabu Matsuda, Akihiro Kawashima

Major Scientific Interests of the Group
1. Molecular mechanisms involved in the spermatogenesis and sperm maturation in mammals
2. Signal transduction in germ cells
3. Biology of mammogenesis, milkstasis and secretion

Projects for Regular Students in Doctoral or Master's Programs
1) Proteome analysis of calcium-binding proteins expressed in the spermatogenic cells.
2) Molecular mechanisms of the sperm maturation during transit through epididymis.
3) Role of the protein tyrosine phosphorylation in capacitation.

Study Programs for Short Stay Students (one week ~ one trimester)
1) Technology for proteome analysis.
2) Assessment of mammalian sperm fertilizing activities.
3) In vitro studies on functions of monoamines in secretion.

Recent Publications
Molecular Neurobiology

Principal Investigator  Prof. Masayuki Masu
E-mail address  mmasu@md.tsukuba.ac.jp
URL  http://www.md.tsukuba.ac.jp/duo/molneurobiol/

Other Faculty Members
Lecturer: Kensuke Shiomi: kshiomi@md.tsukuba.ac.jp
Lecturer: Kazuko Keino-Masu: kazumasu@md.tsukuba.ac.jp
Assistant Professor: Takuya Okada: okada.takuya.gw@u.tsukuba.ac.jp

Major Scientific Interests of the Group
Our main research focus is to study the molecular mechanisms that regulate the neural circuit formation and higher brain functions. Using integrative approaches including molecular biology, biochemistry, pharmacology, developmental biology, and neuroanatomy, we have been investigating how complex networks are formed in the developing brain and how the mature brain functions are acquired and regulated. We are particularly interested in the molecules that play a role in neural differentiation, cell migration, axon guidance, and synaptogenesis.

Projects for Regular Students in Doctoral or Master’s Programs
1) Molecular study on neural differentiation
2) Molecular study on axon guidance
3) Molecular study on neural cell migration

Training Programs for Short Stay Students (one week ~ one trimester)
1) Immunohistochemistry
2) In situ hybridization

Recent Publications
Medical Genetics

Principal Investigator  Emiko Noguchi
E-mail address  enoguchi@md.tsukuba.ac.jp
URL  http://tsukuba-medicalgenetics.org

Major Scientific Interests of the Group
1) Genetic study of asthma/atopic dermatitis/allergic rhinitis/food allergy. Linkage and association analyses, expression profiles from human and animal tissues
2) Identification of the disease-causing gene by next generation sequencing

Projects for Regular Students in Doctoral or Master’s Programs
1) Identification of novel genomic mutations associated with asthma/atopy and development of genetic markers and therapeutic materials for personalized medicine of allergic diseases.
2) Identification of the disease-causing mutation of genetic diseases by next generation sequencers

Study Programs for Short Stay Students (one week ~ one trimester)
1) Genetic testing, genotyping, expression analyses.
2) Bioinformatics

Recent Publications
Diagnostic Surgical Pathology

Principal Investigator  Masayuki Noguchi
E-mail address  nmasayuk@md.tsukuba.ac.jp
URL  http://www.md.tsukuba.ac.jp/diagpatho/

Other Faculty Members
Associate Professor Yukio Morishita:ymorish@md.tsukuba.ac.jp
Associate Professor Yuko Minami: minami-y@md.tsukuba.ac.jp
Assistant Professor Junko Kano: junkano@md.tsukuba.ac.jp
Assistant Professor Shingo Sakashita: sakashingo@hotmail.com
Assistant Professor Kaishi Satomi: kaishis@md.tsukuba.ac.jp

Major Scientific Interests of the Group
1) Molecular pathology of multistep carcinogenesis
2) Studies of the initial genetic alterations of precancerous lesions and early carcinoma
3) Studies of the interactions between cancer cells and interstitial cells

Projects for Regular Students in Doctoral or Master’s Programs
1) Analysis for the molecular mechanisms of pulmonary adenocarcinogenesis. Screening of the differentially expressed genes and proteins between early adenocarcinoma of the lung (in situ adenocarcinoma) and early advanced tumors.
2) Produce monoclonal antibodies against fetal swine to screen for specific antibodies against human carcinomas.
3) In vitro and in vivo studies of the molecular mechanisms of the reproduction of liver tissue.

Study Programs for Short Stay Students (one week ~ one trimester)
1) Basic techniques of immunohistochemistry, in situ hybridization, and FISH
2) Basic techniques of tissue micro-dissection

Recent Publications
Experimental Pathology

Principal Investigator    Mitsuyasu Kato
E-mail address           mit-kato@md.tsukuba.ac.jp
URL                       http://www.md.tsukuba.ac.jp/epatho/

Other Faculty Members
Associate Professor Hiroyuki Suzuki: h-suzuki@md.tsukuba.ac.jp
Assistant Professor Yukihide Watanabe: y-watanabe@md.tsukuba.ac.jp
Assistant Professor Markus Dahl: carlaxemarkus@gmail.com

Major Scientific Interests of the Group
Experimental studies, using murine models and cultured cells, for elucidation of the roles of transforming growth factor-β related molecules in stem cell biology, tissue formation and carcinogenesis. Our aim is to establish novel molecular targeting therapies useful for the prevention of cancer.

Projects for Regular Students in Doctoral or Master’s Programs
1) Molecular mechanisms of TGF-β related molecules (TMEPAI, MafK, Gpmb etc.) in stem cell maintenance and carcinogenesis using gene-manipulated mice and three dimensional histopathological analysis.
2) Molecular mechanisms of TGF-β related molecules (THG-1) in squamous cell carcinoma formation

Study Programs for Short Stay Students (one week ~ one trimester)
1) Pathological tissue preparation, Immunohistochemistry and 3D reconstruction
2) In vitro tumorigenic assays (cell proliferation, sphere forming assay, scratch assay, matrigel invasion assay, 3D culture invasion assay etc.)

Recent Publications
Kidney and Vascular Pathology

Principal Investigator  Prof. Michio Nagata
E-mail address  nagatam@md.tsukuba.ac.jp
URL  http://www.md.tsukuba.ac.jp/rvpatho/

Major Scientific Interests of the Group
Kidney pathology is the main issue in our group.
Current interests include podocyte pathology, pathophysiology of FSGS, systemic vasculitis (ANCA-related) and cystogenesis in polycystic kidney.
Vascular pathology in chronic kidney disease is another focus in our group.

Projects for Regular Students in Doctoral or Master’s Programs
1) Pathophysiology and molecular mechanisms of focal segmental glomerulosclerosis from the view of podocyte and parietal cell transdifferentiation.
2) Morphologic investigation in systemic vascular changes and kidney injury.

Training Programs for Short Stay Students (one week ~ one trimester)
1) Diagnosis of human kidney biopsy samples according to the specific interest.
2) Immunohistochemistry and molecular biologic techniques using podocyte-specific transgenic animals.

Recent Publications
Immunology

Principal Investigator  Akira Shibuya, M.D., Ph.D
E-mail address  ashibuya@md.tsukuba.ac.jp
URL  http://www.md.tsukuba.ac.jp/basic-med/immunology/immunol.index.html

Other Faculty Members
Associate Professor: Kazuko Shibuya, M.D., Ph.D (kazukos@md.tsukuba.ac.jp)
Shinichiro Honda, M.D., Ph.D (shonda@md.tsukuba.ac.jp)
Associate Professor: Satoko Tahara, Ph.D (tokoth@md.tsukuba.ac.jp) Chigusa Oda, M.D., Ph.D (chigusano@md.tsukuba.ac.jp)

Major Scientific Interests of the Group
The molecular mechanisms of tumor immunity, autoimmunity, infectious immunity and allergy and clinical applications of our basic research findings

Projects for Regular Students in Doctoral or Master’s Programs
1) In vivo and in vitro function of the immunoreceptors DNAM-1, Fca/mR, MAIR-I, MAIR-II, and Allergin-1, all of which were identified in our laboratory, in immune responses
2) The pathophysiological roles of the immunoreceptors in tumors, autoimmune diseases, allergy and infectious disease

Study Programs for Short Stay Students (one week ~ one trimester)
1) Generation of monoclonal antibodies and their application for expression analyses by flow cytometry and immunohistochemistry
2) Cell separation by sorting on flow cytometry or magnetic beads and analyses of cytokine production or proliferation upon antigen stimulation

Recent Publications
Regenerative Medicine and Stem Cell Biology

Principal Investigator Osamu Ohneda
E-mail address oohneda@md.tsukuba.ac.jp
URL http://www.md.tsukuba.ac.jp/basic-med/remed/

Staffs:
Dr. Mami Matsuo Takasaki (Assistant Professor), mamimt@md.tsukuba.ac.jp
Dr. Yoshiharu Yamashita (Assistant Professor), t-yama@md.tsukuba.ac.jp
Dr. Masumi Kuma Nagano (Assistant Professor), naganom@md.tsukuba.ac.jp
Dr. Georgina Salazar (Assistant Professor), georgina.salazar@gmail.com

Major Scientific Interests of the Group
1) Identification and analyses of functional stem cells for cell therapy in human tissues
2) Hypoxic responses in stem cell development and tumor development

Projects for Regular Students in Doctoral or Master’s Programs
1) Analysis of functional stem cells (MSC and EPC) for clinical application
2) Analysis of how hypoxic inducible factors (HIFs) are involved in stem cell development
3) Analysis of how HIFs are involved in tumor development (tumor itself and tumor endothelial cell)

Summer School Course (2012)♦
1) Basic Radiobiology for Mesenchymal stem cells
2) Neural Differentiation of human iPS for clinical use

Recent Publications
Biomedical Engineering
Principal Investigator Hirotoshi Miyoshi
E-mail address hmiyoshi@md.tsukuba.ac.jp
URL http://www.md.tsukuba.ac.jp/bm-engng/

Other Faculty Members
Assistant Professor Keiko Ookawa: k_ookawa@md.tsukuba.ac.jp

Major Scientific Interests of the Group
The aims of our researches are development of bioartificial organs, e.g., ex vivo expansion systems of hematopoietic stem/progenitor cells, bioartificial livers, and bioartificial vascular grafts, from the viewpoint of tissue engineering.

Projects for Regular Students in Doctoral or Master’s Programs
1) Effects of stromal cells on expansion of hematopoietic stem/progenitor cells in the three-dimensional (3D) cocultures of hematopoietic cells and stromal cells.
2) Effects of 3D cocultures of fetal liver cells with nonparenchymal cells on the growth and functions of fetal liver cells.
3) Influence of the properties of biomaterials on the functions of cultured vascular cells.

Study Programs for Short Stay Students (one week ~ one trimester)
1) Techniques required for 3D cocultures using porous polymer scaffolds.
2) Measurements of numbers and functions of 3D–cultured cells.

Recent Publications
Environmental Medicine

Principal Investigator  Yoshito Kumagai
E-mail address  yk-em-tu@md.tsukuba.ac.jp
URL  http://www.md.tsukuba.ac.jp/community-med/environmental_medicine/main/toppage.html

Other Faculty Members
Assistant Professor Yasuhiro Shinkai: ya_shinkai@md.tsukuba.ac.jp

Major Scientific Interests of the Group
This laboratory addresses the mechanisms by which environmental chemicals causing oxidative stress and covalent modification to cellular proteins affect living systems by interacting with sensor proteins with reactive thiols (thiolate ions). The observations obtained by this group regarding environmental electrophiles have lent new insight into mechanisms of redox-dependent cellular signal transduction pathways that are negatively regulated by reactive sulfur species (e.g., hydrogen sulfide anions, persulfide and polysulfide).

Projects for Regular Students in Doctoral or Master’s Programs
1) Activation of electrophilic signal transduction pathways associated with cell survival, cell proliferation and cell damage during exposure to environmental electrophiles.
2) Search for such cellular systems regulating sensor proteins covalently modified by the environmental electrophiles.

Study Programs for Short Stay Students (one week ~ one trimester)
1) Detection of cellular proteins modified by environmental electrophiles by Western blot analysis with specific antibodies against the electrophiles.
2) Proteomics analysis by using 2D–SDS/PAGE and MALDI–TOF/MS.

Recent Publications
Major Scientific Interests of the Group
1) Genetics of human autoimmune diseases including systemic lupus erythematosus, rheumatoid arthritis, systemic sclerosis and microscopic polyangiitis (Dr. Naoyuki Tsuchiya, Dr. Aya Kawasaki)
2) Genetics of obesity in Oceanic populations (Dr. Jun Ohashi)
3) Epidemiology and prevention of lifestyle-related diseases (Dr. Kazumasa Yamagishi)

Projects for Regular Students in Doctoral or Master’s Programs
1) Polymorphisms associated with autoimmune diseases in Japanese (Dr. Naoyuki Tsuchiya, Dr. Aya Kawasaki)
2) Polymorphisms associated with obesity in Oceanic populations (Dr. Jun Ohashi)

Study Programs for Short Stay Students (one week ~ one trimester)
Genome database (tutorial), SNP typing (laboratory), Preventive medicine activity in the community (a field trip)

Recent Publications
Occupational Psychiatry / Space Medicine #1
Longevity medicine Endowed Chair #2

Principal Investigator   Prof. Ichiko Matsuzaki #1
E-mail address   ZAW00312@nifty.com
URL   http://www.md.tsukuba.ac.jp/community-med/envhlth/

Other Faculty Members
Assistant Professor Shin-ichiro Sasahara #1, #2: sshara.md.tsukuba.ac.jp
Assistant Professor Satoshi Yoshino #1: satoshi-yoshino.mg@u.tsukuba.ac.jp

Major Scientific Interests of the Group

- Environmental and occupational prevention of work-related diseases.
- Empirical and epidemiological study on risk factors for work-related diseases and prevention.

Projects for Regular Students in Doctoral or Master’s Programs
1) Various mental disorder patients’ treatment in occupational health.
   Training of psychiatric clinical ability demanded on site of industrial medicine.
2) Techniques for managing working people’s mental/physical health (industrial physicians).
3) Research by use of epidemiological techniques.

Training Programs for Short Stay Students (one week ~ one trimester)
1) Health care for workers focusing on their mental health
2) Clinical psychiatry (major depressive disorder, adjustment disorder etc.)
3) Return-to-work support

Recent Publications


Radiation Biology

Principal Investigator  Koji Tsuboi
E-mail address  tsuboi-k@md.tsukuba.ac.jp
URL  http://www.md.tsukuba.ac.jp/basic-med/radiation/

Other Faculty Members
Assistant Professor Takashi Moritake:
moritake@pmrc.tsukuba.ac.jp

Major Scientific Interests of the Group
Radiation biology is a field of medical sciences dealing with research on the biological actions of ionizing radiation on life or living things. In this field, it is essential to establish robust methods to evaluate and measure biological phenomena by physical parameters. The mission of this group is to clarify the biological characteristics of x-rays and proton beams and to improve the safety and efficacy of x-rays and proton beam radiotherapy.

Projects for Regular Students in Doctoral or Master’s Programs
1) Particle beam induced DNA damage and repair,
2) Radiation induced tumor immunological reactions,
3) Biological effects of x-ray micro beams,

Study Programs for Short Stay Students (2 weeks – 6 months)
1) Cell culture techniques and basic in vitro radio sensitivity assays
2) Methods to evaluate DNA damage in cells and tissues
3) Studies on physical parameters to evaluate biological effects

Recent Publications
Infection Biology

Principal Investigator  Atsushi Kawaguchi
E-mail address  ats-kawaguchi@md.tsukuba.ac.jp
URL  http://www.md.tsukuba.ac.jp/basic-med/infectionbiology/virology/index_english.html

Other Faculty Members
Associate Professor: Mitsuru OKUWAKI
Assistant Professor: Shoko SAITO, Kohsuke KATO
(President Special Lab.: President Kyosuke NAGATA)

Major Scientific Interests of the Group
The research aim of this group is to understand the molecular mechanism of replication and pathogenicity of animal viruses such as influenza viruses, measles virus, adenovirus, human cytomegalovirus, etc. The structure and function of virus-encoded factors and host cell-derived factors involved in the above processes are being studied at the atomic, molecular, cellular, and body levels. In addition, we are particularly interested in clarifying the physiological function of identified host factors such as chromatin regulators, molecular chaperones, etc. as well as their roles in infection.

Projects for Regular Students in Doctoral or Master’s Programs
1) Identification and characterization of novel factors in virus replication
2) Control of virus diseases based on the knowledge of host defense systems, or through development of novel anti–viral drugs
3) Regulatory mechanism for the structure and function of chromatin
4) Leukemogenic mechanism by chromosomal translocation

Study Programs for Short Stay Students (one week ~ one trimester)
1) Molecular mechanism of host factors involved in influenza virus replication
2) Action mechanism of an anti–virus drug
3) Cell-free reconstitution of a nucleus
4) Molecular function of a fusion gene product(s) in oncogenesis

Selected Recent Publications
Microbiology

Principal Investigator Ryosuke Ohniwa (Assistant Professor)
E-mail address ohniwa@md.tsukuba.ac.jp
URL http://www.md.tsukuba.ac.jp/basic-med/infectionbiology/microbiology/english.html

Other Faculty Members
Associate Professor Kazuya Morikawa: morikawa.kazuya@u.tsukuba.ac.jp
Associate Professor Shinji Saito: sinsaito@md.tsukuba.ac.jp

Major Scientific Interests of the Group
The research aim of our lab is to understand how *Staphylococcus aureus* and other pathogens have evolved to cope with bactericidal factors from host and environment.

Projects for Regular Students in Doctoral or Master’s Programs
1) Dynamics of cellular structures: nucleoid and membrane
2) Population heterogeneity: stochastic gene expression
3) Natural genetic competence in gram positive pathogens
4) Host–pathogen interaction *invitro*

Study Programs for Short Stay Students (one week ~ one trimester)
1) Molecular genetic and biochemical techniques in bacteria
2) Single molecule analysis using atomic force microscopy

Recent Publications
Neurophysiology

Principal Investigator  Tadachika Koganezawa
E-mail address  t-kogane@md.tsukuba.ac.jp
URL  http://www.md.tsukuba.ac.jp/basic-med/physiology/t-kogane/

Major Scientific Interests of the Group
We are studying mechanisms of cardiovascular and respiratory regulation by the central nervous system. Especially, we are paying attention to the autonomic nervous system for the circulatory and respiratory system.

Projects for Regular Students in Doctoral or Master’s Programs
Cardiovascular and respiratory regulation by the central nervous system plays crucial roles in homeostasis. Disorder of this system causes serious problems in a living body. Despite this, it has been remained that lots of unknown mechanisms in the cardiovascular and respiratory center. Now, we are studying cardiovascular and respiratory regulation by the autonomic nervous system using electrophysiological methods in situ and in vivo, and trying to investigate relationship between disorder of the neurogenic regulation and cardiovascular and respiratory diseases.

Study Programs for Short Stay Students (one week ~ one trimester)
1) Recording of cardiovascular and respiratory parameters in human and rodent.
2) Physiological analysis of cardiovascular and respiratory parameters in human and rodent.

Recent Publications
3) Koganezawa T, Shimomura Y, Terui N. The viscerosympathetic response in rabbits is mediated by GABAergic and glutamatergic inputs into the sympathetic premotor neurons of the rostral ventrolateral medulla. Exp Physiol, 95(11), 1061–1070 (2010)
Molecular Parasitology

Principal Investigator  Kiong Ho
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Major Scientific Interests of the Group
Our primary research interest is to understand the gene expression of eukaryotic parasites with a goal in identifying parasite-specific processes that can be exploited as targets for novel therapeutic interventions. We have focused on how messenger RNA acquire 5' cap in the protozoan parasites that responsible for malaria and sleeping sickness. The structure and mechanism of protozoan capping enzyme is completely different from human host, and thus, capping is an attractive target for anti-protozoal drug discovery. We are also investigating the mechanism of RNA repair and recombination. RNA ligase is the key enzyme that joins the broken RNAs together. We are characterized three separate types of RNA ligases from various species and our immediate goal is to define how these ligases recognize the breaks in the RNA and to identify what types of RNA are repaired in the cell.

Projects for Graduate Students
1) Dissecting the mechanism of hypermethylated cap 4 synthesis in Trypanosome brucei.
2) Characterization of T.bruciee capping enzyme complex with transcription and RNA processing factors.
3) Defining the physiological targets for RNA ligase through genome wide screening.

Study Programs for Short Stay Students
1) Screening of small molecule inhibitor against malaria and sleeping sickness.
2) Biochemical characterization of novel RNA capping activities.
3) Defining the optimal RNA substrates for RNA ligase.

Selected Publications
1) Torchea C, Takagi Y and Ho CK. Archaea RNA Ligase is a Homodimeric Protein that Catalyzes Intramolecular Ligation of Single-Stranded RNA and DNA. *Nucleic Acid Res.* 2006; 36: 6218 - 6227.
Cellular Reprogramming and Biotechnology

Principal Investigator  Ken Nishimura
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Major Scientific Interests of the Group
Our group studies the molecular mechanism of the cell reprogramming to establish an efficient method of the production of well-reprogrammed iPS cells by using our unique gene transfer system (SeVdp vectors). We are also trying to apply these vector to establish safe cell-differentiation systems.

Projects for Regular Students in Doctoral or Master’s Programs
1) Molecular mechanism of iPS cell production by analyzing series of partially reprogrammed cells induced by SeVdp vectors.
2) Establishment of iPS cell production methods with novel factors which improve cell reprogramming.
3) Development of SeVdp vector-based methods to produce differentiated tissues without contaminating undifferentiated cells.

Study Programs for Short Stay Students (one week ~ one trimester)
1) Production of mouse and human iPS cells using SeVdp vectors.
2) Cell biology and molecular biology experiments for analysis of gene expression.

Recent Publications
Cognitive and Behavioral Neuroscience

Principal Investigator  Masayuki Matsumoto
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Other Faculty Members
Assistant Professor Hiroshi Yamada  h-yamada@md.tsukuba.ac.jp

Major Scientific Interests of the Group
The goal of our research is to understand neural mechanisms underlying cognition such as attention, memory, prediction, learning and decision making. In particular, we are investigating the role of monoamine systems, such as dopamine and serotonin, in cognitive functions. Experiments in our laboratory center on the brain of awake behaving monkeys as a model for similar systems in the human brain. Using electrophysiological and pharmacological techniques, we examine what signals monoamine neurons convey while monkeys are performing cognitive tasks and how the signals, released monoamine, work in targeted brain areas to achieve the tasks. These studies will provide more mechanistic accounts of cognitive disorders.

Projects for Graduate Students in Doctoral or Master’s Programs
1) Electrophysiological studies on roles of monoamine systems in cognitive functions
2) Pharmacological studies on roles of monoamine systems in cognitive functions
3) Optogenetical manipulations of monoamine systems in awake monkeys

Training Programs for Short Stay Students (one week – one trimester)
1) Analysis of cognitive performance in monkeys
2) Recording of neuron activity in awake monkeys

Recent Publications
Major Scientific Interests of the Group
1) Exploring genes regulating sleep/wake
2) Real-time visualization and manipulation of neuronal mechanisms controlling sleep/wake
3) Finding new drugs for sleep disorders

Projects for Regular Students in Doctoral or Master’s Programs
1) Large-scale, forward genetic screening of genes responsible for sleep/wake regulation in mutagenized mice
2) Screening for orexin receptor agonists
3) Analysis of sleep and wakefulness in genetically modified mice
4) in vivo real-time imaging of neuronal activities in hypothalamus and other deep brain structures in freely behaving mice

Training Programs for Short Stay Students (one week ~ one trimester)
1) EEG/EMG electrode implantation and recording in mice
2) patch clamp recording in cells and brain slices
3) imaging of nerve cell activities in brain slices

Recent Publications
Functional neuroanatomy

Principal Investigator  Hiromasa Funato
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Major Scientific Interests of the Group
1) Identification of novel genes that regulate sleep/wakefulness behavior using forward genetic approach.
2) Molecular mechanism underlying feeding and body weight homeostasis, anxiety and depressive behavior

Projects for Regular Students in Doctoral or Master’s Programs
1) Functional characterization of novel sleep-regulating genes
2) Combined approaches using viral vectors and gene-modified mice to uncover neural circuits underlying sleep/wakefulness behavior, feeding and body weight homeostasis, and anxiety and depressive behavior

Training Programs for Short Stay Students (one week ~ one trimester)
1) Basic skills for EEG/EMG-based sleep analysis
2) Histological analysis using immunohistochemistry and in situ hybridization
3) Behavioral analysis of viral vector-injected mice.

Recent Publications
Medicinal Chemistry, Organic Chemistry

Principal Investigator  Prof. Hiroshi Nagase, Ph.D.
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Other Faculty Members
Assistant Prof. Naoshi Yamamoto, Ph.D.: yamamoto.naoshi.gt@u.tsukuba.ac.jp
Assistant Prof. Takayuki Ohyoshi, Ph.D.: ohyoshi.takayuki.gb@u.tsukuba.ac.jp
Assistant Prof. Tsuyoshi Saitoh, Ph.D.: tsuyoshi-saitoh.gf@u.tsukuba.ac.jp

Major Scientific Interests of the Group
1) Design and Synthesis of Orexin Agonists
2) Design and Synthesis of Opioid Receptor Agonists and Antagonists
3) Clarification of Mechanism of Drug Resistance and Dependence

Projects for Regular Students in Doctoral or Master’s Programs
1) Study of Medicinal Chemistry  2) Study of Organic Chemistry
3) Research Development of New Drugs

Training Programs for Short Stay Students (one week ~ one trimester)
1) Organic Synthesis of Opioid Compounds  2) Organic Synthesis of Orexin Ligands
3) Purification and Separation Technique  4) Basic Drug Design

Selected Recent Publications


Biochemistry and Molecular Genetics

Principal Investigator Qinghua Liu, Ph.D.
E-mail address qinghua.liu@utsouthwestern.edu
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Other Faculty Member: None

Major Scientific Interests of the Group
1) RNA Interference and MicroRNAs
2) Sleep Research
3) Odor-induced Innate Fear

Projects for Regular Students in Doctoral or Master’s Programs
1) We use genetic screen and biochemical fractionation to identify novel factors (e.g. R2D2, C3PO, and others) and characterize their precise functions in the RNA Interference (RNAi) and MicroRNA pathways.
2) We will understand the molecular circuits of Sleep/Wake control, a fundamental mystery in neuroscience, by integrating mouse genetic screen, quantitative mass spectrometry, and biochemical reconstitution.
3) We are conducting the first genetic screen in mice in search of the “fearless” mutants to understand the molecular circuits of odor-induced innate fear (of predator).

Training Programs for Short Stay Students (one week ~ one trimester)
1) Molecular cloning
2) Fear screen
3) Sleep recording

Recent Publications
Memory, Adult Neurogenesis, and Sleep

Principal Investigator  Masanori Sakaguchi
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URL  http://researchmap.jp/masanorisakaguchi/?lang=english

Major Scientific Interests of the Group

After receiving my medical degree from the University of Tsukuba in 2001, I continued to pursue a research-oriented career in neuroscience, focusing on regenerative medicine, adult neurogenesis and memory in particular. My experience abroad and career thereafter provided me with a firm grasp of world-class techniques (optogenetics, neuronal tracing, behavioral neuroscience, etc.) but furthermore, with an open-mindedness in understanding both Western and Eastern cultures and sufficient communication abilities (fluent English and intermediate-level Chinese) all so vital in scientific research today.

Currently, at IIIS our group strives to investigate the relation between sleep, adult neurogenesis and memory. Our group consist of Dr. Sakaguchi, one technician (English native speaker) and four undergrad students. We hope to clarify the still unanswered questions regarding sleep and its significance towards memory and adult neurogenesis. I welcome motivated and self-driven students and researchers anytime for lab visiting.

Projects for Regular Students in Doctoral or Master’s Programs

1) Function of sleep in memory consolidation
2) Activation of adult born neurons in sleep and its significance in memory
3) Mapping brain regions activated in each sleep stages

Training Programs for Short Stay Students (one week ~ one trimester)

1) Optogenetic stimulation of the target neurons during sleep
2) Behavioral examination of learning & memory using mouse
3) Visualization of memory trace using CAT-FISH analysis

Recent Publications

1) Sakaguchi M and Hayashi Y, Catching the engram: strategies to examine the memory trace. Mol. Brain 2012, 5:32(359 viewed in the first 10days, 6th best viewed during the 1st month)
Major Scientific Interests of the Group
1) Role of adenosine and dopamine in sleep–wake regulation
2) Motivational state as fundamental regulator of sleep and wake
3) Exploring methamphetamine-sensitive circadian oscillation

Projects for Regular Students in Doctoral or Master’s Programs
1) Neuronal mechanisms of dopamine in sleep–wake regulation
2) Characterization of neuronal firing in the nucleus accumbens during sleep–wake states
3) Role of cannabinoid or opioid receptors in the striatum for sleep–wake regulation

Training Programs for Short Stay Students (one week ~ one trimester)
1) EEG/EMG electrode implantation and recording in mice
2) Engineering and production of adeno–associated viruses
3) Opto-/pharmacogenetic modulation of neural circuitry by using stereotaxic microinjections of viral vectors
4) Immunohistochemistry and in situ hybridization of brain tissue

Recent Publications
Name of the Field: Molecular Sleep Biology

Principal Investigator  Yoshihiro Urade, PhD
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URL

Other Faculty Member
Associate Professor Kosuke Aritake, PhD

Major Scientific Interests of the Group
1) Role of prostaglandin D2 in sleep–wake regulation
2) Role of Sox5 in controlling sleep cycle
3) Relationship between sleep and neurodegenerative diseases

Projects for Regular Students in Doctoral or Master’s Programs
1) Involvement of glutamatergic neurons in sleep regulation
2) Relationship between sleep and memory in gene-manipulated animals
3) Screening of new sleep-regulatory natural compounds

Training Programs for Short Stay Students (one week ~ one trimester)
1) Basic and advanced molecular biology and biochemistry experiments
2) Sleep recording and analysis
3) Mouse brain surgery and gene manipulation
4) Screening of new sleep-regulatory natural compounds

Recent Publications
1) Mahesh K Kaushik; Kosuke Aritake; Shinya Kamauchi; Osamu Hayaishi; Zhi-Li Huang; Yoshihiro Urade. Prostaglandin D2 is crucial for seizure suppression and postictal sleep. Exp. Neurol., in Press
6) Qu WM, Xu XH, Yan MM, Wang YQ, Urade Y, Huang ZL. Essential role of dopamine D2 receptor in the maintenance of wakefulness, but not in homeostatic regulation of sleep, in mice. J Neurosci. 30(12):4382-9, 2010
Functional Genomics

Principal Investigator  Prof. Shunsuke Ishii
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Other Faculty Member
Associate Professor Teruaki Nomura: tnomura@rtc.riken.jp

Major Scientific Interests of the Group
Transcriptional control is a key step for development, stress response, and various diseases in human beings. We focus on understanding the molecular mechanisms of transcription control. Our lab has three groups (molecular biology, mouse, and Drosophila), which are using different methods, but focus on the same transcriptional regulators.

Projects for Regular Students in Doctoral or Master’s Programs
1) Role of nuclear oncogene products Myb and Ski in cancer
2) Epigenetic regulation by ATF-2 family transcription factors
3) Mechanism of iPSC generation

Training Programs for Short Stay Students (one week ~ one trimester)
1) Molecular biology experiments for studying transcriptional control
2) Genetic experiments using Drosophila and mice

Recent Publications
Major Scientific Interests of the Group

The objectives of our research group are to develop appropriate medical technologies that are transferable to developing countries, in order to promote their primary health status. The following two subjects are our biggest research targets.

1) Research on controlling emerging and re-emerging infectious diseases of international importance.
2) Research on international medical cooperation.

Projects for Regular Students in Doctoral or Master’s Programs

1) Biology and pathophysiology of re-emerging infectious diseases
   (a) Basic and clinical research on malaria
   (b) Research on the development of malaria vaccine
2) Social technology development for controlling diseases in developing countries
   (a) Researches on global malaria and parasite control strategy
   (b) Evaluation of international health cooperation projects

Training Programs for Short Stay Students (one week ~ one trimester)

1) In vitro culture of *Plasmodium falciparum* and its drug susceptibility assay
2) Discrimination of parasite species by PCR and other methods, including drug resistant DNA marker detection.

Recent Publications

Functional Genomics

Principal Investigator Prof. Ichiro Kurane
E-mail address kurane@nih.go.jp

Major Scientific Interests of the Group
Elucidation of the pathogenesis of dengue fever and dengue hemorrhagic fever.

Projects for Regular Students in Doctoral or Master’s Programs
1) Establishment of animal models of dengue fever.
2) Role of immune responses in the pathogenesis of dengue hemorrhagic fever.

Training Programs for Short Stay Students (one week ~ one trimester)
None

Recent Publications
Major Scientific Interests of the Group
In vitro production of red blood cells (RBCs) able to be used in the clinic. For this purpose, we are attempting to establish immortalized human RBC progenitor cell lines from various cell sources such as hematopoietic stem cells, ES cells and iPS cells. In addition, we are studying the mechanisms of enucleation of RBC progenitor cells so as to improve the efficiency of in vitro enucleation.

Projects for Regular Students in Doctoral or Master’s Programs
1) Cell culture of human ES and iPS cells. Induction of hematopoietic cells from human ES and iPS cells. Establishment of immortalized human hematopoietic cell lines from various cell sources such as hematopoietic stem cells, ES cells and iPS cells.
2) Molecular mechanisms of enucleation of RBC progenitor cells.

Training Programs for Short Stay Students (one week ~ one trimester)
1) Cell culture of mouse ES or iPS cells.
2) Cell analysis by flow cytometer.

Recent Publications
Major Scientific Interests of the Group

In-depth analyses of ubiquitin-, proteasome-, and autophagy-mediated regulatory proteolysis.

Projects for Graduate Students
1) Molecular mechanisms for assembly and diversity in eukaryotic proteasomes.
2) Physiological and Pathological roles of the autophagy system.
3) Control of mitochondrial homeostasis by PINK1/Parkin whose impairment causes Parkinson’s disease.

Study Programs for Short Stay Students (one week ~ one trimester)
1) Enzymatic assays and affinity purification of eukaryotic proteasomes.
2) Ubiquitylation assays directed by Parkin and SCFFBs ubiquitin E3 ligases.
3) Assays for monitoring autophagy based on genetically engineered mice.

Recent Publications