The University of Tokyo
Faculty of Medicine
Graduate School of Medicine

PROSPECTUS
2005—2006
Welcome to
Faculty of Medicine, Graduate School of Medicine
The University of Tokyo

The University of Tokyo Graduate School of Medicine and Faculty of Medicine are dedicated to research and education in medicine, the health sciences, and nursing and purport to train future international leaders in their respective fields. The university has its origin in the smallpox vaccination clinic, which was established at Kanda Otamagaike in May of the 5th year of Ansei (1858) by contributions from 82 Dutch physicians who resided in Edo (the old name for Tokyo) at that time. In the 10th year of the Meiji era (1877), the University of Tokyo Faculty of Medicine, an official university system, was organized from this entity and started on an illustrious course to become the most prestigious medical school in the country. There are about 100 students in the medical school and about 50 in the health sciences and nursing for each academic year. The research department of the graduate school offers a master's degree in medical science, the health sciences and nursing, and international health. It also offers doctoral degrees in medicine, the health sciences and nursing, and international health. The school accepts 150 to 200 graduate students each academic year.

One does not need to prove the importance of medicine, which forms the nucleus of the life sciences and which has achieved dramatic progress in the 21st century; as well as studies such as social medicine, the health sciences, and nursing, in a modern society that is rapidly maturing and aging. Our research department is composed of many outstanding research sections that make active international contributions in diverse fields. Furthermore, new research buildings and hospitals are being constructed to respond to the needs of new education and research environments better.

Incorporating cutting-edge molecular cell biology, molecular genetics, biophysics, structural biology, biomedical engineering, and information science, research is being conducted in our research department on themes such as the organization of our body, the etiology of various diseases, elucidation of physiopathology, new diagnostic methodologies, and the development of therapeutic modalities. Pioneering research results are being introduced in Japan, as well as overseas in the area of social medicine and other disciplines through interactions between patients and society. The university is making significant contributions to society, while it is striving daily to train many pioneering scientists who will be responsible for formulating future medical treatments.
1858 May Practitioners, trained in Dutch (European) medicine in Edo (Tokyo), laid out money to establish the Shutojo (vaccination center) in Kanda Mitamagaike.
Nov. Shutojo was destroyed in a fire that had spread from Kanda Aioicho. Shutojo continued its operations at other sites such as the residence of Ito Genboku.

1859 Sep. Shutojo was reconstructed at Shitaya Izumibashi Dohri.


1861 Oct. Shutojo was renamed as Seiyo Igaku-Sho (Institute of Western Medicine) and offered courses of Western Medicine in the fields of Education, Autopsy, and Vaccination.

1863 Feb. Seiyo Igaku-Sho was renamed as Igaku-Sho (Institute of Medicine).

1868 Jul. Igaku-Sho, affiliated with the Military Hospital which had been moved from Yokohama to Todo residence in Shitaya, was renamed as Daihyoin (the Great Hospital).

1869 Feb. The Daihyoin was renamed as Igakko-Ken-Byoin (Medical School and Hospital).
Dec. Igakko-Ken-Byoin was renamed as Daigaku-Toko (University East Building).

1871 Jul. The Ministry of Education was established and Daigaku-Toko was renamed as Toko (East Building).

1872 Aug. A School System was established. Toko was renamed as Daiichi-Daigaku-Ku-Igakko (The First University District Medical School).

1874 May Daiichi-Daigaku-Ku-Igakko was renamed as Tokyo-Igakko (Tokyo Medical School).
1876 Nov. Tokyo-Igakko was moved to Hongo.

1877 Apr. Tokyo Igakko, affiliated with Tokyo-Kaisei School, was renamed as The University of Tokyo. Tokyo Medical School was renamed as The University of Tokyo Faculty of Medicine.

1886 Mar. The University of Tokyo was renamed as Imperial University, and The University of Tokyo Faculty of Medicine was renamed as the Imperial University Medical College. A Graduate School was established.

1897 Jun. The Imperial University was renamed as Tokyo Imperial University.

1917 Aug. Eiraku Hospital, affiliated with the Ministry of Education Medical Practice License Examination, moved to Tokyo Imperial University and was renamed as Koishikawa Hospital affiliated with Tokyo Imperial University Medical College.

1919 Apr. A faculty system was established renaming Tokyo Imperial University Medical College as the Faculty of Medicine.

1931 Feb. The first building of the Faculty of Medicine was constructed.

1936 Jan. The Brain Research Laboratory was built with funds donated by Mr. Hisasaburo Horikoshi.
Nov. The second building of the Faculty of Medicine (main building) was constructed.

1947 Oct. Tokyo Imperial University was renamed as The University of Tokyo.

1950 Apr. The Institute of Nursing was renamed as The University Nursing School.

1953 Apr. The School of Health Care and Nursing was founded.
Jul. The Graduate School was founded, and the Division of Medical Doctor Biological Science was established. The Brain Research Laboratory became the Brain Research Institute of the Faculty of Medicine.

1956 Apr. The Midwives School was established.

1958 Apr. The Division of Pharmaceutical Sciences became an independent faculty.
May The University of Tokyo Faculty of Medicine celebrated its centennial anniversary.
<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Event</th>
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<tbody>
<tr>
<td>1961</td>
<td>Mar.</td>
<td>The Medical Library was built in commemoration of the centenary.</td>
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<tr>
<td></td>
<td>Apr.</td>
<td>The Institute of Medical Electronics was established.</td>
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<tr>
<td>1965</td>
<td>Apr.</td>
<td>The Research Institute of Logopedics and Pediatrics was established. The School of Health Care and Nursing was reorganized as the School of Health Sciences. The Graduate School of The University of Tokyo was reorganized and the Division of Medical Doctor Biological Science became the Faculty of Medicine. The Health science Course was established in the Medical Science Division.</td>
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<tr>
<td>1966</td>
<td>Sep.</td>
<td>The third building of the Faculty of Medicine was constructed.</td>
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<td>1971</td>
<td>Apr.</td>
<td>The Laboratory of Animal Experiments was established.</td>
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<tr>
<td>1973</td>
<td>Mar.</td>
<td>The Animal Center for Biomedical Research was constructed.</td>
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<tr>
<td>1983</td>
<td>Jan.</td>
<td>An annex of the third building of the Faculty of Medicine was constructed.</td>
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<tr>
<td>1985</td>
<td>Sep.</td>
<td>The office of International Academic Affairs was established.</td>
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<tr>
<td>1987</td>
<td>Apr.</td>
<td>Specialized courses were introduced to the Graduate School of Medicine.</td>
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<tr>
<td>1992</td>
<td>Apr.</td>
<td>The School of Health Sciences became the School of Health Science and Nursing. The School of International Health was established in the Medical Science Division.</td>
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<td></td>
<td>Jul.</td>
<td>The Radiation Research Institute was established.</td>
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<tr>
<td>1995</td>
<td>Apr.</td>
<td>As a result of the shift to the chair system of the Graduate School of Medicine, four divisions, Third Basic Medicine, Social Medicine, Third and Fourth Clinical Medicine, were replaced with Pathology, Immunology and Microbiology, Social Medicine, Reproduction and Development, and Aging Science and Surgery.</td>
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<tr>
<td>1996</td>
<td>Apr.</td>
<td>As a result of the shift to the chair system of the Graduate School of Medicine, three divisions, First Clinical Medicine, Health Science, and International Health, were replaced with Internal Medicine, Health Science and Nursing, and International Health.</td>
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<tr>
<td>1997</td>
<td>Apr.</td>
<td>As a result of the shift to the chair system of the Graduate School of Medicine, three divisions, First and Second Basic Medicine, and Second Clinical Medicine, were replaced with Molecular Cell Biology, Functional Biology, Radiology and Biomedical Engineering, and Neuroscience. As a result of the above-mentioned reorganization, three institutes, the Institute of Brain Research, the Institute of Medical Electronics, and the Institute of Logopedics and Phoniatrics were made redundant.</td>
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<td>1999</td>
<td>Apr.</td>
<td>The Master course of Medical Science was established in the Graduate School of Medicine. This course accepts graduates of all faculties except those from Schools of Medicine, Dentistry, and Veterinary Medicine.</td>
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<tr>
<td>2000</td>
<td>Apr.</td>
<td>The International Research Center for Medical Education was established (A shared facility for education and research)</td>
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<td>2001</td>
<td>Apr.</td>
<td>The University Branch Hospital was united with the University Hospital.</td>
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<td>2003</td>
<td>Apr.</td>
<td>The Center for Disease Biology and Integrative Medicine was established.</td>
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<td>Graduate School of Medicine</td>
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<td><strong>Molecular Cell Biology</strong></td>
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<td>Cell Biology and Anatomy</td>
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<td>• Cell Biology  • Structural Biology  • Structural Cell Biology  • Cellular Neurobiology</td>
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<td>Biochemistry and Molecular Biology</td>
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<td>• Molecular Biology  • Cellular Signaling  • Physiological Chemistry and Metabolism</td>
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<td><strong>Functional Biology</strong></td>
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<td>Physiology</td>
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<td>• Integrative Physiology  • Cellular and Molecular Physiology  • Neurophysiology</td>
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<td>Pharmacology</td>
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<td>• Cellular and Molecular Pharmacology  • Molecular Neurobiology</td>
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<td><strong>Pathology, Immunology and Microbiology</strong></td>
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<td>Pathology</td>
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<td>• Human Pathology and Diagnostic Pathology  • Molecular Pathology  • Surgical Pathology</td>
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<td>Microbiology</td>
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<td>• Microbiology  • Infection Control and Prevention</td>
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<td>Immunology</td>
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<td>• Molecular Immunology  • Clinical Immunology</td>
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<td><strong>Radiology and Biomedical Engineering</strong></td>
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<td>Radiology</td>
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<td>• Diagnostic Radiology  • Radiotherapy  • Nuclear Medicine  • Radiation Oncology / Experimental Radiology</td>
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<td>Biomedical Engineering</td>
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<td>• System Physiology  • Bioimaging and Biomagnetics  • Biosystem Construction and Control  • Biomechanics  • Medical Optics  • Clinical Engineering</td>
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<td><strong>Neuroscience</strong></td>
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<td>Basic Neuroscience</td>
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<td>• Neuropathology  • Neurochemistry  • Neurobiology</td>
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<td>Speech and Cognitive Neurosciences</td>
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<td>• Speech Science  • Cognitive Neuroscience  • Speech Physiology  • Sensory Motor Neuroscience</td>
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<td>Clinical Neuroscience</td>
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<td>• Neuropsychiatry  • Neurology  • Neurosurgery</td>
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<td><strong>Social Medicine</strong></td>
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<tr>
<td>Occupational, Environmental and Preventive Medicine</td>
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<td>• Molecular Preventive Medicine  • Public Health  • Radiological Health</td>
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<td>Forensic Medicine, and Medical Informatics and Economics</td>
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<td>• Forensic Medicine  • Medical Informatics and Economics</td>
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<td><strong>Internal Medicine</strong></td>
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<td>Medicine I</td>
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<td>• Cardiovascular Medicine  • Vascular Biology  • Respiratory Medicine  • Gastroenterology  • Nephrology</td>
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<td>Medicine II</td>
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<td>• Endocrinology  • Nutrition and Metabolism  • Hematology and Oncology  • Allergy and Rheumatology  • Infectious Diseases  • Stress Science and Psychosomatic Medicine</td>
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<td>Clinical Laboratory Medicine and Pathology</td>
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<td>• Clinical Laboratory Medicine  • Diagnostic Pathology  • Transfusion Medicine</td>
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<td><strong>Reproductive, Developmental and Aging Sciences</strong></td>
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<td>Obstetrics and Gynecology</td>
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<td>Pediatric Sciences</td>
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<td>• Pediatrics  • Developmental Pediatrics  • Pediatric Surgery  • Pediatric Oncology</td>
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<td>Aging Sciences</td>
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<td>• Geriatrics  • Aging Research</td>
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<td><strong>Surgical Sciences</strong></td>
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<td>Surgery</td>
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<td>• Thoracic Surgery  • Cardiovascular Surgery  • Gastrointestinal Surgery  • Hepato Biliary Pancreatic Surgery  • Urology  • Artificial Organ and Transplantation Division</td>
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<td>Sensory and Motor System Medicine</td>
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<td>• Dermatology  • Plastic and Reconstructive Surgery  • Oral and maxillofacial Surgery  • Orthopaedic Surgery  • Ophthalmology  • Otorhinolaryngology, and Head &amp; Neck Surgery  • Rehabilitation Medicine</td>
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<td>Vital Care Medicine</td>
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<td>• Anesthesiology  • Emergency and Critical Care Medicine</td>
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<td><strong>Health Sciences and Nursing</strong></td>
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<td>Health Sciences</td>
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<td>• Health Sociology  • Mental Health  • Epidemiology and Preventive Health Sciences  • Biostatistics</td>
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<td>Nursing Sciences</td>
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<tr>
<td>• Advanced Clinical Nursing  • Nursing Administration  • Adult Nursing  • Palliative Care Nursing  • Family Nursing  • Community Health Nursing  • Psychiatric Nursing  • Midwifery and Women’s Health  • Gerontological Nursing</td>
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<td><strong>International Health</strong></td>
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<td>International Social Medicine</td>
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<td>• Health Policy and Planning  • International Community Health</td>
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<tr>
<td>International Biomedical Sciences</td>
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<tr>
<td>• Human Genetics  • Developmental Medical Sciences  • Human Ecology  • Biomedical Chemistry</td>
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<tr>
<td><strong>Center for Disease Biology and Integrative Medicine</strong></td>
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<tr>
<td>• Basic Medical Sciences(1)Molecular Biomedicine for Pathogenesis  • Basic Medical Sciences(2)Biophysics  • Biomedical Materials and Systems  • Clinical Biotechnology  • Environmental Health Sciences  • Animal Research  • Radiation Biology  • Bioinformatics</td>
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</table>
### Endowed Department
- Pharmacoepidemiology
- Integrated Traditional Medicine (Tsumura)
- Corneal Tissue Regeneration (Ameiotech Inc.)
- Clinical Vascular Regeneration (Daiichi Pharmaceutical Co.)
- Bone & Cartilage Regenerative Medicine
- Hematopoietic Regeneration
- Mericon Cartilage of Bone Regeneration
- Clinical Renal Regeneration
- Developmental and Medical Technology (San'kyo) • Metabolome
- Systematic Clinical Oncology • Hospital Logistics by Sagawa Express Co., Ltd.
- Clinical Molecular Epidemiology (Tanabe Selenky Co., Ltd.) • Immunotherapeutics (Medinet)
- Healthcare Related Informatics (NTT DATA CORPORATION) • Total Renal Care Medicine
- Integrated Molecular Science on Metabolic Diseases
- Advanced Clinical Science and Therapeutics • Sato Sports Plaza Co., Ltd Kaetsu Training
- Sleep Disorder Research (Alferza) • Translational Research Based on the Clinical Database
- Joint Disease Research • Health Care Management and Policy
- Computational Diagnostic Radiology and Preventive Medicine

### Research Unit
- Clinical Bioinformatics • Center for Biomedical Ethics and Law
- Nano-Bioengineering Education Program

### COE Program
- Field-Transverse Research on Bio-Signal Transduction Mechanisms
- Center for Integrated Brain Medical Science
- Sundy on Diseases Caused by Environment/Genome Interactions

### Institution
- International Academic Affairs • Medical Library

### Faculty of Medicine
- Cell Biology and Anatomy • Biochemistry and Molecular Biology • Physiology
- Pharmacology • Pathology • Microbiology • Immunology • Radiology
- Biomedical Engineering • Basic Neuroscience • Speech and Cognitive Sciences
- Clinical Neuroscience • Occupational, Environmental and Preventive Medicine
- Medical Principles and Medical Ethics • Forensic Medicine, and Medical Informatics and Economics
- Medicine I • Medicine II • Clinical Laboratory Medicine and Pathology
- Obstetrics and Gynecology • Pediatric Science • Aging Science • Surgery
- Sensory and Motor System Medicine • Vital Care Medicine

### School of Health Sciences and Nursing
- Family Nursing • Community Health Nursing • Fundamental Nursing
- Adult Health and Nursing • Mental Health and Nursing • Health Sociology
- Health Administration • Epidemiology and Biostatistics • Human Ecology
- Biochemistry and Nutrition • Maternal and Child Health

### University Hospital

#### Clinical Division

- **Internal Medicine**
  - General Medicine
  - Cardiovascular Medicine
  - Respiratory Medicine
  - Gastroenterology
  - Nephrology and Endocrinology
  - Metabolic Diseases
  - Hematology and Oncology
  - Allergy and Rheumatology
  - Infectious Diseases
  - Neurology
  - Geriatric Medicine
  - Psychosomatic Medicine

- **Surgery**
  - General Surgery
  - Stomach and Esophageal Surgery
  - Colon and Rectal Surgery
  - Hepato Biliary Pancreatic Surgery
  - Vascular Surgery
  - Breast and Endocrine Surgery
  - Artificial Organ and Transplantation Surgery
  - Cardiovascular Surgery
  - Thoracic Surgery
  - Neurosurgery
  - Anesthesiology and Pain Relief Center
  - Urology and Andrology
  - Gynecologic Surgery

- **Sensory and Motor System Medicine**
  - Dermatology and Photolaser Medicine
  - Ophthalmology and Vision Correction
  - Orthopaedic Surgery and Spinal Surgery
  - Otorhinolaryngology, and Auditory and Voice Surgery
  - Rehabilitation Medicine
  - Plastic, Reconstructive, and Aesthetic Surgery
  - Oral-Maxillofacial Surgery, Dentistry and Orthodontics

- **Pediatrics, Perinatal and Women’s Medicine**
  - Pediatrics
  - Pediatric Surgery
  - Obstetrics and Gynecology

- **Neuropsychiatry**
  - Neuropsychiatry

- **Radiology**
  - Radiology

#### Central Clinical Facilities
- Clinical Laboratory Center • Surgical Center • Radiological Center • Emergency Services
- Transfusion Medicine • Department of Maternal Fetal and Neonatal • Rehabilitation Service
- Medical Engineering Supply Center • Intensive Care Unit • Pathology • Section of Corneal Transplantation
- Department of Cell and Gene Therapy • Department of Endrocytopsis and Endoscopic Surgery
- Department of Hemodialysis and Apheresis • Hospital Computer Center
- Department of Medical Social Service and Welfare • Clinical Research Center
- Infection Control and Prevention • University Hospital Medical Information Network Center
- Organ Transplantation Service • Department of Nutrition • Project Team For Hospital Development
- Department of Clinical and Genetic Informatics • The Clinical Training Center • Department of Paediatric Medicine • Fabic Relations Office
- Department of Clinical Genomics • Cooperative Unit of Medicine and Engineering Research

### Pharmaceutical Department

#### Nursing Department

- Administration Department Office

#### Center
- Health Service Center • The International Research Center for Medical Education and Research

#### Administrative Division
- General Affairs Office • Personnel Office • Research Liaison • Educational Affairs
- Graduate Student Affairs • Buget Office • Purchasing Office • Finance Office
- Facilities Office • Reception Service Medical Library
- Administration Office Medical Library • Information Service Medical Library
**Graduate School of Medicine**

**Molecular Cell Biology**

**Cell Biology and Anatomy***

Department of Cell Biology
- **Professor**: Nobutaka Hirokawa, M.D., Ph.D.
- **Associate Professor**: Yosuke Takei, M.D., Sen Takeda, M.D., Ph.D.

Department of Structural Biology
- **Associate Professor**: Takao Nakata, M.D., Ph.D.

Department of Cellular Neurobiology
- **Professor**: Nobutaka Hirokawa, M.D., Ph.D.

Biochemistry and Molecular Biology

Department of Molecular Biology
- **Professor**: Hirotaka Okayama, M.D., Ph.D.
- **Associate Professor**: Shigeki Jinno, Ph.D.

Department of Cellular Signaling
- **Professor**: Takao Shimizu, M.D., Ph.D.
- **Associate Professor**: Takehiko Yokomizo, M.D., Ph.D.

Department of Physiological Chemistry and Metabolism
- **Professor**: Hisashi Kurihara, M.D., Ph.D.
- **Associate Professor**: Tomochi Asano, M.D., Ph.D.

**Physiology**

Department of Integrative Physiology
- **Professor**: Yasushi Miyashita, Ph.D.

Department of Cellular and Molecular Physiology
- **Professor**: Ken-akuro Mori, Ph.D.

Department of Neurophysiology
- **Professor**: Tomoyuki Takahashi, M.D., Ph.D.

**Pharmacology**

Department of Cellular and Molecular Pharmacology
- **Professor**: Masamitsu Iino, M.D., Ph.D.

Department of Molecular Neurobiology
- **Professor**: Masayoshi Mishina, Ph.D.

**Pathology, Immunology and Microbiology**

Department of Human Pathology/Diagnostic Pathology
- **Professor**: Masashi Fukayama, M.D., Ph.D.

Department of Molecular Pathology
- **Professor**: Kohei Miyazono, M.D., Ph.D.
- **Associate Professor**: Keiji Miyazawa, Ph.D.

**Microbiology**

Department of Microbiology
- **Professor**: Akio Nomoto, Ph.D.
- **Associate Professor**: Tetsuro Matano, M.D., Ph.D.

Department of Infection Control and Prevention
- **Professor**: Kazuhiko Koike, M.D., Ph.D.

**Immunology**

Department of Immunology
- **Professor**: Tadatsugu Taniguchi, Ph.D.

**Radiology**

Department of Diagnostic Radiology
- **Professor**: Kuni Ohtomo, M.D., Ph.D.
- **Associate Professor**: Shigeki Aoki, M.D., Ph.D.

Department of Radiotherapy
- **Associate Professor**: Keiichi Nakagawa, M.D., Ph.D.

Department of Nuclear Medicine
- **Associate Professor**: Toshihito Momose, M.D.

**Biomedical Engineering**

Department of System Physiology
- **Professor**: Joji Ando, M.D., Ph.D.

Department of Bioimaging and Biomagnetics
- **Professor**: Shogo Ueno, Ph.D.

Department of Biosystem Construction & Control
- **Associate Professor**: Yusuke Abe, M.D., Ph.D.

**Neuroscience**

Department of Neuropathology
- **Professor**: Yasuo Ihara, M.D., Ph.D.

Department of Neurochemistry
- **Associate Professor**: Haruhiko Bito, Ph.D.

**Clinical Neuroscience**

Department of Neuropsychiatry
- **Professor**: Nobumasa Kato, M.D.
- **Associate Professor**: Yosuke Naka, M.D.

Department of Neurology
- **Professor**: Shoji Tsuji, M.D., Ph.D.
- **Associate Professor**: Shin Kwak, M.D.

* Introduction to lab included
Sensory and Motor System Medicine

Department of Dermatology*
Professor Kunihiko Tamaki, M.D., Ph.D.
Associate Professor Kanako Kikuchi, M.D., Ph.D.

Department of Plastic and Reconstructive Surgery*
Professor Isao Kashima, M.D., Ph.D.
Associate Professor Hitotaka Asato, M.D.

Department of Oral and Maxillofacial Surgery*
Professor Tsuyoshi Takami, M.D., Ph.D.
Associate Professor Takafumi Susami, D.D.S.
Yoshiyuki Yonehara, M.D., Ph.D.

Department of Orthopaedic Surgery*
Professor Kozo Nakamura, M.D., Ph.D.
Associate Professor Yoshio Takatori, M.D.
Hiroshi Kawaiuchi, M.D.

Department of Ophthalmology*
Professor Makato Araie, M.D., Ph.D.
Associate Professor Goji Tomita, M.D.
Yoshihiro Tamaki, M.D., Ph.D.

Department of Otorhinolaryngology and Head & Neck Surgery*
Professor Kimitaka Koga, M.D., Ph.D. (Otology, Neurotology, Audiology, Medical education)
Associate Professor Tatsuya Yamasoba, M.D. (Otology, Neurotology and Audiology)

Department of Rehabilitation Medicine*
Professor Fumio Eto, M.D., Ph.D.

Vital Care Medicine

Department of Anesthesiology*
Associate Professor Hideko Arita, M.D.
Tomoki Nishiyama, M.D.

Department of Emergency and Critical Care Medicine*
Professor Naoki Yagi, M.D., Ph.D.

Health Sciences

Department of Health Sociology*
Associate Professor Yoshihiko Yamazaki, Ph.D.

Department of Mental Health*
Associate Professor Iwao Oshima, Ph.D.

Department of Epidemiology and Preventive Health Sciences*
Professor Yasuo Ohashi, Ph.D.

Department of Biostatistics*
Associate Professor Yuaka Matsuyama, Ph.D.

Department of Social Gerontology*
Professor Ichiro Kani, M.D., M.P.H.

Department of Health Promotion Sciences*
Professor Akira Akabayashi, M.D., Ph.D.

Department of Biomedical Ethics*
Professor Akira Akabayashi, M.D., Ph.D.

Health Sciences

International Health

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Associate Professor Chushi Kurokawa, M.D., Ph.D.

Department of International Community Health*
Professor Susumu Wakai, M.D., Ph.D.

International Biomedical Sciences

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Professor Katsushi Tokunaga, Ph.D.
Associate Professor Naoyuki Tsuchiya, M.D., Ph.D.

Department of Developmental Medical Sciences*
Professor Hiroshi Ushijima, M.D., Ph.D.
Associate Professor Hideoki Fukunaka, M.D., Ph.D.

Department of Human Ecology*
Professor Chiho Watanabe, Ph.D.
Associate Professor Masahiro Umezaki

Department of Biomedical Chemistry*
Professor Kiyoshi Kita, Ph.D.

Nursing Sciences

Department of Advanced Clinical Nursing*
Professor Katsuya Kanda, R.N., P.H.N., Ph.D.

Department of Nursing Administration*
Professor Katsuya Kanda, R.N., P.H.N., Ph.D.
Endowment Department

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Associate Professor Tetsuro Obabe, M.D., Ph.D.
Department of Corneal Tissue Regeneration (Amniotec Inc.)
Associate Professor Satoru Yamazaki, M.D., Ph.D.
Department of Clinical Vascular Regeneration (Daichi Pharmaceutical Co.)
Associate Professor Hiroyuki Kayama, M.D., Ph.D.
Department of Bone & Cartilage Regenerative Medicine
Associate Professor Chung Ung-il, M.D., Ph.D.
Department of Hematopoietic Regeneration
Associate Professor Seishi Ogawa, M.D., Ph.D.
Department of “Menicon” Cartilage of Bone Regeneration
Associate Professor Kazuta Hashi, M.D., Ph.D.
Department of Clinical Renal Regeneration
Associate Professor Keichi Hishikawa, M.D., Ph.D.
Department of Developmental and Medical Technology (Sankyo)
Professor Hiroshi Suzuki, Ph.D.
Department of Metabolome
Professor Ryo Taguchi, Ph.D.
Department of Systematic Clinical Oncology
Associate Professor Shin Saeki, M.D., Ph.D.
Hospital Logistics by Sagawa Express Co., Ltd.
Professor Hiroshi Kuse
Clinical Molecular Epidemiology (Tanabe Seiyaku Co., Ltd.)
Associate Professor Takanarigotoda, M.D., Ph.D.
Immunotherapeutics (Medinet)
Associate Professor Kazuhiko Kakimi, M.D., Ph.D.
Healthcare Related Informatics (NTT DATA CORPORATION)
Associate Professor Shinya Oka
Division of Total Renal Care Medicine
Associate Professor Shinya Kaniwa, M.D., Ph.D.
Integrated Molecular Science on Metabolic Diseases
Associate Professor Toshimasa Yamashita, M.D., Ph.D.
Department of Advanced Clinical Science and Therapeutics
Associate Professor Koji Kawakami, M.D., Ph.D.
Sato Sports Plaza Co., Ltd Kaatsu Training
Associate Professor Toshiaki Nakaima, M.D., Ph.D.
Department of Sleep Disorder Research (Alfresa)
Associate Professor Takashi Ebisawa, M.D., Ph.D.
Translational Research Based on the Clinical Database
Associate Professor Daisuke Koide, M.D., Ph.D.
Department of Joint Disease Research
Associate Professor Noriko Yashishiruma, M.D., Ph.D.
Health Care Management and Policy
Professor Hideki Hashiyama
Computational Diagnostic Radiology and Preventive Medicine
Associate Professor Naoto Hayashi, M.D., Ph.D.

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Professor Tsutomu Yamasaki, M.D., Ph.D.
Professor Hiroshi Oyama, M.D., Ph.D.
Professor Akhilesh Hashimurne, Ph.D.
Professor Yasushi Kodama, M.D.
Associate Professor Yuzo Onogi, M.D., Ph.D.
Associate Professor Daishi Koide, Ph.D.
Associate Professor Hitoshi Matsu, M.S.
Center for Biomedical Ethics and Law

University Hospital

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Cardiovascular Medicine
Professor Ryozo Nagai, M.D.
Associate Professor Yasunobu Hariya, M.D., Ph.D.
Respiratory Medicine
Professor Takahide Nagase, M.D., Ph.D.
Associate Professor Hajime Takizawa, M.D.
Gastroenterology
Professor Masao Omata, M.D., Ph.D.
Nephrology and Endocrinology
Professor Tomoki Okazaki, M.D., Ph.D.
Metabolic Diseases
Professor Takashi Kadowaki, M.D.
Hematology and Oncology
Allergy and Rheumatology
Professor Kazuhiko Yamamoto, M.D., Ph.D.
Infectious Diseases
Professor Kazuhiko Kike, M.D., Ph.D.
Neurology
Professor Shoji Tsuij, M.D.
Associate Professor Shin Kwak, M.D.
Geriatric Medicine
Professor Masahiro Akishita, M.D., Ph.D.
Psychiatric Medicine
Professor Akira Akabayashi, M.D.
Associate Professor Hiroaki Kumano, M.D.

Clinical Division (Department of Surgery)
General Surgery
Professor Masatoshi Makuuchi, M.D.
Stomach and Esophagus Surgery
Professor Michio Kaminishi, M.D.
Colon and Rectal Surgery
Professor Hirokazu Nagawa, M.D., Ph.D.
Associate Professor Toshiaki Watanabe, M.D., Ph.D.
Hepatobiliary Pancreatic Surgery
Professor Masatoshi Makuuchi, M.D.
Associate Professor Norihiro Kokudo, M.D.
Vascular Surgery
Professor Hirokazu Nagawa, M.D., Ph.D.
Associate Professor Tetsuro Myata, M.D., Ph.D.

Field-Transverse Research on Bio-Signal Transduction Mechanisms
Center for Integrated Brain Medical Science
Associate Professor Hiroshi Kawasaki
Sutudy on Diseases Caused by Environment/Genome Interactions
Associate Professor Makoto Miyagishi
Associate Professor Kojiro Ueki

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Medical Library
Head Yasuyoshi Ouchi, M.D.
Faculty of Medicine
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Professor Michio Kaminishi, M.D.
Artificial Organ and Transplantation Surgery
Professor Masatoshi Makuuchi, M.D.
Associate Professor Yasuhiro Sugawara, M.D.
Cardiovascular Surgery
Professor Shinichi Takamoto, M.D.
Associate Professor Arata Murakami, M.D., Ph.D.
Thoracic Surgery
Professor Shinichi Takamoto, M.D.
Associate Professor Jun Nakajima
Neurosurgery
Professor Takaaki Kirino, M.D., Ph.D.
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Tomoki Nishiyama, M.D.
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Professor Tadakichi Kitamura, M.D.
Associate Professor Takumi Takeuchi, M.D., Ph.D.
Satoru Takahashi, M.D.
Gynecologic Surgery
Professor Osamu Tsutsuji, M.D.
Associate Professor Tetsu Yano
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Dermatology and Photolaser Medicine
Professor Kunihiko Tamaki, M.D., Ph.D.
Associate Professor Kanako Kikuchi, M.D., Ph.D.
Ophtalmology and Vision Collection
Professor Makoto Araie, M.D.
Associate Professor Goji Tomita, M.D., Ph.D.
Orthopaedic Surgery and Spinal Surgery
Professor Kazuo Nakamura, M.D.
Associate Professor Yoshihito Kawanaguchi, M.D.
Otorhinolaryngology, and Auditory and Voice Surgery
Professor Kimikata Kaga, M.D.
Associate Professor Tatsuya Yamashita, M.D.
Rehabilitation Medicine
Professor Fumio Eto, M.D.
Plastic, Reconstructive and Aesthetic Surgery
Professor Isao Kashima, M.D., Ph.D.
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Pediatric Surgery
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Obstetrics and Gynecology
Professor Yuji Taketani
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Professor Naoki Yahagi
Department of Transfusion Medicine and Immunohematology
Professor Koki Takahashi, M.D. (Transfusion Medicine)
Department of Maternal Fetal and Neonatal Professor Yuki Takekami, M.D., Ph.D.
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Professor Fumio Eto, M.D.
Department of Medical Engineering (tentative name)
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Department of Intensive Pathology
Professor Masashi Fukuyama, M.D., Ph.D.
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Professor Takahiro Kuchik, M.D., Ph.D.
Department of Cell Therapy and Transplantation Medicine
Associate Professor Shigeru Chiba, M.D., Ph.D.
Department of Infection Control and Prevention
Professor Kazuhiko Koike, M.D., Ph.D.
Department of Endoscopy and Endoscopic Surgery
Associate Professor Takaaki Kawanaguchi, M.D.
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Professor Masao Omata, M.D., Ph.D.
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Department of Medical Social Service and Welfare
Professor Yosiyoshi Ochi, M.D.
Department of Planning, Information and Management
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Graduate School of Medicine
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Graduate School of Medicine
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Cells transport various kinds of proteins, lipids and mRNAs after synthesis to their specific destinations such as several types of membranous organelles, protein complexes and the mRNA complex. Thus, intracellular transport is fundamental to cellular functions, survival and morphogenesis. Our laboratory is studying the mechanisms of intracellular transport and cellular morphogenesis, especially focusing on molecular motors. Kinesin superfamily proteins (KIFs) and microtubule associated proteins (MAPs) using molecular cell biology, biophysics, structural biology, and molecular genetics.

- Molecular cell biological study of KIFs
- Studies of the mechanism for recognition of and binding to cargoes by KIFs and the regulation of this mechanism
- Studies of the mechanisms of differential directional transports and sorting
- Studies of the dynamics and mechanism of motility of KIFs using molecular biophysics and structural biology
- Molecular genetics of KIFs
- Studies of KIFs and related diseases
- Molecular cell biology and molecular genetics of MAPs

Quick freeze-deep etch electron micrograph of a mouse nerve axon showing a microtubule (25 nm diameter, linear tube-like structure) and a cross-bridge linking the microtubule and a membranous organelle. Microtubules are a major component of the cytoskeleton and serve as a type of rail along which motor proteins transport organelles inside cells. (Reproduced from the cover of Science vol. 279, Jan 23 1998.)
With the goal of understanding the molecular mechanisms controlling growth and differentiation, we have been studying the cell cycle with cultured mammalian cells and fission yeast as model systems.

- Understanding the molecular mechanism enabling the anchor-age-independent S phase onset that is the key for malignant transformation
- Understanding the G1 and G2 cell cycle checkpoint controls
- Understanding the molecular switch between growth and differentiation

Cellular Signaling

Our laboratory specializes in biochemistry, molecular and cellular biology, and genetic engineering to elucidate the roles of lipid mediators in vivo. In collaboration with the Department of Metabolome, we analyze stimulus induced dynamic changes in the lipid composition of the cellular membrane.

- Discovery and structural determination of novel lipid mediators
- Cloning, functional characterization and K/O studies of receptors for lipid mediators
- Cloning, functional characterization and K/O studies of enzymes involved in the metabolism of lipid mediators
- Functional regulation of GPCR
- Roles of lipid mediators in the central nervous and immunological systems

Physiological Chemistry and Metabolism

Developmental and regenerative medicine group is investigating the molecular mechanisms of embryogenesis and is establishing a unique basis for regenerative medicine; metabolic regulation group is studying the signaling mechanisms regulating metabolism and cell growth to develop new therapy for metabolic syndrome.

- Developmental biology and regenerative medicine
  - Neural crest development and formation of the branchial arch and cardiovascular system
  - Reprogramming in early embryogenesis
  - Organogenesis and regeneration of vessels, inner ear and lung
  - Establishment and analysis of disease model mice
  - Establishment of therapeutic cloning models in mice
- Metabolism regulation and pathophysiology
  - Analysis of protein complexes in intracellular signaling and transcription
  - Proteomics and localization analysis of proteins constituting intracellular organelles
  - Analysis of a novel Akt-binding protein, APE
  - Molecular mechanisms of insulin-resistance in metabolic syndrome
Our laboratory specializes in the neuroscience research on cognitive functions in the primate. We investigate interactions among many neurons in the cerebral cortex, which create human cognitive abilities such as memory and its cognitive control. These studies have been done through integrative efforts using electrophysiological, molecular biological and neuroimaging approaches.

- Functions of memory neurons in the temporal cortex
- Roles of the top-down signal from the prefrontal cortex
- Functional differentiations of the prefrontal cortex in memory
- Molecular biological basis of declarative memory in the primate
- Development of high-field MRI for humans and monkeys

We aim at a better understanding of neuronal mechanisms involved in sensory perception of the external world and for the emotional state induced in the brain by sensory inputs. We are currently analyzing the central nervous system for olfaction, a sensory modality that has a strong influence on human emotion. Another major focus is to understand cellular and molecular mechanisms for contact-mediated interactions between neurons and immune cells that occur in pathological and physiological conditions.

- Functional analysis of the neuronal circuit in the central olfactory nervous system (Analysis of odor maps in the brain)
- Neurogenesis and neuron-elimination in the adult brain
- Molecular and cellular mechanisms for the axonal recognition of specific target neurons and for the formation of specific neuronal circuits
- Cellular and molecular mechanisms for the contact-mediated interactions between neurons and immune cells in physiological and pathological conditions
Spatiotemporal distribution of signalling molecules is extremely important in defining cell signals. We are developing indicators of important signalling molecules and visualize their spatiotemporal distribution within intact cells. Using such novel imaging methods we aim at elucidation of the physiological roles of calcium signalling and related signalling mechanisms in various types of cells including neurons of the central nervous system.

- Development of genetically coded indicators of important cell signals
- Molecular approaches to the study of IP3 receptor-mediated Ca2+ signalling
- Elucidation of the relationship between Ca2+ signalling and cell functions
- Visualization and analysis of molecular events at synapses

We have been investigating the molecular basis of higher brain functions by focusing on the glutamate receptor and memory. Previous studies have led to the hypothesis that there is a common principle between memory signaling and synapse formation. The combination of conditional gene targeting in mice and molecular genetics in zebra fish will facilitate our understanding of the mechanism of higher brain function at the molecular, cellular and neural network levels.

- Regulation of brain functions by glutamate receptors in specific brain regions
  - Identification of neural networks for learning and memory
  - Regulation of learning and memory
  - Roles of glutamate receptors in decision-making
- Signaling from glutamate receptors to memory
- Molecular mechanisms of synapse formation and remodeling
  - Molecular mechanism of synapse formation during development
  - Molecular mechanism of synapse remodeling in the adult brain
We investigate the pathogenesis and pathobiology of disease, especially the neoplasmic diseases, using morphological techniques. Our goal is to discover new entities and to clarify unknown pathogenesis of diseases through the interaction with clinical medicine.

- Chronic inflammation and neoplasm
  - Epstein-Barr virus associated gastric carcinoma
  - Pyothorax associated lymphoma
  - Molecular epidemiology of human herpes virus
  - Lung adenocarcinoma and scar formation
  - Lung fibrosis and adenocarcinoma
- Application of molecular pathology to diagnostic pathology
  - Classification of lung cancer using DNA chip
  - Grading of malignancy
  - Acceleration of pathological diagnosis

Our research is focused on the molecular mechanisms of carcinogenesis. We study the signaling mechanisms of the TGF-β superfamily, including TGF-β and bone morphogenetic proteins (BMPs), and elucidate how they regulate progression of cancers. We also investigate the mechanisms of differentiation of murine embryonic stem cells (ESCs) into various cells, including vascular endothelial cells. Based on these findings, we will develop new strategies for the treatment of vascular diseases and cancer.

- Negative regulation of TGF-β signaling by inhibitory Smads and oncoprotein c-Ski
- Molecular mechanisms of growth regulation by TGF-β
- Differentiation of mesenchymal cells by BMPs
- Differentiation of mouse ESCs into vascular cells
- Roles of TGF-β in epithelial-to-mesenchymal transition
- Roles of TGF-β superfamily cytokines in vascular diseases
**Microbiology**

Our major objective is elucidation of the molecular mechanisms for replication and pathogenesis of RNA viruses, such as poliovirus, hepatitis C virus, and human immunodeficiency virus. Based on the outcome, we will develop new strategies against those viral diseases.

- Roles of the human poliovirus receptor in poliovirus infection
- Molecular mechanisms for the dissemination pathways of poliovirus
- Molecular mechanisms for the replication of poliovirus in neurons
- Molecular mechanisms for the development of hepatocellular carcinoma following hepatitis C virus infection
- Replication mechanisms of the hepatitis C virus RNA replicon
- IRES (internal ribosome entry site) activity-dependent virus tropism
- Development of AIDS vaccine
- Virus-specific immune response

**Infection Control and Prevention**

We are engaged in education of medical staff as well as in daily clinical activities on the prevention of healthcare-associated infection (HAI). Research activities on the pathogenesis of infection with hepatitis viruses and HIV, in particular, on the mechanism of hepatocarcinogenesis in HCV infection are also our mission.

- Development of preemptive strategies for the control of healthcare-associated infection
- Development of new methods in infection control and treatment of viral hepatitis
- Molecular pathogenesis of hepatocellular carcinoma in HCV infection
- Pathogenesis of progression of HIV infection
- Molecular pathogenesis of the mitochondrial disturbances in viral infections
- Molecular pathogenesis of hepatitis B viral infection
- Host defences to microorganisms
- Molecular analysis of innate immunity in microorganism infection
- New detection method and pathogenesis of opportunistic cytomegaloviral infection
- Mechanism of multi-drug resistant microorganisms

**Immunology**

Since the original identification of two cytokine genes, interferon-β and interleukin-2, our laboratory has been continuing to elucidate the regulatory mechanisms of signal transduction and transcription in these and other cytokine systems in the context of immunity and oncogenesis. More recently, we have also initiated a project on spatiotemporal regulation in lymphocytes and antigen-presenting cells in the context of cytokine signaling cross talk.

- The mechanisms of signaling and transcription networks operating in the IFN-α/β system in innate immune responses
- The function and regulation of the transcription factor family, i.e., the interferon regulatory factors (IRFs), in innate and adaptive immune responses, such as Th1/Th2 differentiation mechanism, natural killer (NK) cell differentiation
- The mechanisms of regulation of antigen-presenting cells (APCs), typically dendrite cells (DCs), by IFN-α/β and other cytokines and toll-like receptors (TLRs)
- The regulation of oncogenesis by IFN-α/β and the tumor suppressor p53, particularly their mutual cooperation and function on target genes (Noxa etc.)
- Regulation of hematopoiesis and autoimmunity by IFNs and IRFs
- Spatiotemporal regulation of the TLR and cytokine signaling in lymphocytes and antigen-presenting cells.
Radiology

http://www.ut-radiology.umin.jp/

We have been performing a variety of clinically oriented research programs in biomedical imaging, voxel-based or ROI-based analysis, information analysis and radiotherapy, such as computer-assisted diagnosis (CAD), PET-based diagnosis, and intensity modulated radiotherapy (IMRT).

- Diagnostic Radiology
  - Multi-row detector (up to 16 rows) helical computed tomography
  - MR imaging, MR digital subtraction angiography, perfusion imaging, and diffusion tensor imaging/tractography
- Radiation Oncology
  - Physical engineering aspect of radiotherapy
  - Gamma knife radiosurgery and IMRT
  - Clinical and biological studies for reduction of radiation-induced damage
- Nuclear Medicine
  - Functional imaging by radioisotope-labeled tracer technology
  - Evaluation of blood flow and metabolism by emission tomography (PET and SPECT)

System Physiology

http://bme-sysphysiol.m.u-tokyo.ac.jp/

A variety of living cells respond to mechanical forces occurring both inside and outside a body. We have been pursuing biomechanical research focusing on the effects of shear stress generated by flowing blood on vascular cells and circulatory functions. Our analyses range all the way from genes to whole organs and systems. Research on the molecular mechanism of atherogenesis and biomechanical tissue engineering is also ongoing.

- Vascular cell responses to shear stress
- Identification of flow-sensing molecules
- Mechanical stress responsive genes
- Tissue engineering using mechanical stresses
- Atherosclerosis research from the aspect of hemodynamics
- Vascular system physiology
- Microcirculation study using optical imaging
Bioimaging and Biomagnetics

Our department specializes in biomagnetic research, which includes the measurement of biomagnetic fields, magnetic stimulation of the brain, and the effects of magnetic fields on biological systems. We develop, integrate and apply new ideas through innovative interdisciplinary research approaches for the development of noninvasive medical applications using electromagnetic fields.

- Studies into brain function dynamics using transcranial magnetic stimulation (TMS) and current distribution imaging of magnetic resonance imaging (MRI)
- Application of repetitive TMS for the treatment of central nervous system diseases and mental illnesses
- Studies of higher brain functions using MEG and EEG
- Imaging of electrical information based on MRI
- Effects of electromagnetic fields on biological systems
- Magnetic orientation and reorganization of biological materials
- Biomagnetic cell and tissue engineering

Biosystem Construction and Control

Our research fields include medical engineering technologies represented by artificial organs. Especially the research of artificial heart has gotten excellent results such as the world longest survival record in animal replaced with a total artificial heart. We are performing the researches from the basic to the application.

- Implantable total artificial heart
- Implantable ventricular assist device
- Polymer artificial valve
- Next generation artificial lung
- Tissue engineered artificial organs
- Blood compatible material
- Blood trauma 3D real-time measurement
- Implantable microcirculation observation probe
- Neural interface
- Laser surgery and medicine
Neuroscience

To elucidate the molecular mechanisms underlying neurodegeneration and neuronal death observed in Alzheimer’s disease (AD) brains, we have been undertaking studies on production, degradation, and deposition of amyloid β protein (Aβ) and tau, and analyses of animal models.

- Molecular mechanisms of Aβ production through γ-cleavage
- Effect of membrane lipids on Aβ production and deposition
- Intracellular trafficking of APP and Aβ
- Regulation of Aβ production
- Protein chemical analysis of Aβ accumulated in AD brains
- Degradation of tau under physiological conditions
- Protein chemical analysis of tau deposited in AD brains
- Morphological and biochemical analyses of mutant tau transgenic mice
- Expression of mutant tau and neurodegeneration in Caenorhabditis elegans

Neuropathology

http://www.neupath.m.u-tokyo.ac.jp/

To elucidate the molecular mechanisms underlying neurodegeneration and neuronal death observed in Alzheimer’s disease (AD) brains, we have been undertaking studies on production, degradation, and deposition of amyloid β protein (Aβ) and tau, and analyses of animal models.

Neurochemistry

http://www.neurochem.m.u-tokyo.ac.jp/Homepage.html

Our brain is able to recognize and memorize external and internal events as they occur. A functional neural network further stands out by its capacity to extract patterns and rules, and to associate them with abstract meaning and affective valence. What are the local and global spectra of the molecular signaling events in neurons that underlie such complex information processing at the systems level? Are these events, in turn, converted into more profound modifications of the synaptic wiring mechanisms? To address these issues, we are currently investigating the chemistry and physiology of various neuronal protein complexes near and at synapses.

- Molecular investigation (including identification, characterization and real-time visualization) of signaling molecules involved in calcium-dependent synaptic modification, especially during signaling from synapse-to-nucleus, and back from nucleus-to-synapses.
- Understanding molecular mechanisms controlling cytoskeletal dynamics and remodeling on both sides of the synapses, in the dendritic spines and in axon terminals.

Real-time measurement of biochemical events triggered by glutamate uncaging at hippocampal spines (A); Visualization of actin cytoskeleton in cerebellar Purkinje cell dendrites (B).
Cognitive Neuroscience

The laboratory aims to investigate the neural mechanisms of language, cognition, and memory, and we have been working in the field of brain and cognition.

- Research on brain damaged patients: callosal syndrome, right temporal lobe syndrome, macular sparing, aphasia therapy
- Functional magnetic resonance imaging (fMRI) during the cognitive process: mental writing, writing, face recognition, reading comprehension, naming, reading aloud
- fMRI study on speech dominance in split-brain patients
- Magnetoencephalography (MEG) study of cognitive function: visual evoked magnetic fields, motor imagery
- Brain mechanism of Japanese kanji processing

Speech Physiology

Aphasia, apraxia, agnosia, memory disturbance, and dementia cause devastating impairments in daily activities. The goal of our study is to promote the cognitive rehabilitation. To do so, we are investigating the mechanism of those disorders. We also are studying the brain mechanisms of speech using functional magnetic resonance imaging. We focus on the activities of the left inferior frontal gyrus. Another theme of our laboratory is to explore the neural mechanism of visual word recognition and auditory speech perception by the combined use of priming method and functional magnetic resonance imaging/transcranial magnetic stimulation/magnetoencephalogram in normal humans.

- Research on brain damaged patients:
  - Aphasia • agnosia • apraxia • memory disturbance • dementia
- Functional magnetic resonance study of brain mechanism of speech production
- Brain mechanism of word recognition: functional architecture and plasticity

Neuropsychiatry

Our department has provided a leading role in biological psychiatry of stress-related disorders and schizophrenia. Recently, we have promoted cutting-edge biological studies of pervasive developmental disorders.

- Genetic, molecular, and neuroimaging studies of pervasive developmental disorders
- Molecular biology of epilepsy and stress-related disorders
- Genetic studies in schizophrenia, autism, and anxiety disorders
- Multimodal neuroimaging studies of schizophrenia, PTSD, and autism
- Clinical psychopharmacology
- Molecular studies in sleep-related disorders
- Clinical studies on dementia and schizophrenia

http://www.h.u-tokyo.ac.jp/patient/depts.html

Multi-modality neuroimaging in neuropsychiatry using a combination of high-resolution MRI, EEG, MEG, fNIRS, and PET.
Neurology

http://square.umin.ac.jp/neurotky/

Our Department is promoting research programs to elucidate the pathophysiological mechanisms of neurological diseases including neurodegenerative diseases, immune-mediated diseases and neuromuscular diseases, and to establish therapeutic approaches for these diseases. We are also providing excellent programs to train neurologists.

- Molecular Genetics (identification of disease genes and development of therapeutic approaches)
- Molecular pathophysiology of neurological diseases (RNA editing, and protein structures)
- Immune-mediated diseases (autoantibodies)
- Neuropsychology and cognitive neuroscience (magnetic stimulation, NIRS, MEG, PET, and fMRI)
- Neuropathology of neuromuscular diseases (pathological studies on biopsy and autopsy materials)
- Multicenter-based clinical research
- Development of new therapeutics

Neurosurgery

http://www.h.u-tokyo.ac.jp/neurosurg/

The 21st century has been designated as "The Century of the Brain". To lead Japanese Surgical Neuroscience, we have devoted our activities to the following: advanced Clinical Neurosurgery, Neuroscience Research and Graduate and Postgraduate education.

- Advanced Clinical Neurosurgery
  - Skull base surgery in managing benign or malignant skull base tumors and cerebrovascular disorders
  - Advancement of less invasive surgical techniques to maintain the quality of life (QOL) of patients: application of endoscopy and γ-knife radiosurgery
  - Development of new therapeutic strategies for malignant glioma
  - Functional neurosurgery including epilepsy surgery

- Neuroscience Research
  - Application of stem cells in regenerating damaged neuronal networks
  - Treatment of brain tumors using conditionally replicating virus vectors and nano drug delivery systems
  - Tailor-made therapy of malignant brain tumors using genetic analyses
Chemokines play critical roles in the pathogenesis of diseases including acute inflammation, autoimmune diseases, allergic diseases, HIV infection, atherosclerosis and tumor metastasis through the regulation of chemotaxis, activation and differentiation. We hope chemokine research will contribute to Molecular Preventive Medicine.

- Pathogenesis of diseases by chemokine
  - Autoimmune diseases, liver injury, GVHD
  - Atopic dermatitis, bronchial asthma
- Activation of the chemokine receptor and its signal transduction
- Serial analysis of gene expression (SAGE) for hematopoietic cells
- Development of vaccinations to cancers and infectious diseases

Public health is the science and art of preventing disease, prolonging life, promoting health, and quality of life (QOL) through organized community effort. Through studies in various fields and laboratories, our department aims to advance research, support policy development, and promote education toward these ends.

- Efficiency and equity issues of health services
- Health manpower policy
- Occupational and environmental health
- Policy analysis on health and environmental issues
- Clinical epidemiology (QOL, outcome studies, economic evaluation)
Forensic Medicine

Our practice is to determine the cause of unusual death by autopsy and examinations. For the progress of the practice, we are pursuing molecular pathological studies on sudden cardiac death and sociomedical studies on the death investigation system and risk management.

- Ischemic death of cardiomyocyte
- Toxic or protective role of carbon monoxide
- Oxidative stress and lipid peroxidation in pathogenesis
- Law and system of death investigation and medical risk management
- Analytical toxicology

Medical Informatics and Economics

The department continually develops and manages the entire clinical and administrative information system of the University of Tokyo Hospital such as hospital management works. The research and postgraduate education programs cover basic medical informatics, advance applications of information technology to clinical medicine, technology assessment and standardization of healthcare information.

- Development of the new architecture of our hospital information system is based on distributed computing technology
- Development of intelligent computer-based medical record systems
- Standardization of medical terminology and communication protocol for electronic exchange of healthcare information
- Patient-centered medical information systems
- Development and management of a clinical data collection system using the University Hospital Medical Information Network (UMIN)
Internal Medicine

Cardiovascular Medicine

We are investigating the pathogenesis, pathophysiology, diagnostic methods, and novel therapeutic measures of various cardiovascular diseases (ischemic heart disease, heart failure, cardiomyopathy, arrhythmias, atherosclerosis, hypertension, etc.) using a variety of research tools (from molecular biology to epidemiology, bioinformatics).

- Transcriptional regulation of various genes in cardiovascular development and pathogenesis
- Cardiac hypertrophy and heart failure: analyses of pathogenic mechanisms and developments of novel therapies (gene therapy, etc.)
- Immunological basis of cardiovascular diseases
- Imaging techniques (echocardiography, MRI, RI, NOGA) in cardiovascular diseases
- Mechanisms of anti-arrhythmia therapy
- Molecular mechanisms of ischemia-reperfusion injury
- Genetic polymorphisms and risk factors in cardiovascular disease
- Differentiation of smooth muscle cells (atherosclerosis and restenosis after vascular interventions)
- Mouse genetic models of cardiovascular diseases and vascular development
- Neurohumoral factors in cardiovascular diseases

Respiratory Medicine

Based on the fact that a number of patients with respiratory diseases including lung cancer and COPD is tremendously increasing, fruitful results of respiratory research are more and more expected in the 21st century. In this era, we are conducting basic and clinical researches for wide variety of respiratory disorders including lung cancer, asthma and COPD. Especially, we have been intensively studying the molecular mechanisms underlying the pathogenesis of lung disorders. Our research goal is to develop novel therapeutic tools to manage these pulmonary diseases.

- Clinical studies of lung cancer, COPD, bronchial asthma and pulmonary fibrosis
- Epidemiological studies of diffuse panbronchiolitis (DPB) and interstitial lung disease
- Molecular mechanisms underlying the pathogenesis of acute lung injury or ARDS
- Molecular mechanisms underlying the pathogenesis of pulmonary fibrosis (as shown in Figure)
- Analysis of disease models using genetically-engineered mice
- Effects of air pollutants such as diesel exhausts on airway hyperresponsiveness
- Roles of chemokines/cytokines and eicosanoids on airway epithelial cells, smooth muscle cells and eosinophils
- DNA methylation and lung cancer
- Establishment of conditional vectors for hairpin siRNA knockdowns
- Establishment of CpG island searcher
Nephrology & Endocrinology

We are investigating the pathophysiology of renal and endocrine disorders for the development of innovative diagnostic and therapeutic tools. Hypertension is our special interest because not only is it a serious medical problem which impairs many vital organs and the QOL of our patients, but also we have the great advantage of organizing the strategic research approach since hypertension is closely related with both nephrology and endocrinology.

- Renal physiology and morphology
- Pathophysiology of immune-mediated renal injury
- Analysis of pathophysiology and prognostic factors of chronic renal failure
- Endothelial injury and vascular biology in kidney disease
- Role of nitric oxide and oxidative stress in renal disease and hypertension
- Clinical and basic investigation of bone and mineral disorders
- Mechanism of action of nuclear hormone receptors
- Pathophysiology of hypertension and roles of adrenomedullin
- G protein signaling in health and disease

Gastroenterology

Our Department of Gastroenterology is one of the top institutions in the world in the treatment of hepatocellular carcinoma by unique ablation(RFA) and gastrointestinal/pancreatobiliary cancer/stone by endoscopic manipulation(ESD&ERCP). The goal of our department is to accurately diagnose and give the best available treatment to these patients, and to this end, we are performing a wide variety of basic as well as clinical research.

- Development of better therapeutic strategy for hepatitis B and C
- Elucidation of liver injury mechanisms in viral hepatitis
- Prevention of and development of a better therapeutic modality for hepatocellular carcinoma
- Elucidation of gastric injury mechanisms by Helicobacter pylori
- Clarification of colon disease, especially right-sided colon carcinogenesis
- Development of an earlier diagnostic strategy for pancreatic cancer: search for its high-risk group by using SNP (single nucleotide polymorphism) analysis
- Development of a better endoscopic therapeutic modality for pancreatobiliary cancer/stone
- Development of an endoscopic en bloc resection method for early gastric cancer
- Elucidation of the mechanisms of and development of a therapeutic strategy for hepatic fibrosis
- Clarification of mechanisms of liver regeneration

Nutrition and Metabolism

We are investigating to reveal the molecular mechanisms underlying the development of metabolic diseases (diabetes mellitus, lipid metabolic disorders, obesity, metabolic syndrome and atherosclerosis) using interdisciplinary approaches and state-of-the-art technology including genetically engineered model animals, DNA chip, RNA technology, human genetics, clinical epidemiology and bioinformatics. Our major goal is to develop mechanism-based fundamental treatment and prevention strategies for the metabolic diseases.

- Molecular mechanism of insulin resistance linked to obesity focusing on adipokines
- Transcriptional regulation of insulin resistance and obesity by nuclear receptors and cofactors
- Molecular mechanism of insulin signal transduction
- Molecular mechanism of insulin secretory defect in type 2 diabetes
- Genetic susceptibility and risk factors of type 2 diabetes
- Development of accurate diagnostic algorithm for type 2 diabetes
- Molecular mechanism of adipogenesis and obesity
- Transcriptional regulation of lipid metabolism
- Molecular mechanism of atherosclerosis
- Mouse genetic models of diabetes, lipid metabolism disorder and atherosclerosis
**Allergy and Rheumatology**

We are investigating the pathogenesis, diagnostic methods, and novel therapeutics of hematological disorders by making comprehensive use of research technologies in molecular biology, developmental biology, and immunology. We are also performing basic and clinical studies based on genomics, regenerative medicine, and transplantation medicine, which aim at application to therapeutic strategies.

- Clonal analyses of T cell receptor (TCR), in vitro reconstitution of the TCR function using such information and antigen specific immunotherapy
- Mechanisms of oral tolerance and application to therapeutic strategies
- Mechanism of immunological tolerance to autoantigens and immunoregulation
- Development and induction of regulatory T cells and their applications
- Intracellular signaling in immune disorders
- Genomic analyses of rheumatic diseases
- Development of molecular targeting immunosuppressive reagents
- Airway hypersensitivity and remodeling of bronchial asthma
- Mechanisms of IgE mediated allergic disorders and applications for therapies
- Involvement of chemokines in allergic diseases and applications to therapeutic strategies

**Hematology and Oncology**

We are investigating the pathogenesis, diagnostic methods, and novel therapeutics of hematological disorders by making comprehensive use of research technologies in molecular biology, developmental biology, and immunology. We are also performing basic and clinical studies based on genomics, regenerative medicine, and transplantation medicine, which aim at application to therapeutic strategies.

- Self renewal and differentiation of hematopoietic stem cells
- Establishment of ex vivo expansion of hematopoietic cells
- Genome-wide analyses of hematological malignancies
- Identification of molecular pathogenesis of leukemia
- Analyses of the immune system by developmental biology
- Establishment of antigen-specific immunological therapeutics against cancer
- Development of therapeutic strategies for GVHD by engineered immune cells

**Infectious Diseases**

We are investigating both clinical and basic aspects in infectious diseases, in particular, on HIV infection and hepatitis viral infections, the latter of which is the major cause of liver disease worldwide. Our research topics cover the wide areas in microbiology, immunology and pathobiology of infectious diseases, including HIV and HCV infections.

- Clinical studies of HIV infection
- Development of new methods in infection control and treatment of viral hepatitis
- Molecular pathogenesis of hepatocellular carcinoma in HCV infection
- Pathogenesis of extrahepatic manifestations and its control in HCV infection
- Pathogenesis of progression of HIV infection
- Molecular pathogenesis of the mitochondrial disturbances in viral infections
- Molecular pathogenesis of hepatitis B viral infection
- Host defences to microorganisms
- Molecular analysis of innate immunity in microorganism infection
- New detection method and pathogenesis of opportunistic cytomegaloviral infection
- Mechanism of multi-drug resistant microorganisms
Stress Sciences and Psychosomatic Medicine

Targeting stress-related diseases such as psychosomatic and lifestyle-related diseases, we are investigating their pathophysiology and psychopathology through assessing higher brain function, autonomic nervous function, and bio-psycho-behavioral time-series data. We are also actively conducting basic as well as clinical research on stress and relaxation responses and eating-related substances.

- Elucidation of brain processes closely related to mind/body correlation in stress-related diseases by use of brain functional analysis methods such as positron emission tomography, magnetoencephalography, and event-related potentials
- Investigation into the pathophysiology, psychopathology and neurobehavioral basis of stress-related diseases by use of ecological momentary assessment methods
- Behavioral scientific studies and interventional studies using psychobehavioral treatment procedures on stress-related diseases
- Development and clinical application of questionnaires concerning mental health
- Interventional studies of various relaxation procedures
- Psychophysiological and biochemical studies on stress responses and relaxation responses
- Investigation on the effects of newly-found neuropeptides such as orexin and ghrelin in the brain particularly on emotion and stress responses

Clinical Laboratory Medicine

The main goal of our research projects, described below, is the development of new and useful laboratory tests, and elucidation of pathophysiology of diseases through laboratory tests.

- Cell surface analysis and quantification of cell surface antigens using flow cytometry
- Elucidation of pathophysiological roles of lysophospholipid mediators, and its application to laboratory medicine
- Platelet biology
- Research on adrenomedullin
- Oxidative stress and organ damage
- Analysis of the function of the left ventricle using ultrasound
- Relationship between the respiratory function and various pathophysiological conditions
- Magnetoencephalographic (MEG) study on neural mechanisms for audiovisual integration

Transfusion Medicine

Control, testing, and supply of all blood products for transfusion are the main clinical activities of the department of transfusion medicine, which is responsible for the provision of safe blood products and the control of the transfusion practice in the hospital. It actively takes part in autologous blood collection, preservation, and supply for patients receiving routine surgery. In addition, apheresis procedures for collection of peripheral blood stem cells for transplantation and of peripheral blood mononuclear cells for dendritic cell-based vaccine therapy of cancer patients are performed. Also, lymphocyte-based vaccine is prepared for the immunotherapy of recurrent abortion cases. Special laboratory testings, including HLA typing (serologic and DNA-based) for bone marrow and organ transplantations and the detection of anti-HLA, anti-platelet (HPA) and anti-granulocyte antibodies, as well as the phenotyping and genotyping of platelet- and granulocyte-specific antigens for patients with adverse reactions after transfusion, are performed. The research fields include 1) the development of immunological methods for antigen-antibody testing of red cells, lymphocytes, granulocytes, platelets and endothelial cells, 2) the development and clinical application of dendritic cell-based and other vaccines for immunotherapy of cancer, and 3) the development of new anti-thrombotic materials for clinical use.

- Detection of platelet alloantigens and alloantibodies
- Detection of leukocyte alloantigens and alloantibodies
- Detection of anti-endothelial cell antibodies and investigation on their clinical relevance
- Development of a novel method for the evaluation of platelet function
- Dendritic cell-based immunotherapy for malignant diseases
- Development of new anti-angiogenic strategies to treat cancer
- Development of new immunotherapeutic approaches to treat malignant diseases
- Development of new anti-thrombotic materials for clinical use / Use of stem cells in regenerative medicine
Reproductive, Developmental and Aging Sciences

Reproductive Endocrinology
http://square.umin.ac.jp/tyobgyn/

We manage women's reproductive health comprehensively throughout their respective life stages (adolescence, reproductive ages, menopause, and post-menopause). We also aim to develop advanced reproductive techniques, which could be practiced with higher success rates and improved safety, based on experimental and clinical research.

- Establishment of effective and low-risk treatment for infertility
- Development of assisted reproductive technology
- Interaction between the endometrium and embryo during the implantation period
- Pathophysiology of endometriosis
- Local regulation of folliculogenesis
- Technical development of advanced endoscopic surgery
- Development of hormone replacement therapy for postmenopausal women
- Medical treatment for menopausal women

Gynecological Oncology
http://square.umin.ac.jp/tyobgyn/

We are developing the intensive surgical management and selection of the most suitable chemotherapy regimen, which improved prognosis of the patients with ovarian cancer. The basic researches are focusing on the mechanism of gynecological malignancies, especially cervical cancer. We have identified the tumor suppressors involving in the process of cervical carcinogenesis. We are investigating a possible clinical application of the vaccine against human papillomavirus, which is a causative agent of cervical cancer.

- Intensive surgery including pelvic and paraaortic lymphadenectomy
- Selection of adjuvant chemotherapy based on the pathological and molecular marker
- Tumor suppressors involving carcinogenesis of gynecological malignancy
- Analysis of the molecular marker in tumor cells related to clinical behavior
- Prevention of cervical cancer using the human papillomavirus vaccines

Expression of tumor suppressor scribble in malignant cells
**Molecular Cellular Reproductive Medicine**

We are approaching the molecular mechanisms in various reproductive pathological states, using the knowledge and techniques of molecular biology, cellular biology and genetics. The studies are proceeding on the effects of endocrine disruptors on reproductive phenomena, such as embryogenesis, spermatogenesis and fetal development, and on the prenatal genetic diagnosis.

- Effect of endocrine disruptors on reproduction
  - Embryogenesis
  - Spermatogenesis
  - Intrauterine fetal development
- Prenatal diagnosis using molecular genetics
- Molecular mechanisms of embryonic development

**Pediatrics and Developmental Pediatrics**

We are studying all the issues concerning the health of infants, children and adolescents. We have achieved very important investigations to clarify the molecular pathogenesis of human congenital disorders.

- Molecular diagnosis and analysis and collaborative treatment of intractable renal glomerular and tubular diseases
- Molecular diagnosis and analysis of hematological malignancy and bone marrow transplantation
- Study of Embryonic stem cell (ESC) treatments for various human congenital diseases
- Diagnosis, molecular analysis and collaborative treatment of congenital heart diseases
- Molecular analysis and collaborative treatment of congenital immunodeficiency and allergic diseases
- Collaborative treatment of extremely premature neonates and babies with pulmonary hypoplasia
- Enhancement of the immunological resistance of premature neonates using a new type of lactobacillus
- Diagnosis and treatment of neurological, endocrine and metabolic diseases
- Collaborative study and treatment of psychological disorders
- Investigation of new systems to promote mother and baby co-relationships during rearing

**Perinatal Medicine**

The researches are ongoing for development of precise prenatal diagnosis on the fetal status using ultrasonography, and for investigation of fetal physiology using animal models. We are also focusing on the immunological aspects in patho-physiology of pregnancy, developing the immunotherapy for habitual abortion or gestational toxicosis.

- Early diagnosis of abnormal pregnancy
- Development of three dimensional ultrasonography
- Experimental fetal physiology
- Immunotherapy for pregnancy
- Management of complicated pregnancy
**Pediatric Surgery**

Pediatric surgical diseases have great variety. In our department all kinds of pediatric surgical conditions are treated, and in these fetal and neonatal surgical care is our main interest. We also treat many pediatric patients with various respiratory surgical problems that are difficult to treat in other institute.

- The development and differentiation of the fetal lung
- Fetal diagnosis of congenital malformations
- Fetal surgery and treatment
- Probiotics and prebiotics applied to pediatric surgical patients
- The development and differentiation of intestinal lymphoid organs
- Renal functions in congenital hydronephrosis
- Biliary atresia and biliary dilatation: their treatment and long-term prognosis
- Surgical treatment of pediatric respiratory malformations

**Pediatric oncology**

Solid tumors in children are dealt with in our department. Appropriate care strategies combining surgical treatment and chemotherapy are decided and carried out on various malignant tumors after extremely close discussion with pediatric oncologists.

- Genetic analysis and investigations for prognostic factors in neuroblastoma
- Tumorigenesis in Wilms tumors
- Analysis of cellular biology in Wilms tumors
- Treatment of rhabdomyosarcoma
- Genetic mutation in hepatoblastoma

**Geriatric Medicine**

Our department is the first established department of Geriatric Medicine in Japan. It is our goal to treat all the geriatric diseases, such as atherosclerosis, hyperlipidemia, osteoporosis, senile dementia, diabetes, COPD, and aspiration pneumonia, and to improve the quality of life of elderly patients.

- Vascular endothelial function and atherosclerosis
- Studies of molecular mechanisms in vascular calcification
- Antioxidants inhibit vascular smooth muscle cell proliferation and induce apoptosis
- Vascular gene therapy using adenoviral mediated gene transfer of estrogen receptors
- New guidelines for hormone replacement therapy in females in Japan
- Novel gene responsible for breast cancer
- Novel gene responsible for osteoporosis
- Molecular cloning of novel Ring finger protein
- Studies of pathophysiology and novel treatment for Alzheimer’s disease
- Pathophysiological studies on bronchial asthma using gene-targeted mice
- The molecular mechanisms of vascular injury in sleep apnea syndrome

http://www.h.u-tokyo.ac.jp/patient/depts/1510rounenbyou.html
Cardiovascular Surgery, Thoracic Surgery

http://ctstokyo.umin.ne.jp/

We are leading in Japan by annual surgery case volume of 550. New knowledge and techniques are actively applied clinically. Many clinical research projects are going on along with routine clinical activities. Our laboratories have been also carrying out a large variety of basic research.

- Clinical research
  - Brain and spinal cord protection in thoracic aortic surgery
  - Minimally invasive cardiac surgery
  - Valve or vascular tissue allograft transplantation
  - Ventricular assist device for end-stage heart failure
  - Pathophysiology of thymoma
- Basic and experimental research
  - Development of real-time 3D echo
  - Development of myocardial regeneration therapy
  - Analysis of resistance to infection of tissue allograft
  - Analysis of suppressor gene of lung cancer

Gastrointestinal Surgery

http://todai3ge.umin.jp/

Our research activities range from basic topics to clinical ones with close interconnections. Basic research topics encompass underlying molecular mechanisms and the regulation of carcinogenesis, progression, metastasis and prevention of gastrointestinal cancer. Clinical research topics include the establishment of tailored treatment strategies from a patients-by-patient point of view, which ultimately provide a better quality of life while improving survival quality.

- Carcinogenesis, progression, metastasis and prevention of gastrointestinal cancer
  - Inflammation and gastrointestinal carcinogenesis (gastroduodenal reflux, H. pylori infection)
  - Are cancer cells derived from bone marrow?
  - Earlier detection of cancer and micrometastasis by new genetic markers
  - Roles of epigenetic alteration (DNA methylation) in gastrointestinal carcinogenesis
  - Chemoprevention of gastric cancer with PPARγ ligand
- Establishment of tailored treatment strategies
  - Less invasive treatment of early cancer by laparoscopic (assisted) surgery
  - Sentinel node navigation surgery for early cancer
  - Extended radical treatment of advanced cancer
  - Induction of neoadjuvant chemotherapy and improvement of survival
  - Estimation of chemotherapy effects by new bio- and genetic-markers
  - Alternative gastrointestinal reconstruction and estimation of the results
**Hepato Biliary Pancreatic Surgery**

http://square.umin.ac.jp/hbp-t/index21.htm

We constantly perform nearly 200 hepatectomies every year on patients with hepato-biliary malignancies including hepatocellular carcinoma and metastatic liver tumors. The surgical results can be classified as amongst the highest ranking in the world. In order to improve the surgical outcome for hepato-biliary-pancreatic malignancies, we conduct wide areas of research such as analysis of prognostic factors for liver malignancies, evaluation of liver hemodynamics using ultrasonography, liver ischemia/reperfusion injury, and liver regeneration.

- The development of a radical and safe operative procedure for hepato-biliary malignancies
- The analysis of genetic abnormalities in hepatocellular carcinoma
- Development of new methods for the evaluation of liver functional reserve
- The evaluation of hemodynamics in the congested liver using ultrasonography
- Study of the effect of ischemic preconditioning on liver normothermic ischemia/reperfusion
- Study of the underlying mechanisms of acute pancreatitis using rats
- The prediction of recurrence of hepatocellular carcinoma by measuring AFP mRNA in the peripheral blood
- Induction of hepatocyte differentiation from bone marrow cells

**Urology**

http://www.h.u-tokyo.ac.jp/urology/

We constantly perform more than 1,000 urological surgeries a year, including nephrectomy, cystectomy and prostatectomy, with increasing trend of laparoscopic maneuvers and brachytherapy for organ confined prostate cancer. Surgical or Non-surgical means are employed for non-cancer diseases including renal transplantation, urinary dysfunction, urinary incontinence, urolithiasis and male infertility. With regard to laboratory research, not only oncology but also JC virus, PCK disease and vascular biology are now under extensive investigation.

- Tailor medicines on estramustine phosphate (EMP) has been investigated for newly diagnosed advanced prostate cancer (Fig.1)
- JC viral genomic analyses and its distribution in the world
- Estrogen receptor beta and its metabolic cascade analysis
- Hormonal regulation of prostatic proliferation and atrophy
- Human E&H-cadherin correlation with invasiveness of transitional cell carcinoma and prostate cancer
- Oncolytic viral therapy using HSV-1
- PCK disease and genetic analysis
- Urolithiasis: ion channels membrane transport (NaDC-1)
- Vascular biology and erectile dysfunction (ED)
- Fluorescence in situ hybridization (FISH) flow cytometry
- Clinical investigation for urinary incontinence and overactive bladder (Fig.2)

**Artificial Organ Transplantation Division**

http://www.h.u-tokyo.ac.jp/patient/depts/1512ishokugeka.html

We have performed liver transplantation for end staged liver diseases. Until March 2005, we have experienced 417 cases of living donor liver transplantation and two deceased donor liver transplantation case.

- Surgical technique on living donor liver transplantation
  - Right lateral sector graft
  - Criteria and technique on middle hepatic vein reconstruction in right liver graft
  - Vascular reconstruction using homograft vein
- Diagnosis on acute rejection
- Artificial Organ
  - Artificial Liver
Metabolic Care and Endocrine Surgery

Our department has two main divisions. Division of surgical metabolism and nutrition performs research on vital response to surgical stress and on metabolic and nutritional care during peri-surgical period. Division of breast and endocrine surgery performs surgery for 200 cases of breast, thyroid and parathyroid tumors a year, and performs research on tumorigenesis, establishment of treatment and prevention of breast and thyroid cancers.

- Surgical metabolism and nutrition
  - Development of the novel and order-made therapy for cancer
  - Genetic mutation analysis of various cancers
  - Induction of tolerance against surgical stress and endotoxemia
  - Response to endotoxemia through Toll-like receptors.
  - Effects of surgical stress on tumor development
  - Gender difference in the response to surgical stress
  - Bacterial translocation during chemotherapy for cancer
  - Establishment of metabolic care and nutritional support team
- Breast and endocrine surgery
  - Development of a novel method to diagnose and treat the vascular diseases
  - Roles of nuclear receptor in development of breast cancer
  - Micrometastasis of breast cancer
  - Diagnosis of breast and thyroid tumors by fluorescence in situ hybridization of telomere
  - Apoptotic gene expression in endocrine neoplasm
  - Roles of carbohydrate in breast cancer metastasis
  - Establishment of evaluation on QOL of the patients with breast cancer

Surgical Oncology / Vascular Surgery

We had a great deal of experience in treating patients with various cancers and vascular diseases, and we have performed much research on carcinogenesis, cancer metastasis, immunology, atherosclerosis, angiogenesis and vascular regeneration. Based on the research results, we are trying to identify the best way to treat each patient with the least surgical stress.

- Development of the novel and order-made therapy for cancer
  - Genetic mutation analysis of various cancers
  - Radiosensitivity and chemosensitivity of cancer
  - Detection of sentinel lymph nodes using magnetic particle
  - Immunotherapy using dendritic cells
  - Characterization of tumor vasculature and its therapeutic application
  - Gene therapy for disseminated metastasis
  - Drug development to target the receptor and signal transduction cascade of bioactive lipids
- Development of a novel method to diagnose and treat the vascular diseases
  - Vascular regeneration therapy for atherosclerotic obliterans (ASO)
  - Visualization of atherosclerotic lesions
  - Robotics surgery for vascular diseases

Dermatology

Our department performs very varied of basic and clinical research concerning the cutaneous immune system that is orchestrated by Langerhans cells, pathogenesis of skin fibrosis in the scleroderma, and mechanism of growth and metastasis of skin cancers (especially in malignant melanoma). Our specific interest is to develop new therapeutic approaches to the relevant skin diseases using the knowledge we obtain through the data generated by our research.

- Molecules of Langerhans cells that regulate antigen presentation
- The role of chemokines in allergic skin diseases
- Understanding and clinical application of the regulatory mechanisms of allergy inducing factors produced by the epidermis
- Understanding and clinical application of mechanisms of up-regulated expression of the type I collagen gene in scleroderma fibroblasts
- The role of transforming growth factor-β Smad signaling in fibrosis
- The role and signal transduction of transforming growth factor-β receptors in dermal fibroblasts
- The mechanisms of up-regulated expression of integrins in fibrosis
- Mechanisms of growth and metastasis in malignant melanoma cell lines
- Early diagnosis of metastatic lymph nodes by the sentinel lymph node biopsy technique
- Early diagnosis of malignant melanoma with dermoscopy
Plastic and Reconstructive Surgery

In our lab, we are investigating the mechanisms of morphogenesis of congenital anomalies using a developmental biological approach. In addition, we are performing extensive research into the clinical application of engineered tissues such as skin, soft tissue, and cartilage. We also have several cosmesis-related projects such as clinical hair regrowth with cultured cells and analysis of skin aging mechanisms.

- Basic Research
  - Mechanisms of embryonic craniofacial morphogenesis
  - Angiogenesis in embryo and vascular malformations
  - Mesenchymal stem cells derived from lipoaspirates
  - Organ engineering with human adult stem cells
  - Hair regrowth with cultured dermal papilla cells
  - Research on aging skin-related factors
  - Regulation of skin aging using hormones and retinoids
  - Regulation of epidermis by factors derived from dermal fibroblasts

- Clinical Research
  - Microsurgical reconstruction using vascularized tissue transfers
  - Reconstructions for established nerve palsy
  - Cranio maxillo facial surgery
  - Lymphedema

Oral and Maxillofacial Surgery

Our laboratory has been performing a wide range of clinically oriented research in oral-maxillofacial disorders such as congenital diseases, jaw deformities and tumors in the oral region. Cartilage and bone regeneration using tissue engineering techniques is our main field of research.

- Clinical research:
  - Mandibular lengthening by distraction osteogenesis
  - Correction of facial deformity in patients with cleft lip and palate
  - Facial growth in craniofacial anomalies
  - Surgical-orthodontic treatment of dentofacial deformities
  - Evaluation of the treatment outcomes in patients with cleft lip and/or palate

- Basic and experimental research:
  - Cartilage and bone regeneration using the tissue engineering technique
  - Gene analysis of congenital anomalies in the oral and maxillofacial region
  - Effect of free radicals on bone metabolism
  - COX-2 regulation on bone metabolism
  - Mandibular lengthening by the floating bone method

Orthopaedic Surgery

Our department was established in 1906 as the first department of orthopaedic surgery in Japan. Since then our efforts have been dedicated to responding to the needs of patients for orthopaedic care and to related research. Our department seeks to elucidate the molecular and genetic backgrounds of bone and cartilage disorders in order to develop groundbreaking treatments for these conditions. At the same time, we are attempting to establish various clinical devices.

- Bone, cartilage and nerve regeneration
- Regulation of anabolic and catabolic bone metabolism by cytokines (FGFs, PGs)
- Molecular mechanism of age-related bone loss (klotho, PPARγ)
- Molecular mechanism of osteoclast differentiation and apoptosis (RANKL-RANK, INF, Src)
- Reverse and forward genetic approach to the pathophysiology of bone and cartilage disorders (osteoarthritis, OPLL)
- Gene therapy to control pathological bone destruction (arthritic bone resorption and arthritic joint destruction) using adenovirus vectors
- Non-invasive analyzing system to evaluate the mechanical properties of skeletal system in vivo using CT based finite element analyses
- Surgical navigation system with a three-dimensional display and navigation robot
Our department applies cutting-edge technologies and knowledge to diagnosis and treatment of eye diseases. To elucidate pathogenesis and establish more efficient ways of diagnosis and treatment of various refractory eye diseases, basic researches utilizing molecular biological, immunological and/or pharmacological techniques and clinical studies utilizing epidemiological, biostatistical and/or optical methods are conducted. Our efforts are also dedicated to regenerative medicine of the cornea and retina.

- Clinical research
  - Investigation of primary glaucomas and relating factors
  - Development of new methods of glaucoma treatment and validation by RCT
  - Investigation of new ocular hypotensive drugs and their mechanism of action by using transgenic or KO mice or experimental glaucoma monkeys
  - Investigation of mechanism of neural cell death by using cultured RGCs or retinal glial cells and exploratory search for new neuroprotective agents
  - Analysis of ocular circulation in glaucoma and retinal diseases
  - Analysis of corneal topography and wave-front analysis of optical aberrations
  - Development of tissue-engineered cornea by using cultured stem cells of corneal endothelium and epithelium
  - Investigation of molecular mechanism of choroid-retinal neovascularization and new drug delivery system for it utilizing nanotechnology
  - Regenerative medicine of the retina using retinal stem cells
  - Investigation of immune responses in rejection of transplanted cornea and role of chemokines and receptors in uveitis

- Basic and experimental research
  - Molecular biology of the inner ear
  - Basic research on auditory brainstem implants
  - Molecular biology of epipharyngeal cancer and hypopharyngeal cancer
  - Molecular biology of differentiation and development of inner ear and olfactory epithelium
  - Origins of vestibular myogenic potential
  - Aging and regeneration of olfactory epithelium / Binaural healing

Otorhinolaryngology and Head & Neck Surgery

Our research is composed of both clinical and basic research. Clinical research is conducted by specialized clinics in the hospital, which experience ear diseases and hearing disorders from neonates to adulthood, head and neck cancer, paranasal diseases, olfactory and disorders, vertigo and balance disorders and voice and swallowing disorders. Basic and experimental research into molecular biology, electrophysiology and morphology is conducted in our department's laboratories.

- Clinical research
  - Cochlear implantation in deaf children and their development of hearing, speech and language
  - Surgical correction of congenial microtia and atresia and postoperative radical ears to improve hearing
  - Quality of life in patients with head and neck cancer to restore speech and swallowing function
  - Vestibular research on the oculomotor and balance system and myogenic potential
  - Navigation of the paranasal sinuses and skull base surgery
  - Surgical treatment of voice and swallowing disorders

- Basic and experimental research
  - Molecular biology of the inner ear
  - Basic research on auditory brainstem implants
  - Molecular biology of epipharyngeal cancer and hypopharyngeal cancer
  - Molecular biology of differentiation and development of inner ear and olfactory epithelium
  - Origins of vestibular myogenic potential
  - Aging and regeneration of olfactory epithelium / Binaural healing

Rehabilitation Medicine

Our research purpose is to improve the provision of a unique and comprehensive rehabilitation service enabling people to develop their full potential and often returning from being a “patient” to being a “person”. Clinically oriented studies concentrate on elucidation of the origin of disabilities to cause activity limitation and restriction of participation.

- Gait analysis
  - Measurements of 3 dimensional ground reaction forces with a force platform
  - Measurements of foot pressures with a computerized insole sensor system
  - 2-dimensional image analysis with a video camera system

- Cognitive Rehabilitation
  - Functional localization using event related potential and MEG
  - Simple evaluation system of higher brain dysfunction

- Clinical and biological study on disuse syndromes
  - Joint contracture and disuse atrophy in molecular biology
  - Development of a proper program for recovery from deconditioning
We conduct research into various subjects concerned with anesthesia and the pain clinic. There are 6 laboratories in our department. Comprising respiratory, circulatory, nervous and muscular, immune and pain research, and research into anesthetic instruments including monitoring systems.

- **Respiratory system**  Our areas of research include changes in pulmonary vascular resistances in pulmonary edema; and influence of anesthetic drugs on the pulmonary system; and pathophysiological changes in neurogenic pulmonary edema.
- **Circulatory system**  Studies are now being performed on the relationship between the sympathetic nerve system and cardiac function; the influence of inhibitory enzymes upon organic microcirculations; and the ventilation-perfusion distributions during artificial positive pressure ventilation.
- **Nervous and muscular system**  Studies are now in progress on the mechanism of epidural-spinal anesthesia (using Hanaoka’s needle); the influence of anesthetics on the auditory brain stem response; the influence of inhalation anesthetic drugs on the autonomic nervous system; and the pharmacology of neuromuscular blocking agents; and the development of a new monitoring system for neuromuscular blockade.
- **Immune system**  Themes include the response of immune systems to endotoxins in blood and the influences of anesthetics on hepatic Kupffer cells.
- **Pain**  We have performed many studies in this area, including the effects of epidural drugs on thermal nociception with different stimulus intensity; the clinical applications of epidural narcotics; the analgesic mechanism of hyperventilation; the clinical applications of drug challenge tests; the examination of the application of epidural analgesia; the clinical applications of patient controlled analgesia; and the optimal combination of low dose opioids and inhalated anesthetics.
- **Anesthesia machines and other medical equipment**  The development of simulators for anesthetic education, and the development of new equipment for tracheal intubation are now in progress.

**Emergency and Critical Care Medicine**

We are collaborating with The School of Engineering, and now concentrating on the development of the infrastructure of emergency medicine including “the Vital Care Network System”, which allows us to manage continuously large numbers of high risk patients. We are also making efforts to improve sterilization and wound healing.

- **Vital Care Network System**
- **Telemonitoring system for prehospital medicine**
- **High-performance transfer system for the ambulances**
- **Electrolyzed water**
- **Autonomic nervous system regulation of the heart**

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Anesthesia and monitors

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Health Sciences and Nursing

Health Sociology

Our department studies social and psychological factors related to health problems and health care systems, through developing and applying theories, concepts and methods, which have been developed in sociology and social psychology. We carry out studies in interdisciplinary academic fields, involving health, medicine and nursing as well as the field of sociology.

- Studies on Antonovsky’s Salutogenesis and Sense of Coherence (SOC)
- Study on medically infected HIV subjects
- Studies on the current situation and theories of changing professional-patient relationship and patient autonomy
- Studies on the effects of changes in industrial society on “Ways of Working and Living” and fatigue / stress among workers
- Studies on social differences and inequalities in health
- Studies on theory and research methodology on the lives of ill and disabled people and their families

Mental Health / Psychiatric Nursing

Both departments conduct internationally diverse clinical studies on mental disorders and mental health problems.

- Mental Health
  - Psycho-education in mental disorders
  - Evaluation of psychiatric services
  - Evaluation of school counseling
  - Practice and Evaluation of Psychotherapy
  - Early detection and therapeutic education of PDD

- Psychiatric Nursing
  - Workload studies of acute psychiatric wards
  - Clinical competency of psychiatric nursing
  - Skills of community psychiatric nursing
  - Mental health of mothers and child abuse
  - Carer burden
Social Gerontology
http://www.sg.m.u-tokyo.ac.jp/informatione.htm

The three major research areas of this department include social gerontology, psychosocial oncology and biomedical ethics. The faculty and graduate students are multidisciplinary and include those whose primary training is in nursing, medicine, psychology, anthropology and health sciences. Using the theories and research methods of those disciplines, we aim to suggest practical ways to deal with a wide variety of public health problems.

- Exchange of social support and subjective well-being among the elderly
- Psychological well-being among the elderly who have experienced relocation
- Measurement of active life expectancy
- Sexuality and body image issues related to cancer treatments
- Treatment decision-making process among cancer survivors
- Self-help group activities for chronic, life-threatening illnesses
- Psychosocial issues related to infertility treatments
- Multi-disciplinary collaboration in the clinical setting

Biostatistics / Epidemiology and Preventive Health Sciences
http://www.epistat.m.u-tokyo.ac.jp/

Biostatistics and epidemiology provide the methodological basis for health sciences. We are conducting basic methodological research of biostatistics and theoretical epidemiology as well as consultation works and collaborative projects with basic/clinical researchers. The NPO "Japan Clinical Research Support Unit" established by the staff of the department is supporting investigator-initiated clinical trials and large-scale epidemiological studies in respect of data management, statistics and quality assurance.

- Methodological research
  - Design of clinical trials
  - Analysis of correlated data and longitudinal data such as QOL data, multiple recurrence (events) data
  - Analysis of microarray data
- Collaborative projects
  - Japan Arteriosclerosis Longitudinal Study
  - Comprehensive Support Project for Oncology Research - Breast Cancer
  - Comprehensive Support Project for Adequate Treatment of Osteoporosis
  - Investigator-initiated clinical trials of cell therapies

Health Promotion Sciences
http://www.ethps.m.u-tokyo.ac.jp/

The main activity of the Department of Health Promotion Sciences is making health policy proposals concerning health promotion in the community and work place through experimental and survey research. The main research fields are health behavior and life-style related disease. The main focus of health behaviors are physical activity including exercise, diet and nutrition, and obesity. Our classes include lectures and practical training with the aim of helping students to understand the method of planning, implementation and evaluation of the health promotion programs in the community and work place.

- Development of effective health promotion programs
- Assessment of the supportive environments in the community and work place
- Assessment of and supporting methods for health behavior, and the impact on health status
- Short and long term effects of behavior change
- Influence of behavior change on medical costs, and cost effectiveness analysis
- Determinants in the social and physical environment on the adherence of behavior change

Multivariate analysis of cDNA-array data

Class meeting of the department

Physical fitness test as part of a community health promotion program
The Department of Biomedical Ethics conducts both theoretical and empirical studies in the fields of biomedical ethics, research ethics and clinical ethics. Research topics include ethical theories, informed consent, ethics committees and organ transplantation. The Center for Biomedical Ethics and Law (CBEL) was recently set up as an adjunct to the Department of Biomedical Ethics.

- Study of the functions and responsibilities of ethics committees in Japan
- Study of the methods for the formation of social consensus related to advanced medical technology
- Comparative study of clinical ethics in the Asian region
- Publication of a medical ethics case book for Japan
- Acceptability of advance directives in Japan
- Development of evaluation methods for biomedical ethics education
- Psychosocial and ethical aspects of living related organ transplantation

Outreach Program: CBEL provides training courses for ethics committee members. Participants include physicians, nurses and medical pharmaceutical representatives.
Nursing Sciences

Mainly for subjects in their adulthood, we have been performing research in a variety of domains including prevention of cancer and several chronic illnesses, support for coexistence with disease, and palliative care. Focal points in our research, which we conduct under a team approach, are strategies in education and provision of relevant information based on the findings of molecular biology, and the team-approach nursing care system.

- Care for adaptation to physical alteration after surgery
- Cancer genetic counseling in nursing
- Physical activity in middle-aged / elderly
- Prevention and self care support for family with diabetes
- Symptom management for inflammatory diseases
- Evaluation of palliative care services
- Spiritual care for terminally ill persons and their families
- Continuity and dissemination of palliative care
- Nursing care system for out patients
- Nursing terminology

Nursing Administration/ Advanced Clinical Nursing

Our research programs aim to support clinical nurses in providing high quality care for their patients in efficient way. Under a nation-wide healthcare reform, improving the efficiency of healthcare delivery systems becomes essential. For nursing care, assessing the efficacy and the putting in place of quality assurance systems are required. Applying management theories to nursing administration, we focus on nursing quality improvement, nurse staffing, patient classification systems, budgetary management, staff development and continuing education.

- Assessment and improvement of quality of nursing care
- Outcome management for nursing practice
- Risk management in acute care settings
- Nursing case management and critical pathways
- Cost-effectiveness of nursing services
- Patient classification systems
- Physiological studies of clients’/caregivers’ activities
- Occupational safety and health of health care workers
- Nursing policy and strategies to meet the professional demands

Promoting quality nursing care
Family Nursing

Hand-in-hand with the changes occurring in society, the formation and the function of the family is also changing. Current Japanese society expects not only client-centered perspective but also family-centered perspective from nursing research. We are especially focusing on the childrearing and childbearing family nursing research issues.

- Late effects of treatment and posttraumatic stress disorder in children with cancer
- Psychological preparation for children undergoing minor surgery
- Child abuse
- Care of dying children and their families
- Qualitative research to explore childbearing family formation process
- Postnatal depression and difficulties in childrearing

Community Health Nursing

Our research focuses on the development of health care programs, and establishment and evaluation of community health care systems, in response to the health care needs of individuals, families, aggregates and the communities. Also, we are performing research on standardization of skills of public health nurses and terminology of community health nursing.

- Establishment and evaluation of community health care systems
  - Around-the-clock in-home care system
  - Expansion of the target of visiting nurse
  - Hospital discharge planning
- Development of health care programs
  - Support for families with babies and children
  - Occupational health
  - Elderly care
- Definition and standardization of skills of public health nurses/
  Development of community health program
- Terminology of community health nursing

Midwifery and Women’s Health

Having been in place since June, 2002, our research activities focus on maternal-child health care as well as health promotion to achieve an all-round good life for the well woman.

- Life style and oxidative stress during pregnancy
- Maternal body composition during pregnancy and infant birth weight
- Nutrition and weight management during pregnancy and postpartum
- Quality of sleep and sleeping posture of women
- Promotion of women’s health care after delivery and during menopause
- Application of the ICF (International Classification of Functioning, Disability and Health) to an assessment of quality of life among pregnant women
Our main study involves the "Practice and Development of Gerontological Nursing Based on Evidence" where we are striving to develop new nursing techniques and instruments to improve the prediction, prevention, diagnosis and treatment of the elderly. We hope to increase their physical activity and enhance self-esteem in order to maintain their independent lifestyle.

- Development of new techniques and instruments for wound care management for the elderly
  - Risk assessment
  - Preventive care
  - Malnutrition
  - Skin care technique
  - Wound management

- Development of care programs and systems for the elderly
  - Health promotion program for the healthy elderly
  - Preventive approach in long term care for the frail elderly
  - Care program and system for the demented elderly
International Health

Health Policy and Planning

The department aims to provide the scientific evidences to the international health policy in the world, especially in Asian countries. Our long-termed goal is to contribute, through our researches, to establishing the world where we can live healthy, in harmony with nature by respecting each of our cultures and beautiful environments.

- Evaluation of ODA and international health policy
- Sustainable IMCI (Integrated Management of Childhood Illness) in developing countries
- Appropriate interventions for the sustainable malaria prevention
- Situational analysis on immunization service (EPI) in developing countries
- HIV/STIs, AIDS control and prevention
- Injury prevention in developing countries
- Allergic disease or paediatric asthma in developing countries
- Medical wastes in developing countries
- Reproductive health in developing countries
- Health system improvement in developing countries

International Community Health

Our aim is to bring together aspects of clinical, public health and social science research to address the broad issues of health and health care: 1) to investigate how to change the status quo by improving health status of the most vulnerable; 2) to undertake research on the influences of 'globalization' on health and social development; 3) to investigate the mechanisms to reduce inequalities between and within nations on health and development; and 4) to develop the mechanisms to link the above 4 goals with the individual research activities described below.

- Maternal and child health in Asian countries
- Infectious diseases such as tuberculosis, leprosy and HIV/AIDS
- Appropriate treatment and prevention of common diseases and injuries including traffic accidents in Japan and developing countries
- Health promotion
- Comparative study on dental health and care between different countries
- Stroke prevention in developing countries as well as in Japan
- Environmental degradation related diseases such as “ecological diseases” in Kazakhstan, and bronchitis and asthma in children in Bangladesh
- Health policy: “SAPs”, “health sector reform”, “SWApS” (SIP) in developed and developing countries
- Human rights including: 1) Code of conduct, 2) Refugees and 3) War and conflicts
- Disaster relief/medicine

http://www.ich.m.u-tokyo.ac.jp/
**Human Genetics**

Department of Human Genetics is broadly interested in the human genome diversity, especially in the Asian populations. Specifically, we are using genomic research tools including SNP and microsatellite analyses, as well as gene expression profiling, to better understand the genetic background of a variety of complex diseases, especially autoimmune diseases, infectious diseases and sleep disorders.

- Theoretical and experimental analyses on the genetics of complex diseases.
- Development of statistical approaches for susceptibility gene mapping in complex diseases.
- Genomic studies to the understanding of genetic background and pathogenesis of autoimmune diseases.
- Host susceptibility factors to infectious diseases.
- Molecular mechanisms of sleep disorders.
- Development of new methodologies for genomic polymorphism and gene expression analyses.
- Analysis on the genome diversity of Asia-Pacific populations.
- Development of methodologies for the analysis of protein interactions.

**Developmental Medical Sciences**

At its inception, the name of the department was the “Department of Maternal and Child Health”. The studies involved in all activities related to the maintenance and the promotion of health of mothers and children, including research of infectious diseases and nutrition.

In 1992, with the aim of expanding the vision of research and teaching activities, the name was changed to the “Department of Developmental Medical Sciences”. In addition to maternal and child health, the theme thus extended to include aging, human-environment relations and areas of reproductive health.

- Field study of maternal and child health
- Minority group inside and outside of Japan
- Obesity, minor nutrients etc.
- Molecular epidemiology of infectious diseases
- Diarrheal viruses, HIV, hepatitis viruses etc.
- Development of diagnosis of infection (genetic analysis, immunological analysis)
- Physiological and biochemical study of child development
- Hormone and bone metabolism in puberty, during pregnancy and puerperium and in post-menopausal state
- Biochemical analysis of immobilization on calcium and bone metabolism
- Effect of urbanization on maternal and child health (high rise living, child-abuse, social epidemiology of infectious diseases)

**Human Ecology**

For the purpose of elucidating the health and survival of human populations from the human-environment relationship, field investigations in the Asia-Pacific region and experimental studies have been conducted. Based on not only biomedical aspects but also environmental scientific and sociocultural aspects, many international health problems are targeted.

- Health effects of environmental arsenic and possible mitigation strategy in South Asian countries
- Exposure-effects evaluation of chemical pollution of watershed in rural Indonesian children
- Nutritional ecology-based health evaluation for Asia-Oceania populations
- Nutritional adaptation in rural and urban-dwelling populations in developing countries
- Development and environmental preservation in rapidly-changing Asia-Oceania communities
- Effects of perinatal exposures to heavy metals or endocrine disrupting chemicals on neuro-behavioral development
- Modification of the effects of environmental chemicals by nutrients and nutritional status
The aim of our department is to contribute to the overall global health and welfare through basic research. Our current interests are: the energy metabolism of humans, parasites, and bacteria; and RNA and RNA-binding proteins.

- Human succinate dehydrogenase and mitochondrial myopathy
- *Ascaris suum* and *Caenorhabditis elegans*
- Molecular mechanism of adaptation to low oxygen tension
- Mitochondrial quinol-fumarate reductase
- *C. elegans* as a model system of parasitic nematodes and ageing
- Malaria and Trypanosome: characterization of mitochondria as a target for chemotherapy
- *Escherichia coli* and *Mycobacterium*: succinate dehydrogenase complex and regulation of energy supply
- RNA and RNA-binding proteins
- Mitochondrial translation system
- Ribosome biogenesis of Eukarya and Archaea

*Free-living nematode Caenorhabditis elegans expressing a recombinant green fluorescent protein inside the body under the control of the promoter of the iron-sulfur subunit (Ip) gene of succinate-ubiquinone reductase (complex II)*
Focusing on functional analysis of newly isolated genes, particularly related to apoptosis, cell differentiation, or cell cycle, our laboratory is pursuing clarification of the pathogenesis of various diseases and the related physiological machineries in cellular and molecular aspects. Based on our technical advantage in gene manipulation via gene knockout and transgenesis, we give high priorities to in vivo analyses. Our overall goal is to apply our findings to development of novel and definitive therapies for types of diseases.

- Role of AIM (Apoptosis Inhibitor of Macrophage) in atherosclerosis development and other diseases.
- Regulation of hematopoiesis and its relevance to leukemogenesis: via functional analysis of a newly identified Polycomb group molecule MBT-1.
- Regulation of tumorgenesis by modulating apoptosis and cell cycle: via analysis of DEDD-deficient animals.

We have been exploring two-photon excitation microscopy, which utilizes an infrared femtosecond-pulsed laser as a light source, to visualize and stimulate intact tissues at the cellular and molecular levels. We focus on the functions and disorders of the brain and secretory organs.

- The dynamics of synapses in the cerebral cortex, in relation to memory, cognitive processes and mental disorders.
- Molecular mechanisms of exocytosis in synapses and the islet of Langerhans, and their optical control.
**Biomedical Materials and Systems**


Ushida Lab investigates regenerated cartilage, bone and blood vessel in combination of 3D scaffold technologies and tissue engineering. We also focus on the elucidation of cellular mechanism of signal transduction evoked by physical stimulations such as stretching, shear and hydrostatic pressure. Sakai Lab tries to develop novel experimental systems or devices for clinical or diagnostic applications and those for evaluation of environmental impacts on humans based on the approaches of chemical system engineering and on cultivation of human organ-derived cells in different scales, towards the final goal, “human body system engineering”.

- Biodegradable polymers, bioceramics for tissue engineering
- Regenerated cartilage, regenerated bone and regenerated blood vessel
- Elucidation of signal transduction mechanism responding to physical stimulations
- Engineering of human large internal organs
- Evaluation of toxicological responses in humans using in vitro model organs
- Bioassay-based environmental assessment and management

**Clinical Biotechnology**


Nanodevices produced by nanotechnology integrate materials and systems on a nanometer scale, and hold the key to realizing the futuristic medical system that can serve the needed function at the right time and the right place with minimal invasiveness. Furthermore, nanodevices are expected to become an important interface between basic biomedical science and clinical medicine by facilitating the translation of basic achievements into clinical applications. Our division wishes to produce revolutionary medical nanodevices based on nanotechnology and thereby to spread the idea of “Nanomedicine” intranationally and internationally.

- Development of nano-scaled carriers of drugs and genes based on polymeric micelles
  - Functional diagnostic imaging
  - Pinpoint cancer therapy
  - Gene therapy
- Development of intelligent polymer gel systems responding to external stimuli
- Development of highly sensitive bioassay systems based on PEGylated gold nano-particles
- Development of functional cell arrays based on nano-fabrication of polymers
- Development of intelligent scaffolds delivering drugs and genes and their application to regenerative medicine

**Environmental Health Sciences**

http://www.cdbim.m.u-tokyo.ac.jp/english/index.html

The manifestation of diseases having modulation of advance brain function, endocrine system and immune system is known to be induced not only by ‘internal environmental’ factors, but also by ‘external environmental’ agents such as environmental chemicals. In order to provide scientific basis for health risk assessment of environmental chemicals by focusing upon children’s health, we implement the mission of our division to characterize possible health effects of environmental hazardous chemicals and to clarify the toxicity mechanism with an integrative spectrum from the individual to molecular levels.

- Elucidation of the mechanism of toxicity of environmental hazardous chemicals, such as dioxins/PCBs and heavy metals at the molecular and cellular levels
- Clarification of the molecular basis of difference in susceptibility to toxic chemicals among strains of a particular animal species as well as among different animal species.
- Development and application of toxicity evaluation techniques at whole body, cells and molecular levels
- Development of risk assessment methodology to set up safety guidelines on the environment and food
Animal Research

All researchers are accountable for paying attention to "3R" in animal experiment. We give the researchers advice on their animal experiment plans and manage the facility of laboratory animals so that animal experiments are carried out in consideration of animal welfare. We also teach laboratory animal science to medical undergraduates. Research activities are the development of methods to detect trace amount of antigen and the study of interaction between host and parasite in protozoan disease.

- Histopathological diagnosis of BSE using nucleic acid signal amplification technique
- Improvement of immuno-PCR technique
- Investigation of the malaria redox system using mouse malaria model

Radiation Biology

We are investigating the molecular mechanisms of DNA double-strand break repair as the scientific basis of radiation therapy and chemotherapy in medical oncology. We also promote the basic research that contributes to the development of a novel therapeutic strategy by examining a link of the DNA metabolic network including DNA replication and cell cycle control with chromosome instability.

- Molecular mechanisms of homologous recombinational repair
- Mechanisms of the choice between homologous recombination and non-homologous end-joining
- Molecular mechanisms of DNA rereplication
- Mechanisms of the genesis of aneuploidy
- Functional analysis of meiotic recombination genes

Research Resources and Support -Bioinformatics

Targeting biomedical research support using information technologies, our division performs management of the research network and the central servers of the Graduate School of Medicine, and basic research of medical informatics (medical terminology and standardization of medical vocabularies), privacy and anonymizing of personal information, security of research network, distributed processing system for medical information.

- Biomedical research support using network system
- Standardization of medical vocabularies and coding system
- Biomedical terminology and ontology
- Security of biomedical research network
- Privacy of personal data in medical research
- Distributed processing system for medical information using the internet
Central Clinical Facilities

Clinical Laboratory Center

http://www.h.u-tokyo.ac.jp/patient/depts/kensa.html

Our main duty is to provide the high-quality results of laboratory tests. We also emphasize the basic research on laboratory automation and standardization, development and improvement of laboratory tests, and pathophysiological analyses through laboratory tests, as follows.

- Laboratory automation system
- Analysis and quantification of cell surface antigens using flow cytometry
- Clinical application of genetic analysis of leukemia and drug response genes
- Analysis of bioactive substances, and its application to laboratory medicine
- Analysis of the cardiac function using ultrasound
- Relationship between the respiratory function and various pathophysiological conditions
- Investigation of brain function using magnetoencephalography

Surgical Center

http://www.h.u-tokyo.ac.jp/patient/depts/syujutsu.html

Operating rooms were centralized as a surgical center for the first time in Japan, in the surgical ward building of University of Tokyo Hospital on July 1955. The surgical center moved to the new central building on January 1988. In July 2001, the branch hospital of our university located in Mejiro was closed and joined to our University Hospital located in Hongo. Furthermore, a new ward building was opened in October 2001. Since then, the number of operations has been remarkably increasing. Another new central building including new operating rooms will be constructed in fall 2006. Incidentally, last two years, operations were performed 7566 in 2003 and 7546 in 2004.

Teaching activities include lectures to the undergraduate and postgraduate medical students as well as nursing staffs and medical electronics engineers, regarding aseptic techniques, sterilization methods, disinfection methods, prevention of perioperative infections, humoral and cellular responses to trauma and shock, training of handwashing and gown techniques.

- Safety management in the operating rooms
- Efficient management of the operating rooms
- Cleaning, Disinfection and Sterilization
- Environmental control in the operating rooms
- Improvement of cost-effectiveness in the management of surgical center
- Perioperative infection control
- Precautions of accidental troubles in handling surgical instruments and medical devises
- Development of new surgical instruments and medical devises
- Three-dimensional processing of visual information
UMIN is the largest and most versatile academic medical information center in the world with 230 thousands registered medical professionals and 25 million pages per view monthly web accesses. UMIN is managed by the UMIN Council under the National University Hospital Association.

- Major information services
  - Electronic Library for Biomedical Sciences (ELBIS)
  - Internet Data and Information Center for clinical and epidemiological research (INDICE)
  - Evaluation system of Postgraduate Clinical training (EPOC)
  - Web-based Quality Management system of Educational effectiveness (Web-QME)

- Major research activities
  - Information systems for clinical and epidemiological research
  - Evaluation of medical schools and university hospitals
  - Library and information science
  - Network security
Pharmacy

Pharmaceutical Department

http://www.h.u-tokyo.ac.jp/patient/depts/yakuzai.html

Our goal is to provide optimized pharmacotherapy for each patient, by analyzing and predicting individual pharmacokinetics, drug sensitivity and drug adverse reaction. We are now studying the regulatory mechanism of gene expression/function as well as the genetic polymorphism of drug transporters, drug metabolizing enzymes and particularly lipid transporters related to life style-related diseases.

- Transporters involved in drug absorption / distribution / excretion.
- Transporters involved in lipid homeostasis.
- Analyses of genotype and phenotype of drug metabolizing enzymes and transporters.
- Strategies for accurate prediction of drug disposition, and pharmacokinetic/pharmacodynamic (PK/PD) studies (vancomycin, tacrolimus, etc).

Therapeutic drug monitoring
**Health Service Center**

Health service center provides various annual health-checkups, health counselling and education to the students and university staff. We also provide clinical services at our outpatient clinics. Our search divisions are targeting elucidation of predictive factors of various diseases, presymptomatic diagnosis of fatal diseases and mechanisms of common disorders in young adults.

- Health management
  - Annual health-checkups for students and the university staff
  - Health counseling and education
- Clinical services at our outpatient clinics, including Internal Medicine, Psychiatry etc.
- Research divisions
  - Genetic and MRI diagnosis of cardiovascular diseases
  - Genetic mechanisms of psychiatric disorders
  - Predictors of malignancy in the stomach
  - Hypertensive genes and hemodynamics in the ocular fundi
  - Genetic analysis of asthma
  - Immune responses and cardiovascular disorders
  - Predictors of forthcoming cognitive dysfunction in the elderly

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**The International Research Center for Medical Education and Research**

http://www.ircme.u-tokyo.ac.jp/

The International Research Center for Medical Education was installed as a joint educational study institution to promote interdisciplinary research on medical education and international cooperative studies in relation to medical education. This center consists of three sections: the medical educational international cooperation study section: the medical educational international cooperation enterprise plan coordination and information section: and the guest professor section.

- Medical education theory / method
- Medical education curriculum / technique / evaluation
- Needs of medical educational international cooperation
- Strategies for international cooperation in medical education
- Evaluation method of international cooperation enterprises in medical education
- International cooperation in the field of medical education, drafting, enforcement
- Network formation to promote international cooperation in the field of medical education
- Database development study on international cooperative information in the field of medical education

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Prof. Noel (Oregon Univ.) at his final lecture
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