**Molecular Pharmacology**

**Diseases**: Central nervous system (Brain, retina, and spinal cord)
- Investigate pathology of diseases
- Generate animal disease model
- Evaluate effect of drug

**Animals**
- Zebrafish
- Mouse
- Common Marmoset

**Themes**
- Stroke, mental illnesses, and Amyotrophic lateral sclerosis
- Glaucoma and Age-related macular degeneration
- Muscular dystrophy and Spinal muscular atrophy using iPS cells

**Stuffs**
- Professor Hideaki Hara
- Associate Proof. Masamitsu Shimazawa
- Assistant Professor Shinsuke Nakamura

**Analysis of the optic nerve denaturation using PET/MRI**

- A non-invasive retina section scan
- Pharmacometrics using iPS cells derived from the patients

- The establishment of iPS cells derived from a human patient and differentiation instruction

- Cerebral ischemia and hemorrhage model
- ALS model mice

**Research of mental illnesses using several behavioral tests**

**Study to be mediator of Death Valley considering Innovative drug development**
45 Members

**CNS**
- **Stroke (5 persons)**
  - Research 2 persons D2, B6, B5, 1 person
- **Mental illness (7 persons)**
  - D3, D2, D1, M2, B6, B5, B4, 1 person
- **Neurodegenerative disease (4 persons)**
  - D3, B6, B5, B4, 1 person
- **iPS cell (5 persons)**
  - D2, D1, M2, B5, B4, 1 person

**Retina**
- **Neuroprotection (4 persons)**
  - D3, M1, 1 person, B6, 2 persons
- **Angiogenesis (5 persons)**
  - D4, D3, M2, M1, B4, 1 person

**in vitro (10 persons)**
- Research 3 persons
  - D2, M2, B6, 1 person, M1, B4, 2 persons

**Staffs**
- **Hideaki Hara**
  - Professor
- **Masamitsu Shimazawa**
  - Associate Professor
- **Shinsuke Nakamura**
  - Assistant Professor
- **Yoshiko Iwata**
  - Secretary
Brief introduction

Gifu Pharmaceutical University

Established in 1932
Students 800
Staffs 100

Hideaki HARA, PhD., R.Ph.
Vice President
Molecular Pharmacology,
Gifu Pharmaceutical University
Where we are

Japan

Gifu Pref.
Scenic Gifu Prefecture

Gifu-jyo Castle
Nagara river

Gifu City

fireworks at Nagara river

Takayama Festival

Cormorant fishing
Nobunaga Oda (Samurai lord)

North part of Gifu (Japanese Alps)
Mitahora Campus

From BSc1 to BSc3
Headquarters

Built in 2009

From BSc4 to BSc6, MSc, PhD
GPU's Pharmacy

Gifu University Hospital

School of Medicine

School of Engineering

Headquarters

School of Veterinary Sciences

Animal hospital

GPU and Gifu Univ.
Our sciences and drug development

STEP 1
Drug screening
- Pharmacognosy
- Natural Resources

STEP 2
Target validation
- Radiochem

STEP 3
Preclinical test
- Med Therapeutics
  - **Mol Pharmacology**
- Pharm Engineering
  - Pharm Physical Chem
  - Pharm Analytical Chem

STEP 4
Clinical trials
- PMS & Practice
- Pharmaceutics
  - Global Regulatory Science

STEP 5

- Clinical Pharmacy studies
- Community Pharmacy
- Drug Information
- Pharmacy Practice & social science

- Molecular biology
- Biochemistry
- Pharmacology
- Microbiol & Immunol
- Hyg Chem & Toxicol
- Clin Pharmaceutics

- Organic Chemistry
## Representative drugs developed by GPU

<table>
<thead>
<tr>
<th>Generic name (application)</th>
<th>Brand name</th>
<th>Company</th>
<th>On the Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aminopropylon (anti-inflammatory analgesic)</td>
<td>Obelon</td>
<td>Nippon Shinyaku</td>
<td>1958</td>
</tr>
<tr>
<td>Ethyl piperidinoacetylaminobenzoate (gastritis treatment)</td>
<td>Sulcain</td>
<td>Nippon Shinyaku</td>
<td>1967</td>
</tr>
<tr>
<td>Emorfazone (anti-inflammatory analgesic)</td>
<td>Pentoil</td>
<td>SANDOZ</td>
<td>1982</td>
</tr>
<tr>
<td>Tranilast (anti-allergic drug)</td>
<td>Rizaben</td>
<td>KISSEI Pharma</td>
<td>1984</td>
</tr>
<tr>
<td>Bucolome (anti-gout agents)</td>
<td>Paramidin</td>
<td>ASKA Pharma</td>
<td>1989</td>
</tr>
<tr>
<td>Suplatast Tosilate (anti-allergic drug)</td>
<td>IPD</td>
<td>TAIHO Pharma</td>
<td>1995</td>
</tr>
</tbody>
</table>
## External Funds

#30 out of approx. 800 universities!

<table>
<thead>
<tr>
<th>Rank</th>
<th>University</th>
<th>Funds (¥)/ researcher</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Univ. Tokyo</td>
<td>16,516,277</td>
</tr>
<tr>
<td>2</td>
<td>Kyoto Univ.</td>
<td>13,789,541</td>
</tr>
<tr>
<td>3</td>
<td>Tokyo Inst. Tech</td>
<td>12,110,037</td>
</tr>
<tr>
<td>29</td>
<td>Fukushima Pref. Univ.</td>
<td>3,877,636</td>
</tr>
<tr>
<td>30</td>
<td>GPU</td>
<td>3,798,321</td>
</tr>
<tr>
<td>31</td>
<td>Nagasaki Univ.</td>
<td>3,732,452</td>
</tr>
</tbody>
</table>

From the 2015 University ranking report (Asahi Newspaper)
# Grants-in-aid from MEXT (government)

## #21 out of all 800 universities

<table>
<thead>
<tr>
<th>Rank</th>
<th>University</th>
<th>Grant (¥)/researcher</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Univ. Tokyo</td>
<td>9,567,953</td>
</tr>
<tr>
<td>2</td>
<td>Kyoto Univ.</td>
<td>7,530,962</td>
</tr>
<tr>
<td>3</td>
<td>Tokyo Inst. Tech</td>
<td>6,509,543</td>
</tr>
<tr>
<td>4</td>
<td>Osaka Univ.</td>
<td>6,069,458</td>
</tr>
<tr>
<td>5</td>
<td>Nagoya Univ.</td>
<td>6,022,415</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Tsukuba Univ.</td>
<td>2,665,961</td>
</tr>
<tr>
<td>21</td>
<td>GPU</td>
<td>2,640,000</td>
</tr>
<tr>
<td>22</td>
<td>Hiroshima Univ.</td>
<td>2,621,118</td>
</tr>
</tbody>
</table>

From the 2015 University ranking report (Asahi Newspaper)