#### Division of Pharmaco-Physical Chemistry Department of Biophysical Sciences

### Outline

The Department of Biophysical Sciences offers three fields of study—physical chemistry, analytical chemistry, and radiochemistry. The laboratory of Pharmaco-Physical Chemistry provides both basic and advanced educational programs related to physical chemistry in basic pharmaceutical sciences for undergraduates and graduate students. Our current research focuses on three areas and is conducted based on biophysical, bioorganic, and bioanalytical chemistry: 1) X-ray crystallographic analysis of biologically significant proteins, 2) characterization of enzymes responsible for steroid biosynthesis, 3) development of simple and ultrasensitive methods for assay of clinically important biomolecules.

#### **Faculty members**

Professor : Teruki Yoshimura, Ph.D. Instructor : Chiaki Okada, M.S. Instructor : Masaki Nagase, B.Pharm.

## Main research

1) Structural studies of enzymes involved in endotoxin synthetic pathway.

- 2) Structural studies of enzymes involved in ergosterol synthetic pathway.
- 3) Characterization of the enzymes responsible for steroid biosynthesis.
- 4) Development of simple and ultrasensitive methods for assay of clinically important biomolecules.

# **Current publications**

- Quantification of HPV16 E7 Oncoproteins in Urine Specimens from Women with Cervical Intraepithelial Neoplasia. D Makioka, M Inada, M Awano, E Saito, T Shinoda, S. Abe, T Yoshimura, M Müller, T Sasagawa, E Ito, *Microorganisms*, 12, 120, 2024.
- Non-amplification Nucleic Acid Detection with Thio-NAD Cycling, J. Microbiol. Methods, S Yamura, N Kawada, S Yamakado, Y Kyosei, S Watabe, T Yoshimura, Y Murase, S Mitara, E Ito, *J. Microbiol. Methods*, 204, 106647, 2023.
- Expression, Purification, and preliminary X-ray Crystal Diffraction Analysis of the Saccharomyces cerevisiae Phosphomevalonate Kinase, C Suzuki, M Nagase, T Yoshimura, M Ishizaka, T Ose, M Yao, C Okada, *Crystallography Reports*, 68, 57-61, 2023.
- Synthesis and Biological Evaluation of Coumarin Derivatives as Selective CYP2A6 Inhibitors, Y Yamaguchi, N Nishizono, D Kobayashi, T Yoshimura, K Wada, K Kobayashi, K Oda, *Bioorg. Med. Chem. Lett.*, 86, 129206, 2023.
- Removal of Soluble ACE2 in VeroE6 Cells by 17β-Estradiol Reduces SARS-CoV2 Infectivity, Y Kyosei, T Yoshimura, E Ito, *Biol. Pharm. Bull.*, 46, 1842-1845, 2023.
- Advanced Detection Method for Dengue NS1 Protein Using Ultrasensitive ELISA with Thio-NAD Cycling, P-K Chen, J-H Chang, L-Y Ke, J-K Kao, C-H Chen, R-C Yang, T Yoshimura, E Ito, *Viruses* 15, 1894, 2023. https://doi.org/10.3390/v15091894
- Changes in Protein Phosphorylation by Insulin Administration in the Central Nervous System of the Gastropod Mollusk Lymnaea Stagnalis, J Nakai, K Namiki, Y Totani, S Yasumasu, T Yoshimura, T Aoki, E Ito, *Biophys. Physicobiol.*, 2023., https://doi.org/10.2142/biophysico.bppb-v20.0038
- Ultrasensitive ELISA Detection of Proteins in Separated Lumen and Membrane Fractions of Cancer Cell Exosomes, K Iha, N Tsurusawa, H-Y Tsaibc, M-W Lin, H Sonodae, S Watabe, T Yoshimura, E Ito, *Anal. Biochem.*, 654 (1), 114831, 2022.
- Gastric Cancer Cell-Derived Exosomal GRP78 Enhances Angiogenesis upon Stimulation of Vascular Endothelial Cells, K Iha, A Sato, H-Y Tsai, H Sonoda, S Watabe, T Yoshimura, M-W Lin, E Ito, *Curr: Issues Mol. Biol.*, 44, 6145–6157, 2022.
- Early Diagnosis with Ultrasensitive ELISA, E Ito, K Iha, T Yoshimura, K Nakaishi, S Watabe, *Advances in Clinical Chemistry*, 101,121-133, 2021.
- Antigen Tests for COVID-19, Y Kyosei, S Yamura, M Namba, T Yoshimura, S Watabe, E Ito, *Biophys. Physicobiol.*, 18, 28–39, 2021.
- Zeptomole Detection of an Enzyme by a Simple Colorimetric Method, K Iha Y Kyosei, M Namba, D Makioka, S Yamura, S Watabe, T Yoshimura, E Ito, *Anal. Sci.*, 37, 1469-1472, 2021.
- Improved Detection Sensitivity of an Antigen Test for SARS-CoV-2 Nucleocapsid Proteins with Thio-NAD Cycling, Y Kyosei, M Namba, S Yamura, S Watabe, T Yoshimura, T Sasaki, T Shioda, E Ito, *Biol. Pharm. Bull.*,44 (9), 1332-1336, 2021.
- Ultrasensitive Detection of SARS-CoV-2 Spike Proteins Using the Thio-NAD Cycling Reaction: A Preliminary Study before Clinical Trials, Y Kyosei, M Namba, D Makioka, A Kokubun, S Watabe, T Yoshimura, T Sasaki, T Shioda, E Ito, *Microorganisms*, 9 (11), 2214-2222, 2021.
- Modified ELISA for Ultrasensitive Diagnosis, N Tsurusawa, J Chang, M Namba, D Makioka, S Yamura, K Iha, Y Kyosei, S Watabe, T Yoshimura, E Ito, *J. Clin. Med.*, 10, 5197-5210, 2021.
- An Adult Case of Generalized Convulsions Caused by the Ingestion of Ginkgo biloba Seeds with Alcohol, F Azuma, K

Nokura, T Kako, D Kobayashi, T Yoshimura, K Wada, Internal Medicine, 59(12), 1555-1558, 2020.

- Urinary Adiponectin as a New Diagnostic Index for Chronic Kidney Disease Due to Diabetic Nephropathy, S Yamakado, H Cho, M Inada, M Morikawa, Y-H Jiang, K Saito, K Nakaishi, S Watabe, H Takagi, M Kaneda, A Nakatsuma, M Ninomiya, H Imachi, T Arai, T Yoshimoto, K Murao, J-H Chang, S-M Chen, Y-C Shih, M-J Zeng, L-Y Ke, C-H Chen, T Yoshimura, T Miura, E Ito, *BMU Open Diab. Res. Care*, 0:e000661, 2019.
- Ultrasensitive ELISA Developed for Diagnosis, K Iha, M Inada, N Kawada, K Nakaishi, S Watabe, Y H Tan, C Shen, L-Y Ke, T Yoshimura, E Ito, *Diagnostics*, 9,78 2019.
- Synthesis of N-ω-Phenylalkyl-4-(p-Chlorophenyl)-Piperidin-4-ol Analogues with Potent Antiproliferative Activity Against HCT-116 Cells, N Hatae, E Kujime, K Yano, M Kizuka, R Ashida, T Choshi, T Nishiyama, C Okada, T Iwamura, T Yoshimura, *Heterocycles*, 97(1), 560-568 2018.
- Synthesis of β-Dihydropyrrolyl and β-Pyrrolyl Acrylates and Their Antiproliferative Activity against HCT-116 and HL-60 Cells, N Hatae, Y Sakai, K Yorozu, C Okada, M Yoshimatsu, T Yoshimura, *Heterocycles*, 95(1) 557 -567 2017.
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- Antiproliferative activity of hybrid compounds between 6-methoxy-3-(4-methoxyphenyl)-1*H*-indole and 4-phenylpiperidine against HCT-116 and HL-60 cells, N Hatae, T Nishiyama, S Tamura, R Y, A Matsui, H Shinchi, S Hibino, C Okada, T Yoshimura, T Choshi, E Toyota, *Heterocycles*, 93 (1), 440-452 2016.
- Concise Synthesis of Carbazole-1,4-Quinones and Evaluation of Their Antiproliferative Activity against HCT-116 and HL-60 Cells, T Nishiyama, N Hatae, T Yoshimura, S Takaki, T Abe, M Ishikura, S Hibino, T Choshi, Eur. J. med. Chem., 121, 561-577 2016.
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- Detection of HIV-1 p24 at Attomole Level by Ultrasensitive ELISA with Thio-NAD Cycling, A Nakatsuma, M Kaneda, H Kodama, M Morikawa, S Watabe, K Nakaishi, M Yamashita, T Yoshimura, T Miura, M Ninomiya1, E Ito, *PLoS One*, 10(6), e0131319 2015.
- Decrease in Pyridoxal-5'-Phosphate Concentration and Increase in Pyridoxal Concentration in Rat Plasma by 4'-O-Methylpyridoxine Administration, D Kobayashi, T Yoshimura, A Johno, M Ishikawa, K Sasaki, K Wada, *Nurition Res.*, 35, 637-642 2015.
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