

# **Osaka Prefecture University Graduate School of Life and Environmental Sciences, Department of Veterinary Science, in Rinku Campus (2016)**





## Welcome

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Osaka Prefecture University (OPU), one of the largest public universities in Japan, is a leading advanced research university. Located in southern Osaka, OPU consists of 4 colleges (comprising 13 undergraduate schools) and 7 graduate schools, distributed across three modern and comfortable campuses: Nakamozu (the main campus), Habikino, and Rinku. It also has satellite campuses in the central Osaka. At each campus, 6,200 undergraduate and 1,900 graduate students pursue their academic interests with advanced, cutting-edge facilities under the supervision of 700 assigned faculty members.

OPU has been expanding its overseas network, especially in Southeast Asia. As of January 21, 2016, OPU has relationships with 154 partner institutions in 37 countries and regions. OPU conducts pioneering research in collaboration with these institutions and promotes student exchange. Please refer to the following OPU website for information about OPU's Worldwide Research and Education Network.

[http://www.osakafu-u.ac.jp/english/info/overview/international\\_exchange.html](http://www.osakafu-u.ac.jp/english/info/overview/international_exchange.html)

OPU actively accepts international students from around the world to promote the internationalization of its education and research. Currently, about 200 international students (including exchange students) from 18 countries and regions are studying at OPU. More than 50 international exchange students from our overseas partner institutions visit our campus every year.

Since April 2009, OPU the Division of Veterinary Science has transferred to our new Rinku Campus located on the shore across from Kansai International Airport. On this new campus, the Veterinary Medical Center and Education and

Research Center for Experimental Animal Science have been housed in an education/research building under the department. Due to this move, undergraduate students in the first year of veterinary science who completed their general subject courses and core courses for their major at the Nakamozu Campus will take their major courses from the second year onwards at the Rinku Campus.

Leading the world in producing cutting-edge research at the Rinku Campus that is equipped with state-of-the-art facilities, the course aims to foster specialists with creative leadership in various areas such as an advanced medical treatment for animals, food safety, communicable diseases between humans and animals, life science and animal biotechnology research. This is an opportunity to provide an overview of the scientific activities of our departments, ... by this pamphlet.

As you will discover, research activities cover clinical sciences, veterinary medicine and basic sciences, resulting in an impressive number of original publications, typically part of doctoral theses listed at the end of the document.

We are looking forward to your continued support and cooperation.



Professor Tadayoshi  
Takeuchi: The head  
of the Division of  
Veterinary Science



Professor Kazumi  
Sasai: The head of  
the Department of  
Veterinary Science

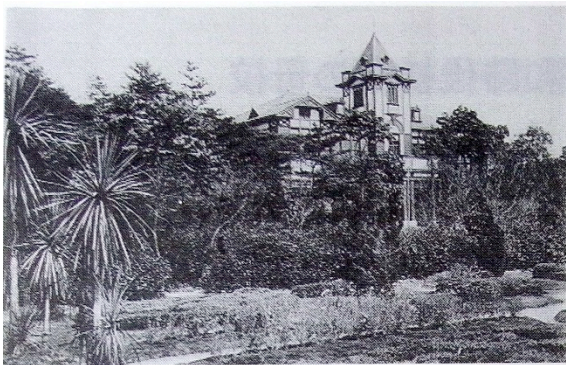


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## History

The Osaka Prefecture University Department of Veterinary Science has one of the richest traditions of any veterinary school in the country, dating back to its founding as a training school for veterinary science (Jyuigaku-Kosyujo) in 1883 in Kita-ku, Osaka city.

In 1888, Osaka-Furitsu-Nogakko was founded and contained Department of Veterinary Science and Department of Agriculture in Sakai-ku, Sakai city. The campus started running out of space due to facility improvements, and moved to Ikuno-ku, Osaka city in 1890. The new school site is commonly known as Katsuyama, which is a hill known to be one of the historical sites associated with the Osaka Campaign ("Osaka-no-jin") in the 17th century. The school was named Kachiyama Nogakko, after the hill.



Kachiyama Nogakko from 1890 to 1925

In 1926, the area around Osaka-Furitsu-Nogakko became urbanized and the campus of the school was relocated again to Daisen-cho in Sakai city. Taking advantage of the relocation to the Daisen school building, a campaign to upgrade the school to a higher education institution was initiated.



Daisen School from 1926 to 1968

In 1949, when universities were established under the new education system, Naniwa-Daigaku was established by the merger of seven technical schools in Osaka, each of which had a different campus. It placed a strong emphasis on "practical learning," thus offering the courses in the areas of engineering, agriculture, economics, integrated arts and sciences and social welfare. In 1955, Naniwa Daigaku was renamed Osaka Prefecture University. In the 1960s, departments which were dispersed on different campuses were moved to the Nakamozu Campus and this formed the basic system on which the current Nakamozu Campus developed.



Nakamozu Campus (the main campus) from 1969

In 2009, the Department and Division of Veterinary Science, and the Veterinary Medical Center have transferred to our new Rinku Campus located on the shore across from Kansai International Airport. The veterinary sciences department is carrying out improved faculty development programs at the new facilities, which are equipped with the latest educational and research equipment.



Rinku Campus from 2009

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## Organization

Veterinary science, a comprehensive science focused on animal treatment, tackles various issues deeply related to the health and safety of animals and humans and the welfare of the local society: (1) the enhancement of animal treatment, (2) the threat of amphiexenosis due to the increase in the international movement of people and animals and also distribution of livestock products, (3) the improvement of livestock production efficiency using biotechnology, (4) the development of new medicine, and (5) the safety evaluation of foods and pharmaceuticals.

The Division of Veterinary Science aims to develop (1) specialists in veterinary learning, view, and technique who are capable of integrating specialized knowledge and technique in the domain of applied animal science, (2) specialists

capable of contributing to the diagnosis and treatment of animals and public hygiene, and (3) international specialists capable of exhibiting innovative leadership in biomedical fields related to both animals and humans.

Since April 2009, the Division of Veterinary Science has transferred to our new Rinku Campus located on the shore across from Kansai International Airport. On this new campus, the Veterinary Medical Center and Education and Research Center for Experimental Animal Science have been housed in an education/research building under the department. The division is carrying out improved faculty development programs at the new facilities, which are equipped with the latest educational and research equipment.

### Organization Chart of Division of Veterinary Science

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#### Veterinary Science

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##### Structural and Functional Biosciences for animals

Integrated Structural Biosciences

Integrated Functional Biosciences

##### Veterinary Environmental Sciences

Bioenvironmental Sciences

Infectious Diseases Control

##### Veterinary Clinical Sciences

Advanced Pathobiology

Advanced Clinical Medicine

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## Laboratory of Veterinary Anatomy

Professor Kazushige Ogawa  
Associate Professor Takayuki Nakajima

### Research Interest:

The major research interest of **K. Ogawa** is whether Eph receptor tyrosine kinases and ephrin ligands may regulate cytoarchitecture in various tissues once development is completed. The roles of Eph receptors and ephrins have been extensively characterized in developing tissues. Different biological functions have been attributed to these proteins, including regulation of tissue-border formation, axon guidance, cell migration and vascular development. However, little is known about the localization and functions of these proteins in normal adult organs.

**T. Nakajima** studies the molecular and biochemical mechanisms in brain after cerebral ischemia using rat models of cerebral ischemia. Cerebral infarction as results of occlusion of cerebral arteries have long been major health problem. Investigation on molecular and biochemical mechanisms after cerebral ischemia would help in designing novel strategies for therapy of brain infarction.

### Key words:

Eph, ephrin, Tissue organization, Angiogenesis, Brain ischemia, Neuronal cell death

### Publications:

1. N. Saeki, S. Nishino, T. Shimizu, **K. Ogawa**. EphA2 promotes cell adhesion and spreading of monocyte and monocyte/macrophage cell lines on integrin ligand-coated surfaces. **Cell Adh. Migr.**, 9(6): 469-482, 2015; doi: 10.1080/19336918.2015.1107693.
2. S. Uchiyama, N. Saeki, **K. Ogawa**. Aberrant EphB/ephrin-B expression in experimental gastric lesions and tumor cells. **World J. Gastroenterol.**, 21(2): 453-464, 2015; doi: 10.3748/wjg.v21.i2.453.
3. **T. Nakajima**, R. Hata, T. Kondo, S. Takenaka. Proteomic analysis of the hippocampus in naïve and ischemic-preconditioned rat. **J. Neurol. Sci.**, 358 : 158-171. 2015.
4. **T. Nakajima**, M. Yanagihara and H. Nishii. Temporal and regional patterns of Smad activation in the rat hippocampus following global ischemia. **J. Neurol. Sci.**, 337 : 25-37, 2014.
5. **K. Ogawa**, N. Saeki, Y. Igura and Y. Hayashi. Complementary expression and repulsive signaling suggest that EphB2 and ephrin-B1 are possibly involved in epithelial boundary formation at the squamocolumnar junction in the rodent stomach. **Histochem. Cell Biol.**, 140:659-675, 2013; doi: 10.1007/s00418-013-1129-2.
6. M. Ishii, I. Mueller, T. Nakajima, E.B. Pasquale and **K. Ogawa**. EphB signaling inhibits gap junctional intercellular communication and synchronized contraction in cultured cardiomyocytes. **Basic Res. Cardiol.**, 106:1057-1068, 2011; doi: 10.1007/s00395-011-0219-3.
7. **T. Nakajima**, S. Ochi, C. Oda, M. Ishii and K. Ogawa. Ischemic preconditioning attenuates of ischemia-induced degradation of spectrin and tau: implications for ischemic tolerance. **Neurol. Sci.**, 32:229-239, 2011.
8. **K. Ogawa**, N. Takemoto, M. Ishii, I. Mueller, E. B. Pasquale, T. Nakajima. Complementary expression and repulsive signaling suggest that EphB receptors and ephrin-B ligands control cell positioning in the gastric epithelium. **Histochem. Cell Biol.**, 136:617-636, 2011; doi: 10.1007/s00418-011-0867-2.

## Laboratory of Veterinary Pathology

Professor Jyoji Yamate  
Associate Professor Mitsuru Kuwamura  
Associate Professor Takeshi Izawa

### Research Interest

Common project: Diagnostic pathology for companion, zoo and laboratory animals.

Using chemically-induced hepatic and renal fibrosis, **J. Yamate** has investigated the complicated pathogenesis with regards to M1/M2 macrophage polarization and myofibroblasts. Additionally, transplantable rat models have been established in terms of stem cell differentiation and applications for biomedical sciences *in vivo* and *in vitro*.

**M. Kuwamura** studies rat and mouse mutants with neurological disorders pathologically. He is also interested in pathological aspects of diseases in companion and

domestic animals and comparison.

**T. Izawa** has studied on the key factors involved in the development of intractable diseases such as liver cirrhosis by molecular pathological approaches (i.e. DNA microarray, laser microdissection) using rodent models.

### Key words:

Fibrosis, Macrophage function, Mesenchymal differentiation, Tumor models, Neurodegeneration, Animal models, Liver cirrhosis, Cytokines, Expression profile

## Publications:

1. A. Bondoc, C. Katou-Ichikawa, H. M. Golbar, M. Tanaka, **T. Izawa, M. Kuwamura, J. Yamate**. Establishment and characterization of a transplantable tumor line (RMM) and cell line (RMM-C) from a malignant amelanotic melanoma in the F344 rat, with particular reference to galectin-3 expresison in vivo and in vitro. *Histol. Histopathol.*, in press.
2. M. Tanaka, **T. Izawa, J. Yamate**, R. J. Franklin, T. Kuramoto, T. Serikawa, M. Kuwamura. Glia. The VF rat with abnormal myelinogenesis has a mutation in Dopey1. *Glia*. 62:1530-42, 2014.
3. **T. Izawa**, T. Horiuchi, M. Atarashi, **M. Kuwamura, J. Yamate**. Anti-fibrotic role of miR-214 in thioacetamide-induced liver cirrhosis in rats. *Toxicol. Pathol.* 43:844-51, 2015.

## Laboratory of Laboratory Animal Science

Professor

Toshiya Okada

Assistant Professor

Tomohiro Kondo

## Research Interest:

**T. Okada** and **T. Kondo** research work focuses on the development, improvement and biological differences of laboratory animals. The present major studies are:

- (1) Developmental studies of laboratory animals during perinatal period.
- (2) Effects of environmental factors on the development of laboratory animals.
- (3) Development and improvement of animal models for human diseases.
- (4) Studies on the species and strain differences in laboratory animals.
- (5) Genetic analysis in laboratory animals.

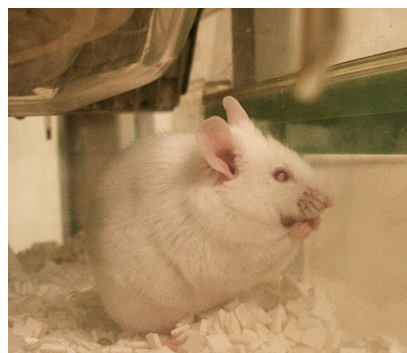
## Key words:

Behavioral Analysis, Cataract, Cerebral Ischemia, Environmental Enrichment, Fetal Growth Restriction, Genetic Analysis, Intrauterine Growth Retardation, Renal Development

## Publications:

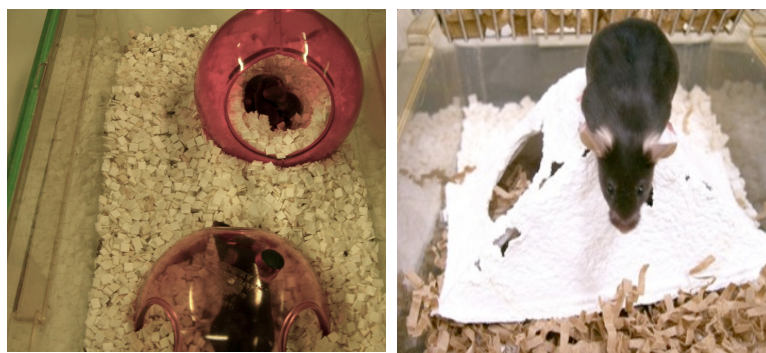
1. Yuasa K, **Kondo T**, Nagai H, Mino M, Takeshita A, **Okada, T**. Maternal protein restriction that does not have an influence on the birth weight of the offspring induces morphological changes in kidneys reminiscent of phenotypes exhibited by intrauterine growth retardation rats. *Congenit. Anom.*,56(2): 79-85, 2016.
2. **Kondo T**, Kitano-Amahori Y, Nagai H, Mino M, Takeshita A, Kusakabe KT, **Okada T**. Effects of maternal subtotal nephrectomy on the development of the fetal kidney: A morphometric study. *Congenit. Anom.*, 55(4): 178-182, 2015.
3. **Kondo T**, Nagai N, Kawashima T, Taniguchi Y, Koyabu N, Takeshita A, Kusakabe KT, **Okada T**. Hereditary and histological characteristics of a new cataract mouse model originating from CF#1 strain (CF#1/b cac). *Comp. Med.*, 64(5): 360-368, 2014.
4. Takeshita A, Kusakabe KT, Hiyama M, Kuniyoshi N, **Kondo T**, Kano K, Kiso Y, **Okada T**. Dynamics and reproductive effects of complement factors in the spontaneous abortion model of CBA/J x DBA/2 mice. *Immunobiology*, 219 (5): 385-391, 2014.
5. **Kondo T**, Ishiga-Hashimoto N, Nagai H, Takeshita A, Mino M, Morioka H, Kusakabe KT, **Okada T**. Expression of transforming growth factor  $\beta$  (TGF $\beta$ ) and fibroblast growth factor 2 (FGF2) in the lens epithelium of Morioka cataract (MCT) mice. *Congenit. Anom.*, 54 (2): 104-109, 2014.
6. **Okada T**, Kataoka Y, Takeshita A, Mino M, Morioka H, Kusakabe KT, **Kondo T**. Effects of transient forebrain ischemia on the hippocampus of the Mongolian Gerbil (*Meriones unguiculatus*): An immunohistochemical study. *Zool. Sci.*, 30(6): 484-489, 2013.

## Morioka cataract (MCT) mouse



a new cataract mouse model originated in the ddY strain

## Enrichment material



left: plastic igloo and plastic crawl ball, right: paper house



## Laboratory of Integrative Physiology

Professor	Yoichi Nakamura
Associate Professor	Mitsuaki Moriyama
Associate Professor	Katsura Takano

### Research Interest:

In the central nervous system, there are three kinds of glial cell other than neurons: astrocytes, oligodendrocytes, and microglia. They play important roles in both pathological and physiological conditions. Goal of our research is to elucidate the glial regulation mechanism of inter- and intracellular signaling using glial cell cultures as basic experimental systems, with biochemical, immunological, morphological techniques, and so on. Current interest is focused on glial functions, such as NO, cytokines and neurotrophic factors production, transglutaminase, superoxide dismutase, sugar and amino acid metabolism, and phagocytosis: in order to elucidate the mechanisms of prion diseases, neurodegenerative diseases, sleep, traumatic brain injury, and brain ischemia.

### Key words:

Astrocytes, Microglia, Neurodegenerative diseases, Prion diseases, Sleep, Traumatic brain injury, Transglutaminase, Extracellular superoxide dismutase, Phagocytosis

### Publications:

1. M. Ogawa, **K. Takano**, K. Kawabe, **M. Moriyama**, **Y. Nakamura**. Theophylline potentiates lipopolysaccharide-

induced NO production in cultured astrocytes. **Neurochem. Res.**, 39: 107-116, 2014. doi: 10.1007/s11064-013-1195-9.

2. A. Motoyoshi-Yamashiro, **K. Takano**, K. Kawabe, T. Izawa, H. Nakajima, **M. Moriyama**, **Y. Nakamura** Amphotericin B induces glial cell line-derived neurotrophic factor in rat brain. **J. Vet. Med. Sci.**, 76:1353-8, 2014. doi: 10.1292/jvms.14-0160
3. K. Kawabe, **K. Takano**, **M. Moriyama**, **Y. Nakamura** Lipopolysaccharide-stimulated transglutaminase 2 expression enhances endocytosis activity in mouse microglial cell line BV-2. **Neuroimmunomodulation**, 22: 243-249, 2015. doi:10.1159/000365484
4. **K. Takano**, N. Tanaka, K. Kawabe, **M. Moriyama**, **Y. Nakamura**. Extracellular superoxide dismutase induced by dopamine in cultured astrocytes. **Neurochem. Res.**, 38: 32-41, 2013. doi: 10.1007/s11064-012-0882-2
5. A. Motoyoshi-Yamashiro, M. Tamura, **M. Moriyama**, **K. Takano**, K. Kawabe, H. Nakajima, R. Katoh-Semba, T. Furuichi, **Y. Nakamura**. Activation of cultured astrocytes by amphotericin B: Stimulation of NO and cytokines production and changes in neurotrophic factors production. **Neurochem. Int.**, 63: 93-100, 2013. doi: 10.1016/j.neuint.2013.05.007

## Laboratory of Veterinary Pharmacology

Professor	Tadayoshi Takeuchi
Associate Professor	Yasu-Taka Azuma
Associate Professor	Hidemitsu Nakajima

### Research Interest:

Transit of foods and contents from the mouth to the anus has received an exact control. The peristaltic movement in the gastrointestinal tract is regulated by the close interaction of cells such as the mucous, the enteric neurons, the smooth muscles, and the interstitial cells of Cajal that compose the intestines organization. However, the function of these cells is still a lot of uncertain points. Therefore, **T. Takeuchi** has elucidated the interactive mechanisms between them and their changes at the pathological condition and at the same time clarified their individual functions. Moreover, T. Takeuchi also pursue the identification of the inhibitory neurotransmitter and the change of its role by aging. First interest is whether cytokines, especially IL-19, produced by inflammation are able to act on mucosal immunology. Second interest is whether neurotransmitters and mediators, which are essential for regulating gastrointestinal motility,

are able to act on mucosal immunology. **Y.T. Azuma** is interested in understanding the relation of motility to immunity in gastrointestinal function.

H. Nakajima's major goal is to elucidate molecular mechanisms underlying neuronal cell death with the aggregation of a multifunctional protein GAPDH, which has been first identified at our lab. Also, **H. Nakajima** has discovered an inhibitor of GAPDH aggregation with some patents. The projects are going up with techniques of molecular biology, cell biology and genetically-modified animals established by our labs.

### Key words:

peroxisome, protein import, pexophagy, plasmalogen, clinical biochemistry, nutrition, mass spectrometry, vitamins, cobalamin

### Publications:

1. **Y.T. Azuma**, S. Hayashi, K. Nishiyama, S. Kita, K. Mukai, **H. Nakajima**, T. Iwamoto, **T. Takeuchi**. Na<sup>+</sup>/Ca<sup>2+</sup> exchanger-heterozygote knockout mice display increased relaxation in gastric fundus and accelerated gastric transit *in vivo*. **Neurogastroenterol. Motil.**, 2016 (in press)
2. **Y.T. Azuma**, N. Samezawa, K. Nishiyama, **H. Nakajima**, **Takeuchi T**. Differences in time to peak carbachol-induced contractions between circular and longitudinal smooth muscles of mouse ileum. *Naunyn-Schmiedeberg's Archives of Pharmacology*, 2016 (in press)
3. M. Itakura, **H. Nakajima**, T. Kubo, Y. Semi, S. Kume, S. Higashida, A. Kaneshige, M. Kuwamura, N. Harada, A. Kita, **Y.T. Azuma**, R. Yamaji, T. Inui, **T. Takeuchi**. GAPDH aggregates accelerate Amyloid- $\beta$  amyloidogenesis in Alzheimer Disease. **J. Biol. Chem.**, 290(43): 26072-26087, 2015.
4. **H. Nakajima**, T. Kubo, H. Ihara, T. Hikida, T. Danjo, M. Nakatsuji, N. Shahani, M. Itakura, Y. Ono, **Y.T. Azuma**, T. Inui, A. Kamiya, A. Sawa, **T. Takeuchi**. Nuclear-translocated GAPDH Promotes Poly(ADP-ribose) Polymerase-1 Activation during Oxidative/Nitrosative Stress in Stroke. **J. Biol. Chem.**, 290(23): 14493-14503, 2015 .

## Laboratory of Cellular and Molecular Biology

Professor

Associate Professor

Masayuki Komori

Shigeo Takenaka

### Research Interest:

**Komori:** Peroxisomes are subcellular organelles found in virtually all eukaryotic cells and function in a wide variety of metabolic pathways including biosynthesis of cholesterol, bile acids, dolichol, and ether phospholipids. Peroxisomal dysfunctions in human lead to severe abnormalities that are often lethal such as Zellweger syndrome. My research interests are 1) molecular mechanism of peroxisome biogenesis and degradation (pexophagy), 2) biological significance of ether lipids (plasmalogens) in mammals, and 3) heterologous expression of useful proteins in methylotrophic yeast.

**Takenaka:** One of my interests is to develop methods for diagnosing diseases and predicting their prognosis using mass spectrometry-based metabolic profiling, especially in nervous and metabolic diseases in veterinary fields. Another interest focused on is to explore functions of vitamin B<sub>12</sub> (cobalamin), a cobalt containing soluble vitamin. It is well known to be involved in anti-pernicious anemia, branched chain-amino acids and C1-metabolism, but its functions on neural function are remained to be elucidate.

### Key words:

peroxisome, protein import, pexophagy, plasmalogen, clinical biochemistry, nutrition, mass spectrometry, vitamins, cobalamin

### Publications:

1. Shimada, T, **Takenaka, S**, Murayama, N, Yamazaki, H, Kim, JH, Kim, D, Yoshimoto, F, Guengerich, FP, and **Komori, M**. Oxidation of acenaphthene and acenaphthylene by human cytochrome P450 enzymes. **Chem. Res. Toxicol.**, 28: 268-278, 2015.
2. Kawabe, M, Baba, Y, Tamai, R, Yamamoto, R, **Komori, M**, Mori, T, **Takenaka, S**. Plasma metabolite profiling of canine oral melanoma using gas chromatography mass spectrometry. **J. Vet. Med. Sci.**, 77: 1025-1028, 2015.
3. Tamai, R, Furuya, M, Hatoya, S, Akiyoshi, H, Yamamoto, R, Komori, Y, Yokoi, S, Tani, K, Hirano, Y, **Komori, M**, and **Takenaka, S**. Profiling of serum metabolites in canine lymphoma using gas chromatography mass spectrometry. **J. Vet. Med. Sci.**, 76: 1513-1518, 2014.
4. Shimada, T, Murayama, N, Yamazaki, H, Tanaka, K, **Takenaka, S**, **Komori, M**, Kim, D. and Guengerich, FP. Metabolic Activation of Polycyclic Aromatic Hydrocarbons and Aryl and Heterocyclic Amines by Human Cytochromes P450 2A13 and 2A6. *Chem Res Toxicol.*, 26,: 529-537, 2013.
5. Tanaka, K., Soeda, M., Hashimoto, Y., **Takenaka, S**. and **Komori, M**. Identification of phosphorylation sites in Hansenula polymorpha Pex14p by mass spectrometry, **FEBS Open Bio.**, 3: 6-10, 2012.



## Laboratory of Toxicology

Associate Professor  
Assistant Professor

Kazuhiko Nishimura  
Hiroshi Nakagawa

### Research Interest:

**K. Nishimura:** Erythropoiesis is indispensable to recovery of the anemia. However, the mechanism of erythropoiesis has many questions. I study the mechanism of erythropoietin production and the search of the substance which promotes erythropoietin production.

It is reported that the erythropoietin participates in mechanism of cell protection. I study the interaction of erythropoietin production and autophagy induction as the cell protective function.

**H. Nakagawa:** Newly synthesized proteins are transported from ER to Golgi apparatus through the COPII transport vesicles. The failure of COPII vesicle formation causes the ER stress and then leads to ER stress-induced apoptosis. I study the mechanism of the COPII vesicle transport.

### Keywords:

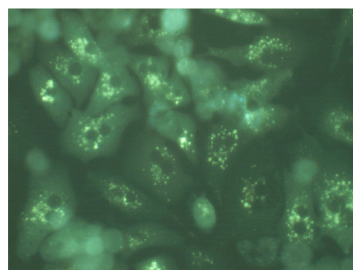
Autophagy, Endoplasmic reticulum stress, Vesicular transport, Programmed cell death, G protein, Apoptosis, Microflora, Anemia and Erythropoiesis

### Publications:

1. T. Bessho, T. Okada, C. Kimura, T. Shinohara, A. Tomiyama, A. Imamura, M. Kuwamura, **K. Nishimura**, K. Fujimori, S. Shuto, O. Ishibashi, B.K. Kubata, T. Inui. Novel Characteristics of Trypanosoma brucei Guanosine 5'-monophosphate Reductase Distinct from Host Animals. **PLoS Negl. Trop. Dis.**, 10, e0004339. doi: 10.1371/journal.pntd.0004339, 2016
2. A. Hinenoya, K. Shima, M. Asakura, **K. Nishimura**, T. Tsukamoto, T. Ooka, T. Hayashi, T. Ramamurthy, S.M. Faruque, S. Yamasaki. Molecular characterization of cytolethal distending toxin gene-positive *Escherichia*

*coli* from healthy cattle and swine in Nara, Japan. **BMC Microbiol.**, 14:97 doi: 10.1186/1471-2180-14-97, 2014

3. **K. Nishimura**, K. Tokida, H. Katsuyama **H. Nakagawa**, S. Matsuo. The effect of hemin-induced oxidative stress on erythropoietin production in HepG2 cells. **Cell Biol. Int.**, 38, 1321-1329, 2014
4. **K. Nishimura**, H. Katsuyama, **H. Nakagawa**, S. Matsuo. Stimulating Effect of Ethanol on Erythropoietin Production in the Liver Cells. **J. Metab. Syndr.**, 3, 164 doi: 10.4172/2167-0943.1000164, 2014
5. H. Matsumoto, S. Miyazaki, S. Matsuyama, M. Takeda, M. Kawano, **H. Nakagawa**, **K. Nishimura**, S. Matsuo. Selection of autophagy or apoptosis in cells exposed to ER-stress depends on ATF4 expression pattern with or without CHOP expression. **Biology Open**, 2(10), 1084-1090, 2013
6. **H. Nakagawa**, M. Ishizaki, S. Miyazaki, T. Abe, **K. Nishimura**, M. Komori, S. Matsuo. Sar1 translocation onto the ER-membrane for vesicle budding has different pathways for promotion and suppression of ER-to-Golgi transport mediated through H89-sensitive kinase and ER-resident G protein. **Mol. Cell Biochem.**, 366(1-2), 175-182, 2012



Autophagy:  
MDC stain

## Laboratory of Veterinary Public Health

Professor  
Associate Professor  
Assistant Professor

Masami Miyake  
Takeshi Matsuzawa  
Mayo Yasugi

### Research Interest:

The research projects in the laboratory deal with the pathogenic bacteria, such as diarrheogenic *Escherichia coli*, *Clostridium perfringens*, *Salmonella*, and *Listeria*, that cause food-borne diseases and zoonoses. The projects are directed toward understanding the molecular mechanism of 1) how these bacterial pathogens respond to the surroundings to exert their virulence, 2) how they induce pathological alterations in host cells, and 3) how the host cells respond at molecular and cellular levels defending themselves against

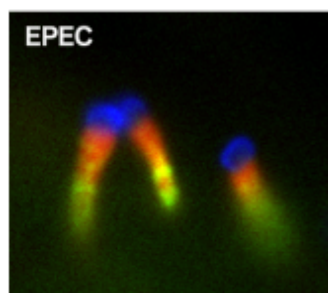
the pathogens' attack. Microbiological, biochemical, immunological, and genetic procedures, as well as cell biology techniques, are employed to visualize the molecular events during the course of host-parasite interactions.

### Key words:

*Escherichia coli*, *Clostridia*, *Salmonella*, *Listeria*, stress response, inflammation, autophagy, xenophagy, sporulation, germination, virulence factors, toxins, high throughput screen,

## Publications:

1. **Yasugi M**, Okuzaki D, Kuwana R, Takamatsu H, Fujita M, Sarker MR, **Miyake M**. The transcriptional profile during deoxycholate-induced sporulation in a *Clostridium perfringens* isolate from foodborne illness. **Appl. Environ. Microbiol.**, in press, 2016.
2. **Yasugi M**, Sugahara Y, Hoshi H, Kondo K, Talukdar PK, Sarker MR, Yamamoto S, Kamata Y, **Miyake M**. *In vitro* cytotoxicity induced by *Clostridium perfringens* isolate carrying a chromosomal cpe gene is exclusively dependent on sporulation and enterotoxin production. **Microb. Pathog.**, 85: 1-10, 2015.
3. **Matsuzawa T**, Fujiwara E, Washi Y. Autophagy activation by interferon- $\gamma$  via the p38 mitogen-activated protein kinase signalling pathway is involved in macrophage bactericidal activity. **Immunology**, 141: 61-9, 2014.
4. **Yasugi M**, Kubota-Koketsu R, Yamashita A, Kawashita N, Du A, Sasaki T, Nishimura M, Misaki R, Kuhara M, Boonsathorn N, Fujiyama K, Okuno Y, Nakaya T, Ikuta K. Human monoclonal antibodies broadly neutralizing against influenza B virus. **PLoS Pathog.**, 9: e1003150, 2013.



Immunohistochemistry of Zonula occludens-1 (ZO-1) recruitment at the sites of infection by enteropathogenic *E. coli* (EPEC) in HeLa cells. Green, ZO-1; blue, bacterial DNA; red, F-actin. For detail, refer to **Infect. Immun.** 75: 565-573, 2007.



Phase contrast (Upper) and fluorescence (lower) micrographs of *Clostridium perfringens* cells in the process of sporulation. Bacterial cells at different sporulation stages can be observed. Blue, DNA; red, membrane structure.

## Laboratory of Veterinary Immunology

Professor  
Assistant Professor

Shinobu Watarai  
Tadashi Iwasaki

### Research Interest:

**S. Watarai:** The potential usefulness of liposomes as carriers and adjuvants for developing topical and mucosal vaccines has attracted considerable interests. pH-sensitive liposomes, which generate fusion ability under weakly acidic conditions, were developed to establish effective vaccine. The usefulness of pH-sensitive fusogenic polymer-modified liposomes as a vaccine carrier is studied and the applied research of the pH-sensitive fusogenic liposomes for the disease prevention and treatment is also done. The development of liposome vaccine for cancer therapy and the development of liposomal mucosal vaccine are advanced now.

**T. Iwasaki:** My major research interest is pathological mechanisms of allergic diseases and the application of its knowledge to the establishment of treatment of the disease.

### Key words:

Allergy, Diagnosis, Cancer, Immunization, Infectious Disease, Liposome, Vaccine

### Publications:

1. **Watarai, S.**, and Sasaki, Y. Evaluation of stearylamine-modified liposomes for the oral vaccine adjuvant. **J. Infect. Dis. Ther.**, 2:141, 2014.
2. **Watarai, S.**, Iwase, T., Tajima, T., Yuba, E., Kono, K., and Sekiya, Y. Application of pH-sensitive fusogenic polymer-modified liposomes for development of mucosal vaccines. **Vet. Immunol. Immunopathol.**, 158(1-2): 62-72, 2014.
3. **Watarai, S.**, Iwase, T., Tajima, T., Yuba, E., and Kono, K. Efficiency of pH-sensitive fusogenic polymer-modified liposomes as a vaccine carrier. **Scientific World J.**, 2013:903234, 2013.
4. Yuba, E., Harada, A., Sakanishi, Y., **Watarai, S.**, and Kono, K. A liposome-based antigen delivery system using pH-sensitive fusogenic polymers for cancer immunotherapy. **Biomaterials**, 34(12): 3042-3052, 2013.
5. Kamimiya, H., Suzuki, Y., Kasama, T., Kajiwara, H., Yamamoto, T., Mine, T., **Watarai, S.**, Ogura, K., Nakamura, K., Tsuge, J., and Kushi, T. Unique gangliosides synthesized *in vitro* by sialyltransferases from marine bacteria and their characterization: gangliosides synthesis by bacterial sialyltransferases. **J. Lipid Res.**, 54(3): 571-580, 2012.
6. Sakata J, Kawatsu K, **Iwasaki T**, Tanaka K, Takenaka S, Kumeda Y, Kodama H. Production and characterization of a novel monoclonal antibody against *Vibrio parahaemolyticus* FOF1 ATP synthase's delta subunit and its application for rapid identification of the pathogen. **J. Microbiol. Methods.**, 88(1): 77-82, 2012.
7. Kodama H, Nakamura H, Kashima M, **Iwasaki T**, Togase H. Protection against atypical *Aeromonas salmonicida* infection in common carp, *Cyprinus carpio* L., by administration of a mixed microbial culture of *Lactobacillus paracasei*, *Pichia membranifaciens* and *Saccharomyces cerevisiae*. **J. Vet. Med. Sci.**, 73(10): 1319-1325, 2011.



## Laboratory of Veterinary Epidemiology

Professor  
Assistant Professor

Masafumi Mukamoto  
Tomoko Kohda

### Research Interest:

**M. Mukamoto's** research work focuses on clarification of molecular mechanisms on the infection of pathogenic microorganisms to elicit infectious diseases in domestic animals. **M. Mukamoto** attempts to analyze functional mechanisms of pathogenic factors and host factors for pathogens by use of various molecular biological, biochemical and immunological techniques. The present main research is analysis of molecular structures and biological activities in toxins from *Clostridium perfringens*, *C. septicum* and *C. chauvoei*.

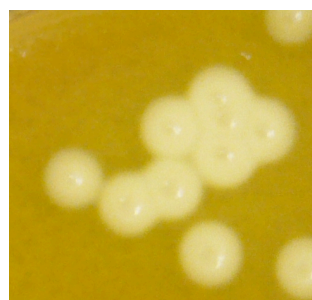
**T. Kohda** focuses on the areas of research closely related to current knowledge on the structure and function of botulinum neurotoxins. The main task of the present research is the mechanism of receptor recognition and the different affections of host animals.

### Key words:

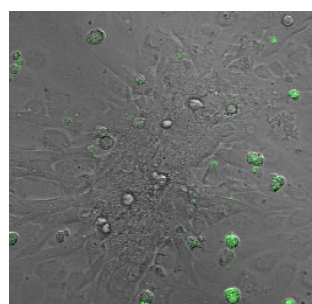
Pathogenic microorganisms, Diagnosis, Infectious diseases control, Pathogenic factor, Clostridia, toxin

### Publications:

1. H. Teramoto, Y. Kumeda, K. Yokoigawa, K. Hosomi, S. Kozaki, **M. Mukamoto**, and **T. Kohda**. Genotyping and characterization of the secretory lipolytic enzymes of *Malassezia pachydermatis* isolates collected from dogs. **Vet. Rec. Open**, 2: e000124, 2015.
2. K. Hosomi, R. Kuwana, H. Takamatsu, **T. Kohda**, S. Kozaki, and **M. Mukamoto**. Morphological and genetic characterization of group I *Clostridium botulinum* type B strain 111 and the transcriptional regulator spoIIID gene knockout mutant in sporulation. **Anaerobe**, 33: 55-63, 2015.
3. K. Hosomi, Y. Sakaguchi, **T. Kohda**, K. Gotoh, D. Motooka, S. Nakamura, K. Umeda, T. Iida, S. Kozaki, and **M. Mukamoto**. Complete nucleotide sequence of a plasmid containing the botulinum neurotoxin gene in *Clostridium botulinum* type B strain 111 isolated from an infant patient in Japan. **Mol. Genet. Genomics**, 289: 1267-1274, 2014.
4. Y. Sakaguchi, K. Hosomi, J. Uchiyama, Y. Ogura, K. Umeda, M. Sakaguchi, **T. Kohda**, **M. Mukamoto**, N. Misawa, S. Matsuzaki, T. Hayashi, and S. Kozaki. Draft Genome Sequence of *Clostridium botulinum* Type B Strain Osaka05, Isolated from an Infant Patient with Botulism in Japan. **Genome Announc.**, 2: e01010, 2014.
5. **M. Mukamoto**, R. Kimura, M.B. Hang'ombe, **T. Kohda**, S. Kozaki. Analysis of tryptophan-rich region in *Clostridium septicum* alpha-toxin involved in binding to GPI-anchored proteins. **Microbiol. Immunol.**, 57: 163-169, 2013.
6. K. Nakamura, **T. Kohda**, Y. Seto, **M. Mukamoto**, and S. Kozaki. Improved detection methods by genetic and immunological techniques for botulinum C/D and D/C mosaic neurotoxins. **Vet. Microbiol.**, 162: 881-890, 2013.
7. **M. Mukamoto**, H. Maeda, **T. Kohda**, C. Nozaki, M. Takahashi, and S. Kozaki. Production of a neutralizing mouse-human chimeric antibody against botulinum neurotoxin serotype E. **Jpn. J. Infect. Dis.**, 66: 46-50, 2013.
8. **M. Mukamoto**, H. Maeda, **T. Kohda**, C. Nozaki, M. Takahashi, S. Kozaki. Characterization of neutralizing mouse-human chimeric and shuffling antibodies against botulinum neurotoxin A. **Microbiol. Immunol.**, 56: 748-755, 2012.
9. K. Nakamura, **T. Kohda**, Y. Shibata, K. Tsukamoto, H. Arimitsu, M. Hayashi, **M. Mukamoto**, N. Sasakawa, S. Kozaki. Unique biological activity of botulinum d/c mosaic neurotoxin in murine species. **Infect. Immun.**, 80: 2886-2893, 2012.



Colonies of *C. perfringens* isolated from a necrotic enteritis chicken on CW agar plate with egg yolk.



Rounding cell death of rat cardiac cells by alpha-toxin from *C. septicum*.

# Laboratory of International Prevention of Epidemics

Professor Shinji Yamasaki  
Associate Professor Makoto Matsubayashi  
Assistant Professor Atsushi Hinenoya  
Specially Appointed Sharda Prasad Awasthi  
Assistant Professor

## Research Interest:

**S. Yamasaki, A. Hinenoya, and SP Awasthi** have focused on enteric bacteria such as enterohemorrhagic *Escherichia coli*, other diarrheagenic *E. coli*, in particular, CDT-producing *E. coli*, *Campylobacter* spp. *Vibrio* spp. and *Shigella* spp. in terms of molecular epidemiology, development of diagnostic measures, virulence mechanisms and antimicrobial resistances. Our goal of the study is to develop rapid and simple diagnostic, therapeutic and preventive methods against these bacterial infections.

**Matsubayashi's** research work focuses on understanding the distribution of intestinal protozoa (*Cryptosporidium*, *Giardia*, *Eimeria*, and *Entamoeba* etc.) in human, livestock, and wild and companion animals by genetical survey, and controlling the infections. From the viewpoints, my interests include development of molecular tools to assess host specificity or their pathogenicity using mouse model, and clarification of host-parasite adaptation by chemical biology, or genome or transcriptome analyses.

## Key words:

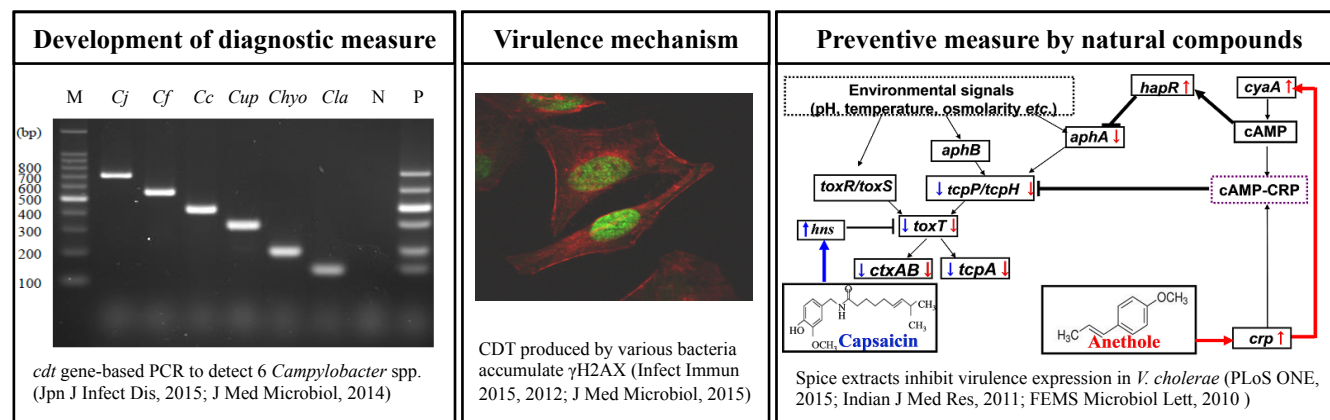
Food microbiology, Antimicrobial resistance, Rapid diagnosis, Zoonosis, Molecular Epidemiology, Pathogenic *E. coli*, Cytolethal Distending Toxin, *Eimeria*, *Cryptosporidium*, Parasitic adaptations

## Publications:

1. **M. Matsubayashi\***, F. Kawahara, T. Hatta, J. Yamagishi, T. Miyoshi, Anisuzzaman, K. Sasai, T. Isobe, K. Kita and N. Tsuji. Transcriptional profiles of virulent and precocious strains of *Eimeria tenella* at sporozoite stage; novel biological insight into attenuated asexual development. **Infect. Genet. Evol.**, in press, 2016.
2. R. A. Ombarak, **A. Hinenoya, S. P. Awasthi**, A. Shima, A.-R. M. Elbagory and **S. Yamasaki\***. Prevalence and pathogenic potential of *Escherichia coli* isolates from raw milk and raw milk cheese in Egypt. **Int. J. Food Microbiol.**, 221: 69-76, 2016.
3. K. Kamei, N. Hatanaka, M. Asakura, S. Somroop, W. Samorsornuk, **A. Hinenoya**, N. Misawa, S. Nakagawa

and **S. Yamasaki\***. *Campylobacter hyointestinalis* isolated from pigs produce multiple variants of biologically active cytolethal distending toxin. **Infect. Immun.**, 83(11): 4304-4313, 2015.

4. M. S. H. Zahid, **S. P. Awasthi**, M. Asakura, S. Chatterjee, **A. Hinenoya**, S. M. Faruque and **S. Yamasaki\***. Suppression of virulence of toxigenic *Vibrio cholerae* by anethole through the cyclic AMP (cAMP)-cAMP receptor protein signaling system. **PLoS ONE**, 10(9): e0137529, 2015.
5. **A. Hinenoya, S. P. Awasthi**, N. Yasuda, A. Shima, H. Morino, T. Koizumi, T. Fukuda, T. Miura, T. Shibata and **S. Yamasaki\***. Chlorine dioxide is a superior disinfectant against multi-drug resistant *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Acinetobacter baumannii*. **Jpn. J. Infect. Dis.**, 68(4): 276-279, 2015.
6. **M. Matsubayashi**, K. Kanamori, M. Sadahiro, M. Tokoro, N. Abe, M. Haritani and T. Shibahara\*. First molecular identification of *Entamoeba polecki* in a piglet in Japan and implications for aggravation of ileitis by coinfection with *Lawsonia intracellularis*. **Parasitol. Res.**, 114: 3069-73, 2015.
7. **A. Hinenoya**, K. Shima, M. Asakura, K. Nishimura, T. Tsukamoto, T. Ooka, T. Hayashi, T. Ramamurthy, S. M. Faruque and **S. Yamasaki\***. Molecular characterization of cytolethal distending toxin gene-positive *Escherichia coli* from healthy cattle and swine in Nara, Japan. **BMC Microbiol.**, 14(4):97, 2014.
8. **S. P. Awasthi**, M. Asakura, N. Chowdhury, S. B. Neogi, **A. Hinenoya**, H. Md. Golbar, J. Yamate, E. Arakawa and T. Tada. Ramamurthy and **S. Yamasaki\***. Novel cholera toxin variants, ADP-ribosylating toxins in *Vibrio cholerae* non-O1/non-O139 strains and their pathogenicity. **Infect. Immun.**, 81(2): 531-541, 2013.
9. **M. Matsubayashi**, I. Teramoto-Kimata, S. Uni, H.S. Lillehoj, H. Matsuda, M. Furuya, H. Tani and K. Sasai\*. Elongation factor-1 $\alpha$  is a novel protein associated with host cell invasion and a potential protective antigen of *Cryptosporidium parvum*. **J. Biol. Chem.**, 288: 34111-20, 2013.





### Research Interest:

**Y. Seto** is interested in the infectious diseases, and developing the laboratory diagnostic methods using the various molecular approaches to control the infectious diseases.

**T. Tajima** is interested in the immunological responses of host against infectious diseases caused by intracellular pathogens such as viruses and *Rickettsia*.

### Key words:

Infectious Diseases, Molecular Epidemiology, Caliciviruses, *Anaplasma*, *Rickettsia*, *Ehrlichia*, Feline infectious peritonitis virus

### Publications:

1. N. Iritani, A. Kaida, N. Abe, J. Sekiguchi, H. Kubo, K. Takakura, K. Goto, H. Ogura, and **Y. Seto**. Increase of GII.2 Norovirus infection during the 2009-2010 season in Osaka

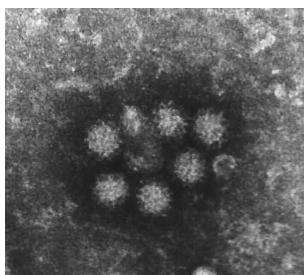
city, Japan. **J. Med. Virol.**, 84, 517-525, 2012.

2. N. Iritani, A. Kaida, H. Kubo, N. Abe, K. Goto, H. Ogura, and **Y. Seto**. Molecular epidemiology of Noroviruses detected in seasonal outbreaks of acute nonbacterial gastroenteritis in Osaka city, Japan. **J. Med. Virol.**, 82, 2097-2105, 2010.

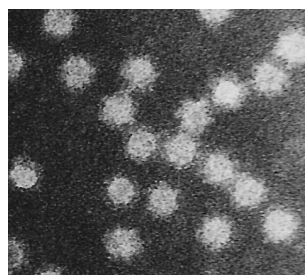
3. K. Nakamura, T. Kohda, **Y. Seto**, M. Mukamoto, and S. Kozaki. Improved detection methods by genetic and immunological techniques for botulinum C/D and D/C mosaic neurotoxins. **Vet. Microbiol.**, 162, 881-890, 2013.

4. **T. Tajima**, and M. Wada. Inhibitory effect of interferon gamma on frequency of *Ehrlichia canis*-infected cells *in vitro*. **Vet. Immunol. Immunopathol.**, 156, 200-204, 2013.

5. T. Soma, M. Wada, S. Taharaguchi, and **T. Tajima**. Detection of ascitic feline coronavirus RNA from cats with clinically suspected feline infectious peritonitis. **J. Vet. Med. Sci.**, 75, 1389-1392, 2013.

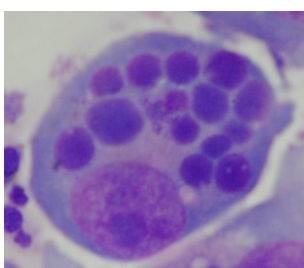


(A)

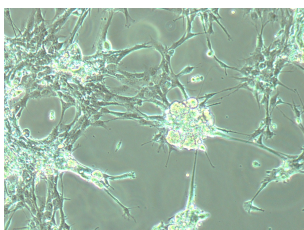


(B)

Transmission electron microscopy images.  
(A) Norovirus detected in fecal specimen,  
(B) Norovirus-like particle expressed by  
Baculovirus expressing system.



*Ehrlichia canis* -infected dog macrophage line cell



Feline infectious peritonitis virus-infected cat line cell

# Advanced Pathobiology

## Laboratory of Cell Pathobiology

Professor  
Associate Professor  
Associate Professor

Toshio Inaba  
Kikuya Sugiura  
Shingo Hatoya

### Research Interest:

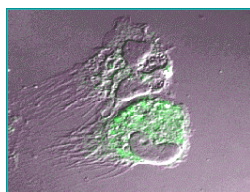
Our research work focuses on the cellular mechanisms of blood, incretion and metabolism taking place in the control of homeostasis in animals, the pathophysiology of disorders caused by the structural or functional abnormalities in the cells, and diagnosis and therapy in those disorders. Projects under investigation include; 1) dendritic cell based cancer immunotherapy, 2) establishment of canine and feline embryonic stem cells (ES cells) from blastocyst, 3) generation of canine and feline induced pluripotent stem cells (iPS cells) from adult cells for regenerative veterinary medicine, and 4) development of canine and feline in vitro fertilization techniques.

### Key words:

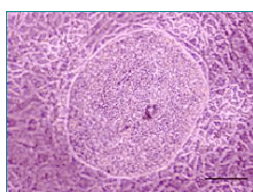
Cancer, Cat, Dendritic cell, Dog, Embryonic stem cell, Induced pluripotent stem cell, *in vitro* fertilization, Regenerative veterinary medicine,

### Publications

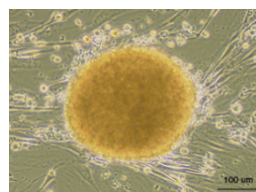
1. R. Kanegi, **S. Hatoya**, Y. Tsujimoto, S. Takenaka, T. Nishimura, V. Wijewardana, **K. Sugiura**, M. Takahashi, N. Kawate, H. Tamada, **T. Inaba**. Production of feline leukemia inhibitory factor (LIF) with biological activity in *Escherichia coli*. **Theriogenology**, in press.
2. V. Wijewardana, **K. Sugiura**, DPH Wijesekera, **S. Hatoya**, T. Nishimura, R. Kanegi, T. Ushigusa, A. Fujii, **T. Inaba**. Effect of ovarian hormones on maturation of dendritic cells from peripheral blood monocytes in dogs. **J. Vet. Med. Sci.**, 77(7): 771-775, 2015.
3. Y. Koyama, **K. Sugiura**, C. Yoshihara, **T. Inaba**, T. Ito. Highly effective non-viral antitumor gene therapy system comprised of biocompatible small plasmid complex particles consisting of pDNA/polyethylenimine “max”/anionic polysaccharide ternary complexes. **Pharmaceutics**, 7: 152-164, 2015.
4. V. Wijewardana, **K. Sugiura**, D.P.H. Wijesekera, **S. Hatoya**, T. Nishimura, R. Kanegi, T. Ushigusa, A. Fujii, **T. Inaba**. Development of a dendritic cell-targeting lipopeptide as an immunoadjuvant that inhibits tumor growth without inducing local inflammation. **J. Vet. Med. Sci.**, 77(7): 771-775, 2014.
5. V. Wijewardana, **K. Sugiura**, D.P.H. Wijesekera, **S. Hatoya**, T. Nishimura, R. Kanegi, T. Ushigusa, A. Fujii, **T. Inaba**. Enhancement of anti-tumor immune responses by transfection of IFN $\gamma$  gene into tumor using a novel type synthetic vector. **J. Vet. Med. Sci.**, 77(7): 771-775, 2014.
6. H. Nishida, M. Nakayama, H. Tanaka, H. Kamishina, T. Izawa, **S. Hatoya**, **K. Sugiura**, Y. Suzuki, C. Ide, **T. Inaba**. Evaluation of serum phosphorylated neurofilament subunit NF-H as a prognostic biomarker in dogs with thoracolumbar intervertebral disc herniation. **Vet. Surg.**, 43(3): 289-293, 2014.
7. T. Nishimura, **S. Hatoya**, R. Kanegi, **K. Sugiura**, V. Wijewardana, M. Kuwamura, M. Tanaka, J. Yamate, T. Izawa, M. Takahashi, N. Kawate, H. Tamada, H. Imai, **T. Inaba**. Generation of functional platelets from canine induced pluripotent stem cells. **Stem Cells Dev.**, 22(14): 2026-2035, 2013.
8. V. Wijewardana, **K. Sugiura**, M. Yahata, T. Akazawa, D.P.H. Wijesekera, S. Imamoto, **S. Hatoya**, N. Inoue, **T. Inaba**. Production of canine soluble CD40 ligand to induce maturation of monocyte derived dendritic cells for cancer immunotherapy. **Vet. Immunol. Immunopathol.**, 156(1-2):121-127, 2013.



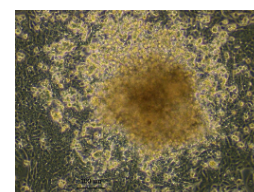
Canine Dendritic cells expressing MHC Class II, generated from monocytes (Vet Immunol Immunopathol 2006)



Canine ES cells isolated in our labs (Mol Reprod Dev 2006)



Canine iPS cells isolated in our labs (Stem Cells Dev 2013)



Feline iPS cells isolated in our labs (ISSCR 11th Annual Meeting 2013)

## Laboratory of Veterinary Radiology

Associate Professor  
Associate Professor

Satoshi Matsuyama  
Shunsuke Noguchi

### Research Interest of Prof. Matsuyama:

DNA damages by environmental and intracellular agents, if left unrepaired, lead to carcinogenesis, aging and other adverse health effects. The major focus of our research is to understand molecular mechanisms of cellular DNA base excision repair that remove DNA lesions and restore genetic information. Another major focus is identification of tumor-related gene expression in various companion animal tumors.

### Key words:

DNA repair, oxydative damages, tumorigenesis, adaptive response.

### Research Interest of Prof. Noguchi:

MicroRNAs (miRNAs) have been known to contribute to tumor development and progression. Therefore, the tumor-specific miRNAs are considered to be therapeutic targets and biomarkers. The aims of our research are to understand the molecular mechanisms involved in development or progression of canine cancers by elucidating the functions of tumor-specific miRNAs and to develop the novel therapeutic modalities based on the molecular mechanisms.

Also, we participate in cancer therapy in veterinary medical center and we attempt to apply the achievements of our study to cancer therapy.

### Key words:

Canine cancer, miRNA, biomarker, cancer therapy

### Publications:

1. M. Yamamoto, R. Yamamoto, S. Takenaka, **S. Matsuyama**, and K. Kubo. Abundance of BER-related proteins depends on cell proliferation status and the presence of DNA polymerase  $\beta$ . **J. Radiat. Res.**, 56(4): 607-14, 2015.
2. R. Yamamoto, M. Umetsu, M. Yamamoto, **S.**

**Matsuyama**, S. Takenaka, H. Ide, and K. Kubo. AP endonuclease knockdown enhances methyl methanesulfonate hypersensitivity of DNA polymerase  $\beta$  knockout mouse embryonic fibroblasts. **J. Radiat. Res.**, 56(3):462-466, 2015.

3. **S. Matsuyama**, Y. Nakano, M. Nakamura, R. Yamamoto, T. Shimada, F. Ohashi, and K. Kubo. Cloning and expression analysis of prohibitin mRNA in canine mammary tumors. **J. Vet. Med. Sci.**, 77(1):101-104, 2015.
4. **S. Noguchi**, T. Mori, M. Igase, and T. Mizuno. A novel apoptosis-inducing mechanism of 5-aza-2'-deoxycytidine in melanoma cells: Demethylation of TNF- $\alpha$  and activation of FOXO1. **Cancer Lett.**, 369:344-353, 2015.
5. **S. Noguchi**, T. Mori, T. Nakagawa, K. Itamoto, T. Haraguchi, and T. Mizuno. DNA methylation contributes to toward silencing of anti-oncogenic microRNA-203 in human and canine melanoma cells. **Melanoma Res.**, 25:390-398, 2015.
6. R. Yamamoto, Y. Ohshiro, T. Shimotani, M. Yamamoto, **S. Matsuyama**, H. Ide, and K. Kubo. Hypersensitivity of mouse NEIL1-knockdown cells to hydrogen peroxide during S phase. **J. Radiat. Res.**, 55(4): 707-712, 2014,
7. **S. Noguchi**, M. Kumazaki, T. Mori, K. Baba, M. Okuda, T. Mizuno, and Y. Akao. Analysis of microRNA-203 function in CREB/MITF/RAB27a pathway: comparison between canine and human melanoma cells. **Vet. Comp. Oncol.**, 2014 Oct 3. doi: 10.1111/vco.12118..
8. H. Matsumoto, S. Miyazaki, **S. Matsuyama**, M. Takeda, M. Kawano, H. Nakagawa, K. Nishimura, and S. Matsuo. Selection of autophagy or apoptosis in cells exposed to ERstress depends on ATF4 expression pattern with or without CHOP expression. **Biol. Open**, 2(10): 1084-1090, 2013.

## Laboratory of Theriogenology

Professor  
Associate Professor

Hiromichi Tamada  
Noritoshi Kawate

### Research Interest:

We are studying on reproductive phenomena and their artificial controls in domestic animals, and clarifying causes and developing methods of diagnosis, treatment and prevention of reproductive diseases.

Research themes for each professor:

### Dr. Hiromichi Tamada:

The purposes of my research are clarifying the roles of hormones and growth factors in animal reproduction,

controlling reproductive phenomena and contributing to prevention and treatment for reproductive diseases. Roles of hormone and growth factors in the uterus, artificial control of estrous cycles and reproductive analyses of pyometra have been studied.

The current research includes the followings.

- (1) Effects of *Lepidium meyenii* (maca) on reproduction
- (2) Mechanism of placental growth
- (3) Improvement of embryo culture system



**Dr. Noritoshi Kawate:** I have been studying on reproductive endocrinology to aim to clarifying causes and to developing methods of diagnoses and treatments in testicular and ovarian diseases in domestic animals including cattle, goats, dogs and etc.

The current research projects include the followings.

- (1) Study on regulatory mechanism of insulin-like peptide 3 (INSL3) secretion in bulls and male goats
- (2) Application of assays of testicular hormones in maternal blood for fetal sex determination in pregnant cattle
- (3) Association study of semen characteristics in Japanese Black beef bulls with testicular and metabolic hormones in blood and BSP proteins in seminal plasma
- (4) Analyses of various factors affecting conception by timed-AI (Ovsynch+CIDR) in Japanese Black beef cows
- (5) Development of protocols to suppress must in male Asian elephants by hormonal drugs

#### Publications:

1. Hannan MA, **Kawate N**, Fukami Y, Pathirana IN, Büllesbach EE, Inaba T, **Tamada H**. Acute regulation of plasma insulin-like peptide 3 concentrations by luteinizing hormone in male goats. **Theriogenology**, in press.
2. **Tamada H**, Adachi N, **Kawate N**, Inaba T, Hatoya S, Sawada T. Positive correlation between patency and mRNA levels for cyclooxygenase-2 and prostaglandin E synthase in the uterine cervix of bitches with pyometra. **J. Vet. Med. Sci.**, in press.
3. Ohta Y, Yoshida K, Kamiya S, **Kawate N**, Takahashi M, Inaba T, Hatoya S, Morii H, Takahashi K, Ito M, Ogawa H, **Tamada H**. Feeding hydroalcoholic extract powder of *Lepidium meyenii* (maca) increases serum testosterone concentration and enhances steroidogenic ability of Leydig cells in male rats. **Andrologia**, in press.
4. **Tamada H**, Takemoto K, Tominaga M, **Kawate N**, Takahashi M, Hatoya S, Matsuyama S, Inaba T, Sawada T. Expression and localization of epidermal growth factor, transforming growth factor- $\alpha$  and epidermal growth factor receptor in the canine testis. **J. Reprod Dev.**, 62:59-64, 2016.
5. Hannan MA, Fukami Y, **Kawate N**, Sakase M, Fukushima M, Pathirana IN, Büllesbach EE, Inaba T, **Tamada H**. Plasma insulin-like peptide 3 concentrations are acutely regulated by luteinizing hormone in pubertal Japanese Black beef bulls. **Theriogenology**, 84:1530-5, 2015.
6. Hannan MA, **Kawate N**, Kubo Y, Pathirana IN, Büllesbach EE, Hatoya S, Inaba T, Takahashi M, **Tamada H**. Expression analyses of insulin-like peptide 3, RXFP2, LH receptor, and 3 $\beta$ -hydroxysteroid dehydrogenase in testes of normal and cryptorchid dogs. **Theriogenology**, 84:1176-84, 2015.
7. Takahashi M, Tsuchiya H, Hamano S, Inaba T, **Kawate N**, **Tamada H**. Clinical study report on milk production in the offspring of a somatic cell cloned Holstein cow. **J. Reprod Dev.**, 59:595-8, 2013.
8. Takahashi M, Sawada K, **Kawate N**, Inaba T, **Tamada H**. Improvement of superovulatory response and pregnancy rate after transfer of embryos recovered from Japanese Black cows fed rumen bypass polyunsaturated fatty acids. **J. Vet. Med. Sci.**, 75:1485-90, 2013.
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11. **Tamada H**, Kawata N, **Kawate N**, Inaba T, Kida K, Hatoya S, Akune A, Nakama K, Kohsaka T, Takahashi M, Sawada T. Factors associated with patency of the uterine cervix in bitches with pyometra. **Res. Vet. Sci.**, 93:1203-10, 2012.
12. Pathirana IN, Yamasaki H, **Kawate N**, Tsuji M, Büllesbach EE, Takahashi M, Hatoya S, Inaba T, **Tamada H**. Plasma insulin-like peptide 3 and testosterone concentrations in male dogs: changes with age and effects of cryptorchidism. **Theriogenology**, 77:550-7, 2012.
13. **Kawate N**, Ohnari A, Pathirana IN, Sakase M, Büllesbach EE, Takahashi M, Inaba T, **Tamada H**. Changes in plasma concentrations of insulin-like peptide 3 and testosterone from birth to pubertal age in beef bulls. **Theriogenology**, 76:1632-8, 2011.
14. Pathirana IN, **Kawate N**, Tsuji M, Takahashi M, Hatoya S, Inaba T, **Tamada H**. *In vitro* effects of estradiol-17 $\beta$ , monobutyl phthalate and mono-(2-ethylhexyl) phthalate on the secretion of testosterone and insulin-like peptide 3 by interstitial cells of scrotal and retained testes in dogs. **Theriogenology**, 76:1227-33, 2011.
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16. Pathirana IN, Tanaka K, **Kawate N**, Tsuji M, Hatoya S, Inaba T, **Tamada H**. Homozygosity of single nucleotide polymorphisms in the 3' region of the canine estrogen receptor 1 gene is greater in Toy Poodles than in Miniature Dachshunds and Chihuahuas. **Anim. Sci. J.**, 82:390-5, 2011.
17. Pathirana IN, Ashida Y, **Kawate N**, Tanaka K, Tsuji M, Takahashi M, Hatoya S, Inaba T, **Tamada H**. Comparison of testosterone and insulin-like peptide 3 secretions in response to human chorionic gonadotropin in cultured interstitial cells from scrotal and retained testes in dogs. **Anim. Reprod Sci.**, 124:138-44, 2011.
18. **Kawate N**, Watanabe K, Uenaka K, Takahashi M, Inaba T, **Tamada H**. Comparison of plasma concentrations of estradiol-17 $\beta$  and progesterone, and conception in dairy cows with cystic ovarian diseases between Ovsynch and Ovsynch plus CIDR timed AI protocols. **J. Reprod Dev.**, 57:267-72, 2011.
19. **Tamada H**, **Kawate N**, Kawata N, Inaba T, Kida K, Hatoya S, Akune A, Nakama K, Kohsaka T, Sawada T. Detection of relaxin mRNA in the corpus luteum, uterus, and uterine cervix in the bitch. **J. Vet. Med. Sci.**, 72:1383-6, 2010.

## Laboratory of Veterinary Internal Medicine

Professor  
Associate Professor  
Assistant Professor

Kazumi Sasai  
Hiroyuki Tani  
Masaru Furuya

### Research Interest:

Our common research theme include 1) development of novel detection and prevention tools for infectious disease, especially zoonosis in companion and industrial animals, 2) epidemiological studies of zoonosis in companion, industrial and wild animals, 3) development of diagnostic and therapeutic tools for neoplastic diseases in companion animals using immunological methods, and 4) establishment of novel diagnostic and therapeutic procedures for dermatological and autoimmune diseases in companion animals.

**Prof. Sasai's** interests involve the study of mechanism of dermatological disorder in small animals using immunological technique. He is also interested in establishment of new diagnosis technique for zoonosis, especially *Cryptosporidium* and epidemiological studies of zoonosis in wild animals. Moreover, he is involved in the study of host defense mechanism against chicken coccidiosis using monoclonal antibodies. Associate Professor **H. Tani** has focused on the development of detection tools and oral mucosal vaccine for microbial infections due to *Staphylococcus* and *Salmonella* spp.. Assistant Professor **M. Furuya** has focused on the identification of specific tumor antigen leads to the development of new diagnosis method and cancer immunotherapy in veterinary clinical practice. Our research would provide the versatile informations and tools for small animal medicine, livestock industry, and wildlife management.

### Key words:

Dermatology, Zoonosis, *Cryptosporidium*, Coccidia, Monoclonal antibody, *Salmonella*

### Publications:

1. Saeki J, Nakanishi H, **Furuya M**, Masubuchi M, Matsubayashi M, **Tani H**, **Sasai K**. A Serological Survey of *Leptospira* spp. Antibodies in Wild Raccoons (*Procyon lotor*) in Osaka, Japan. **Asian J. Anim. Vet. Adv.**, in press.
2. Matsubayashi M, Kawahara F, Hatta T, Yamagishi J, Miyoshi T, Anisuzzaman, **Sasai K**, Isobe T, Kita K, Tsuji N. Transcriptional profiles of virulent and precocious strains of *Eimeria tenella* at sporozoite stage; novel biological insight into attenuated asexual development. **Infect. Genet. Evol.**, in press.
3. Matsubayashi M, Takayama H, Kusumoto M, Murata M, Uchiyama Y, Kaji M, **Sasai K**, Yamaguchi R, Shibahara T. First report of molecular identification of *Cystoisospora suis* in piglets with lethal diarrhea in Japan. **Acta Parasitol.**, 61(2):406-11, 2016.
4. Okada S., **Furuya M.**, Takenaka S., Fukui A., Matsubayashi M., **Tani H.**, **Sasai K.** Localization of heat shock protein 110 in canine mammary gland tumors. **Vet. Immunol. Immunopathol.**, 167(3-4):139-46, 2015.
5. Sasai H, Fujita D, Tagami Y, Seto E, Denda Y, Hamakita H, Ichihashi T, Okamura K, **Furuya M**, **Tani H**, **Sasai K**, Yamate J. Characteristics of bone fractures and usefulness of micro-computed tomography for fracture detection in rabbits: 210 cases (2007-2013). **J. Am. Vet. Med. Assoc.**, 46(12):1339-44, 2015.
6. Saeki J, Katsukawa C, Matsubayashi M, Nakanishi H, **Furuya M**, **Tani H**, **Sasai K**. The detection of toxigenic *Corynebacterium ulcerans* from cats with nasal inflammation in Japan. **Epidemiol. Infect.**, 143, 2660-5, 2015.
7. **Furuya M**, Funasaki M, **Tani H**, **Sasai K**. Identification of novel tumor-associated antigens in canine mammary gland tumor. **Vet. Comp. Oncol.**, 13(3):194-202, 2015.
8. Matsubayashi M, Hatta T, Miyoshi T, Anisuzzaman, **Sasai K**, Yamaji K, Shimura K, Isobe T, Kita K, Tsuji N. Localization of eimeripain, an *Eimeria tenella* cathepsin B-like cysteine protease, during asexual and sexual intracellular development in chicken ceca. **J. Vet. Med. Sci.**, 76(4):531-7, 2014.
9. Tamai R, **Furuya M**, Hatoya S, Akiyoshi H, Yamamoto R, Komori Y, Yokoi S, Tani K, Hirano Y, Komori M, Takenaka S. Profiling of serum metabolites in canine lymphoma using gas chromatography mass spectrometry. **J. Vet. Med. Sci.**, 76(11):1513-8, 2014.
10. Matsubayashi M, Kimata I, Uni S, Lillehoj HS, Matsuda H, **Furuya M**, **Tani H**, **Sasai K**. Elongation Factor-1 $\alpha$  is a Novel Protein Associated with Host Cell Invasion and a Potential Protective Antigen of *Cryptosporidium parvum*. **J. Biol. Chem.**, 288(47):34111-20, 2013.
11. Matsubayashi M, Hatta T, Miyoshi T, Anisuzzaman, **Sasai K**, Shimura K, Isobe T, Kita K, Tsuji N. High-throughput RNA sequencing profiles and transcriptional evidence of aerobic respiratory enzymes in sporulating oocysts and sporozoites of *Eimeria tenella*. **Infect. Genet. Evol.**, 18:269-76, 2013.
12. Koyashiki-Nagano S, Matsubayashi M, Kimata I, **Furuya M**, **Tani H**, **Sasai K**. Infectivity of *Cryptosporidium andersoni* Kawatabi type relative to the small number of oocysts in immunodeficient and immunocompetent neonatal and adult mice. **Parasitol. Int.**, 62(2):109-11, 2013.

## Laboratory of Veterinary Surgery

Professor

Fumihito Ohashi

Associate Professor

Hideo Akiyoshi

### Research Interest:

This laboratory aims to clarify the pathophysiological mechanisms of intractable diseases in companion animals and to develop the therapies for these diseases. The laboratory has studied on : (1) the pathophysiology and the therapies in disorders of urinary, cerebrospinal and digestive organs in companion animals, (2) the immunopathology and the immunological therapies in tumor bearing animals and, (3) the methods for evaluation and inhibition of stress in companion animals during surgical procedures.

### Key words:

Urology, Neurology, Gastroenterology, Immunopathology and immunological therapies in tumor, Stress during surgical procedure

### Publications

1. Sone K, **Akiyoshi H, Hayashi A, Ohashi F**. Elevation of serum surfactant protein-A with exacerbation in canine eosinophilic pneumonia. **J. Vet. Med. Sci.** 78(1): 143–146, 2016
2. Kuromachi M, Izawa T, Hori M, Kusuda K, Shimizu J, Iseri T, **Akiyoshi H, Ohashi F**, Kuwamura M, Yamate J. Chordoma of the thoracic vertebrae in a Bengal tiger (*Panthera tigris tigris*). **J. Vet. Med. Sci.** 77(7): 893-895, 2015
3. Iseri T, Shimizu J, **Akiyoshi H**, Kusuda K, **Hayashi A**, Mie K, Izawa T, Kuwamura M, Yamate J, Fujimoto Y, Ohashi F. Computed tomography and magnetic resonance imaging of thoracic chordoma in a Bengal tiger (*Panthera tigris tigris*). **J. Vet. Med. Sci.** 77(7): 857-860, 2015
4. Ishibashi M, **Hayashi A, Akiyoshi H, Ohashi F**. The influences of hyperbaric oxygen therapy with a lower pressure and oxygen concentration than previous methods on physiological mechanisms in dogs. **J. Vet. Med. Sci.** 77(3): 297-304, 2015
5. Nojiri A, **Akiyoshi H, Ohashi F**, Ijiri A, Sawase O, Sumida T, Matsushita T, Takemoto M, Fujibayashi S, Yamaguchi T. Treatment of a unicameral bone cyst in a dog using a customized titanium device. **J. Vet. Med. Sci.** 77(1): 127-131, 2015
6. Tamai R, Furuya M, Hatoya S, **Akiyoshi H**, Yamamoto R, Komori Y, Yokoi S, Tani K, Hirano Y, Komori M, Takenaka S. Profiling of serum metabolites in canine lymphoma using gas chromatography. **J. Vet. Med. Sci.** 76(11): 1513-1518, 2014
7. Ijiri A, Yoshiki K, Tsuboi S, Shimazaki H, **Akiyoshi H**, Nakade T. Surgical resection of twenty-three cases of brain meningioma in dogs and cat. **J. Vet. Med. Sci.** 76(3): 331-338, 2014
8. Chung JS, Tamura K, **Akiyoshi H**, Cruz Jr PD, Ariizumi K. The DC-HIL/Syndecan-4 Pathway Regulates Autoimmune Responses Through Myeloid-derived Suppressor Cells. **J. Immunol.** 192(6):2576-2584, 2014
9. Tanaka T, Shimada T, **Akiyoshi H**, Shimizu J, Zheng C, Yijyun L, Mie K, **Hayashi A**, Kuwamura M, Hoshi F and Ohashi F. Relationship between major histocompatibility complex class I expression and prognosis in canine mammary gland tumors. **J. Vet. Med. Sci.** 75(10): 1393–1398, 2013
10. Ishibashi M, **Akiyoshi H**, Iseri T, **Ohashi F**. Skin conductance reflects drug-induced changes in blood levels of cortisol, adrenaline and noradrenaline in dogs. **J. Vet. Med. Sci.** 75(6):809-813, 2013
11. Tanaka T, Shimada T, **Akiyoshi H**, Cao Z, Mie K, Li Y, **Hayashi A**, Ohashi F. Germline polymorphism at the  $\beta 2$ -microglobulin exon 1/intron 1 splice site in canine mammary gland simple and complex carcinomas. **Vet. Rec.** 172(20):529-534, 2013
12. Sone K, **Akiyoshi H**, Shimizu J, Cao Z, Li Y, Tanaka T, **Hayashi A**, Sugii S, **Ohashi F**. Surfactant protein-A concentration in sera from dogs with pulmonary parenchymal diseases. **J. Vet. Med. Sci.** 75(6): 685–691, 2013
13. **Hayashi A**, Tanaka H, Tajima T, Nakayama M, **Ohashi F**. A spayed female cat with squamous cell carcinoma in the uterine remnant. **J. Vet. Med. Sci.** 75(3): 391–393, 2013

## Laboratory of Veterinary Advanced Diagnosis and Treatment

Professor

Takashi Hasegawa

Associate Professor

Yuka Fujimoto

### Research Interest:

**T. Hasegawa's** research is the analysis of pathophysiology, and advanced diagnostic and/or therapeutic procedures on intractable disorders in the areas of veterinary ophthalmology, orthopedics, and neurology. In addition, my current major interests are the development of novel diagnostic and therapeutic procedures including regeneration therapy to some diseases including keratoconjunctivitis sicca,

corneal disorders, glaucoma, and delayed- and/or non-union bone fractures. My research groups are now investigating the analysis of pathophysiology via ultrasound biomicroscopy on canine glaucoma and developing novel artificial tears containing sodium hyaluronate/dodecahydrosqualene for treatment of keratoconjunctivitis sicca.



### Publications;

1. Wada, Y., Yamamoto, R., Kitamura, N., Akiyoshi, H., **Hasegawa, T.**, Shimada, T., Ohashi, F., and Kubo, K. The effectiveness of megavoltage radiation therapy against nasal tumors in 24 dogs. **J. Jpn. Vet. Med. Assoc.**, 68: 441-446, 2015. (in Japanese with English abstract).
2. **Hasegawa, T.**, Kawata, M., and Ota, M. Ultrasound biomicroscopic findings of the iridocorneal angle in live healthy and glaucomatous dogs. **J. Vet. Med. Sci.**, 77: 1625-1631, 2015.
3. Bondoc, A, Izawa, T., Hirata, S., **Hasegawa, T.**, Kuwamura, M., Golbar, H. M., and Yamate, J. Myoepithelioma of the gland of the third eyelid in a dog. **J. Comp. Pathol.**, 151:186-189, 2014.
4. **Hasegawa, T.**, Amako, H., Yamamoto, T., Tazawa, M., and Sakamoto, Y. Corneal- protective effects of an artificial tear containing sodium hyaluronate and castor oil on a porcine short-term dry eye model. **J. Vet. Med. Sci.**, 76:1219-1224, 2014.
5. Kawata, M. and **Hasegawa, T.** Evaluation of the distance between the Schwalbe's line and the anterior lens capsule as a parameter for the correction of ultrasound biomicroscopic values of the canine iridocorneal angle. **Vet. Ophthalmol.**, 16:169-174, 2013.

### Research Interest:

**Y. Fujimoto** is interested to study innate immunity in veterinary medicine and has focuses on gastrointestinal immunity and oral immunity in dogs and cats. And, study of anesthesia and pain control for dogs and cats is one of research themes, too.

### Key words:

chronic inflammation, inflammatory bowel disease, chronic enteritis, gingivostomatitis, innate immunity, veterinary science, regulatory T cell, anesthesia, pain control

### Publications:

1. **Y. Fujimoto**, N. Nakatani, T. Kubo, Y. Semi, N. Yoshida, H. Nakajima, T. Iseri, Y.T. Azuma, T. Adenosine and ATP affect LPS-induced cytokine production in canine macrophage cell line DH82 cells. **J. Vet. Med. Sci.**, 74(1): 27-34, 2012.

## Veterinary Medical Center

### Laboratory of Veterinary clinical pathology

Professor  
Associate Professor

Terumasa Shimada  
Shunsuke Shimamura

### Research Interest:

This laboratory aims to elucidate pathologic condition of the disease in companion animals and provide novel method for the diagnosis for the disease.

**T. Shimada** has focused on the relationship between an immune response and an intractable disease such as cancer, IBD and so on. We have analyzed immune cells and immunological products such as cytokines in clinical samples of the disease with doctor course students and exclusive staffs. Our goal of the study is to develop immunological methods of diagnosis and therapy against the intractable disease.

**S. Shimamura** has focused on the identification of novel biomarkers for cardiorenal syndrome and their utility in prognosis, diagnosis and targeted treatment of heart failure-induced renal disease in companion animals.

### Key words:

immune response, intractable disease, cancer

### Publications:

1. K. Mie, M. Tomihari, K. Hoshi, T. Nakamura, T. Yamaguchi, K. Miyahara, **T. Shimada**. Influence of transfusion of lymphokine- activated T killer cells on inflammatory responses in dogs after laparotomy. **J Vet Med Sci.**, (in press) 2016.
2. Y. Sasaki, R. Iwama, **S. Shimamura**, M. Katayama, Y. Uzuka, K. Yabe, K. Takasuna, H. Satoh, K. Furuhashi. Estimation of glomerular filtration rate in dogs by a single-blood sample method involving iohexol. **Am J Vet Res.**, 76(9): 828-835, 2015.
3. M. Tomihari, A. Nishihara, **T. Shimada**, M. Yanagawa, M. Miyoshi, K. Miyahara, A. Oishi. A comparison of the immunological effects of propofol and isoflurane for maintenance of anesthesia in healthy dogs. **J. Vet. Med. Sci.**, 77(10): 1227-1233, 2015.
4. **S. Shimamura**, K. Kimura, M. Katayama, T. Mashita, K. Maeda, S. Kobayashi, R. Sato, J. Yasuda. Evaluation of neutrophil function during hemodialysis treatment in healthy dogs under anesthesia with sevoflurane. **J. Vet. Med. Sci.**, 76(11): 1539-1543, 2014.

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# Veterinary Medical Center

## Veterinary Medical Center

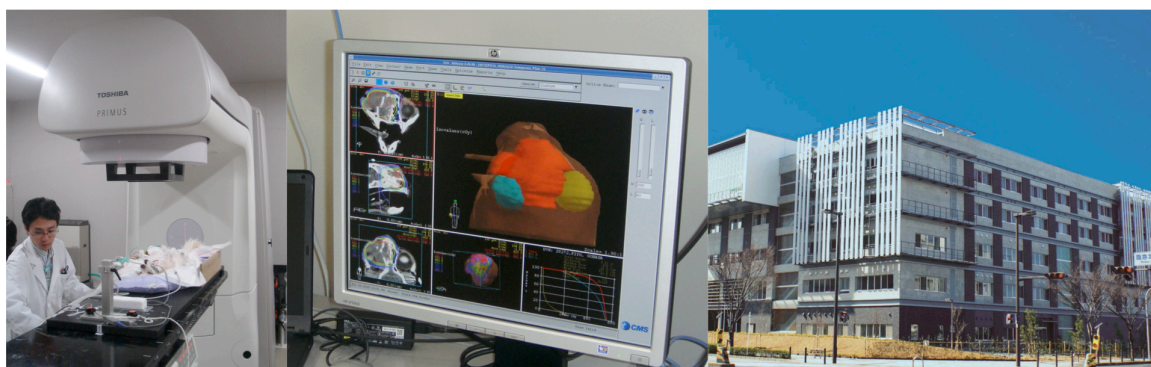
*One of the Nation's Leading Center of Veterinary Clinical Care*

The Department of Veterinary Science originated as a veterinary clinic back in 1883. Transferred to the Rinku Campus in April 2009, it has added advanced medical facilities to its educational setting. The buildings on the campus are soundproof, odor-controlled, and fully prepared against biohazard and virus attacks.

The Veterinary Medical Center, one of the cutting-edge facilities on the new campus, provides secondary care for animals utilizing high-tech medical devices such as linac radiation therapy machines and MRI. It also responds to specialized care and emergency operations, many of which treat age-related diseases that are increasing in animals similarly to humans.



The contemporary operating room (left) and CT scanner (right)



The high-energy radiation therapy facility (left and middle)

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# Veterinary Medical Center

## Veterinary Medical Center

Director Terumasa Shimada

### Exclusive staffs

Professor	Terumasa Shimada
Associate Professor	Shunsuke Simamura
Assistant Professor	Norihiko Kitamura
Assistant Professor	Shin Nishimura
Assistant Professor	Tomoyo Nabetani
Assistant Professor	Shougo Hirata
Assistant Professor	Yusuke Wada

The Veterinary Medical Center is a referral and teaching hospital. The aims of the center are to provide a comprehensive and demonstrably excellent clinical service across a range of species and disciplines to clients, to continue to make advances in veterinary knowledge, diagnosis, treatment and patient welfare through clinical research and to provide a wide range of clinical cases and species for teaching students and training postgraduate clinical professionals. The center has clinical services as below.

### Internal Medicine:

Our staff provides diagnosis and treatment of general internal diseases. Specialized clinical departments of internal medicine also provide advanced clinical diagnosis and treatment of specified diseases, such as cardiac diseases, skin diseases, and immunological diseases.

Professor	Toshio Inaba
Professor	Kazumi Sasai
Associate Professor	Kikuya Sugiura
Associate Professor	Hiroyuki Tani
Associate Professor	Shingo Hatoya
Assistant Professor	Masaru Furuya

### Surgery

Our staff provides diagnosis and surgical treatment of chest (heart and lung), abdomen (liver, gastro-intestinal tract, kidney, and urinary bladder ), skin, and other soft-tissue diseases; bone and joint diseases; disc, spinal cord, and brain diseases; and all types of cancer.

Professor	Fumihito Ohashi
Professor	Takashi Haegawa
Associate Professor	Hideo Akiyoshi
Associate Professor	Yuka Fujimoto

### Theriogenology

Our staff covers all aspects of reproductive health, including obstetrics, breeding soundness examination, infertility, artificial insemination, and reproductive surgery.

Professor	Hiromichi Tamada
Associate Professor	Noritoshi Kawate

### Radiology

Our staff provides radiation treatment using a state-of-the-art linear accelerator for patients with cancer (including mast cell tumors, soft tissue sarcomas, nasal tumors, brain tumors, spinal tumors, and melanomas).

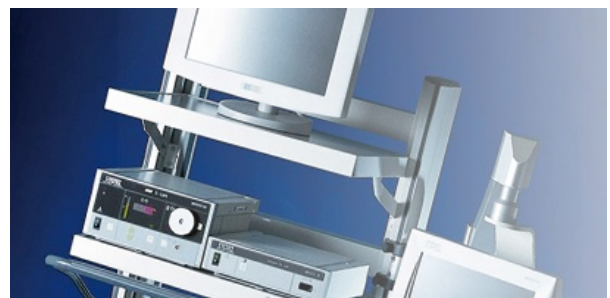
Associate Professor	Satoshi Matsuyama
Assistant Professor	Yusuke Wada



MRI



X-RAY FLUOROSCOPY SYSTEM



RIGID SCOPE SYSTEM



## Education and Research Center for Experimental Animal Science

### *Learning practical skills in conducting laboratory animal experiments*

The Education and Research Center for Experimental Animal Science is newly established on the Rinku Campus as an inter-faculty core facility for conducting experimental animal research in the university.

The main feature of the center is an animal farm for breeding small laboratory animals such as specific pathogen-free rodents and genetically modified mice as well as medium-sized animals such as dogs and goats under proper breeding conditions as directed by a central control system. The center is also equipped with laboratory equipment supporting various investigations into the development of novel medical treatments, the clarification of mechanisms of disease onset, the prevention of infectious diseases, particularly zoonotic diseases, and so on. The scientists should consider the welfare of

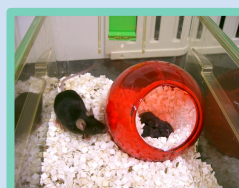
various kinds of animals, including domestic animals, companion animals, animals for exhibition and laboratory animals, ethical issues surrounding the relationship between humans and animals and promote animal welfare and protection from a practical point of view. The center will also effectively and efficiently provide not only equipment and rooms for animal experiments but also information covering all aspects of experimental animal research including genetic features of animals, proper handling, and appropriate experimental protocols. The center will also promote animal welfare and protection from a practical point of view. Through these activities, the center will practically support education and research in animal biology as the core element of its veterinary science program.



**A researcher working at procedure room**



**Cage changing station and individual ventilated cages (IVC)**



**Environmental enrichment (Rodent Crawl Ball)**

# Industry-Academia-Government Collaboration Institution

## ▪ Joint Use Institution

The various results of research in animal life science are accumulated in the "Rinku campus" which is a creation base of "intelligence" of Kansai as intellectual property through scientific research activities and practical veterinarian clinical activity. The "intellectual property" must be returned to society as property common to human beings. From this point, the social role of the "Rinku campus" which serves as a central base of "intelligence" of a south Osaka area is important. Of course we contribute to society through education and research from a long-term viewpoint. Furthermore we directly return the accumulating "intellectual property" to society by practicing densely the constant cooperation with private enterprises,

the government and a self-governing body. We think that it is our important mission who is working at the creation base of "intelligence".

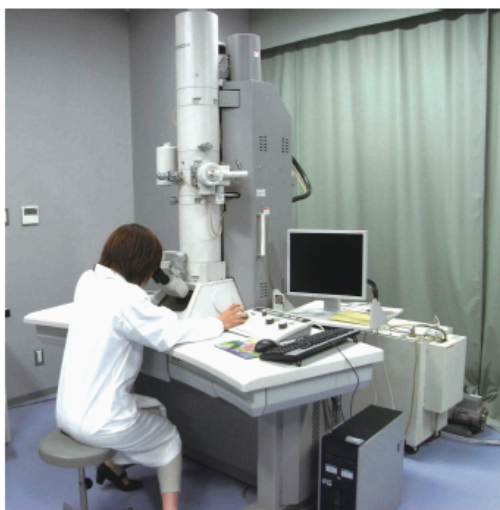
The "intellectual creation cycle" which we aim at is standing on a global view, performing the advanced and innovative research activities, and using all the created results for society from a public situation.

An industry-academia-government collaboration institution and a joint use institution are the bases of an "intellectual creation cycle". Therefore, our institution comprises the latest facilities and devices.



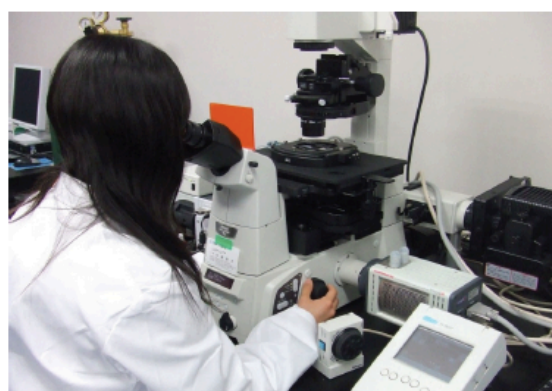
LCMS-IT-TOF

LCMS-IT-TOF is the liquid chromatograph mass spectrometer which combined the high-speed liquid chromatograph, the ion trap type mass spectrometer, and the flight time type mass spectrometer



TEM

Transmission electron microscope (TEM) is used to investigate the fine structure of biological samples including microorganisms and cellular organelle.



Live Cell Imaging System

We can analyze a living cell including the time lapse observation using luminescence or fluorescence.

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## Undergraduate Veterinary Course: School of Veterinary Science

The School of Veterinary Science, OPU (SVSOPU) is originally established in 1883, as a public training and medicare center for animals in Osaka that was known as Jyuigaku-Kosyujō. Since then, over 100 years the school has been producing a number of specialists who took a leadership in veterinary medical practice, higher education, public health, research, disease control, food safety, environmental protection and biotechnology. The mission of this school is

to foster veterinarians, technical experts, and researchers to contribute to social and industrial development and scientific progress. Students gain specialized knowledge on advanced veterinary medical care, problem-solving skills, and creativity together with a deep understanding of bioethics and the coexistence of human beings and animals.

The SVSOPU, as one of the 16 schools offering undergraduate veterinary education course in Japan, provides a six-year educational program to foster students specified for veterinary science. The curriculum of undergraduate veterinary course consists of 13 liberal arts (26 credits), and 104 specialized subjects concerning veterinary science. Students must earn at least 220 credits in total, including 180 credits for specialized subjects for their graduation. Graduation requirement includes finishing 2.5 years research work and graduation thesis. The graduates are qualified as an applicant for Japanese “National License for Veterinarian”. Successful applicants who pass the national exams can hold a Japanese veterinary license,

and are eligible for veterinary clinic practice, food inspection, and related occupations specified for veterinarians. Among 40-50 annual graduates, approximately half of them are employed as veterinary clinicians. One fourths work as public employees, being experts for infection control in animal diseases, and for food safety control. The rest of the graduates enter pharmaceutical companies, where they manage in basic and applied research, or go to graduate school to continue his/her research experiences.



In a “Large Animal Practice A”, undergraduate students learn basic knowledge for handlings and diagnostic procedures for Large animal practice. There are five laboratories for undergraduate practice classes in the SVSOPU, which specifically equipped with specific purposes (small animal clinics, large animal clinics, histochemistry, pharmacology, microbiology, and so on).



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## Graduate School: Division of Veterinary Science

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Veterinary science, a comprehensive science focused on animal treatment, tackles various issues deeply related to the health and safety of animals and humans and the welfare of the local society: (1) the enhancement of animal treatment, (2) the threat of zoonosis due to the increase in the international movement of people and animals and also distribution of livestock products, (3) the improvement of livestock production efficiency using biotechnology, (4) the development of new medicine, and (5) the safety evaluation of foods and pharmaceuticals.

The Division of Veterinary Science aims to develop (1) specialists in veterinary learning, view, and technique who are capable of integrating specialized knowledge and technique in the domain of applied animal science, (2) specialists capable of contributing to the diagnosis and treatment of animals and public hygiene, and (3) international specialists capable of exhibiting innovative leadership in biomedical fields related to both animals and humans.

Since April 2009, the Division of Veterinary Science has transferred to our new Rinku Campus located on the shore across from Kansai International Airport. On this new campus, the Veterinary Medical Center and Education and Research Center for Experimental Animal Science have been housed in an education/research building under the department. The division is carrying out improved faculty development programs at the new facilities, which are equipped with the latest educational and research equipment.

### **Subdivision: Structural and Functional Bioscience for Animal**

Our major objective is to disseminate the latest animal biological information. To achieve this goal, we conduct research; from both morphological and functional view points, into complicated and varied life processes regarding gene, protein, cell organelle, cell, tissue, and organism functions in animals while keeping in mind the differences in biomechanisms among species. We try to provide superior educational opportunities based on

research and integrate this into a comprehensive body of knowledge.

Course: Integrated Structural Biosciences

Course: Integrated Functional Biosciences

### **Subdivision: Veterinary Environmental Sciences**

We aim to maintain and improve quality of the life environment and the health of livestock, pets, and human beings from the veterinary science point of view. To achieve this goal, we educate and conduct research into harmful factors in terms of (1) their action mechanisms, influences and controls on the molecular, cellular, organismal, and group levels, (2) their relation to food safety, and (3) their analysis and evaluation using advanced techniques.

Course: Bioenvironmental Sciences

Course: Infectious Diseases Control

### **Subdivision: Veterinary Clinical Sciences**

We aim to maintain the highest educational and research standards on the organismal, cellular, and molecular levels regarding (1) the latest diagnosis, treatment and prevention methods for animal diseases and (2) the etiopathogenesis and pathoma of animal diseases or production difficulties caused by environmental changes.

Course: Advances Pathobiology

Course: Advanced Clinical Medicine

See our webpage for detail <[http://www.bioenv.osakafu-u.ac.jp/eng/grad/vet/grad\\_vet\\_e.html](http://www.bioenv.osakafu-u.ac.jp/eng/grad/vet/grad_vet_e.html)>



## Summary of employment

### CLASS OF 2014

Number of Respondents 44  
Male 27 Female 17

#### Type of Employment Accepted

Employment	Number of graduates
Small animal practice	30
Large animal practice	2
Local government	2
Federal government	0
Private company	7
National research center	0
Not decided	2
Total	43

### CLASS OF 2013

Number of Respondents 45  
Male 31 Female 14

#### Type of Employment Accepted

Employment	Number of graduates
Small animal practice	26
Large animal practice	0
Local government	9
Federal government	0
Private company	5
National research center	1
Not decided	1
Total	42

#### Type of Advanced Education Positions Accepted

Position	Number of graduates
Ph.D. in Osaka Pref. Univ.	0
Ph.D. in other vet. School	0
Ph.D. in medical School	1
Total	1

#### Type of Advanced Education Positions Accepted

Position	Number of graduates
Ph.D. in Osaka Pref. Univ.	2
Ph.D. in other vet. School	0
Ph.D. in medical School	1
Total	3

## Doctoral Theses from 2010 to 2016

Author	Title of the thesis	Supervisor
2016		
Eizi Teramoto	The development of an isolation method of <i>Malassezia pachydermatis</i> in the external ear canal of dogs and comparison of genotyping and biological activities among the isolates	M. Mukamoto
Kimio Nishiike	Study on the monitoring of bovine leukosis	M. Mukamoto
Noritaka Saeki	EphA2 and ephrin-A1 being expressed in monocytes/macrophages and vascular endothelial cells are implicated in transendothelial migration	K. Ogawa
Natsuki Tanaka	Functional analyses of Ccdc85c, a causative gene for genetic hydrocephalus	M. Kuwamura
Maki Ishibashi	The influences of lower-hyperbaric oxygen therapy to glutathione peroxidase in blood of dogs	F. Ohashi
Keiichiro Mie	Effects of adoptive immunotherapy using lymphokine-activated T killer cells on peripheral blood lymphocytes of tumor-bearing dogs	F. Ohashi
Mizuki Tojo	Abundance of BER-related proteins and effects of methylated bases on the interaction between N-methylpurine DNA glycosylase and nuclear proteins in mouse cells	K. Kubo
Hisashi Anayama	Studies on Distribution and Differentiation of Adipose Progenitor Cells in Rat Adipose Tissue	J. Yamate
Takashi Kotera	Pathological Studies on Histogenesis of Stem Cell-Derived Rat Tumors, with Particular References to Cellular Properties of Malignant Fibrous Histiocytoma and Malignant Teratoma	J. Yamate
Jun Saeki	Epidemiological survey of bacterial zoonosis from the animals to be close	K. Sasai
Takashi Kurakawa	Analysis of human microbiota by quantitative reverse transcription polymerase chain reaction	S. Yamasaki
2015		
Reo Tamai	Blood metabolites profiles of dogs with lymphoma and antitumor effect of fatty acid synthase inhibitor	S. Takenaka
Yui Suzuki	Pathological Study on the 5/6 Nephrectomy Renal Failure Model Using Common Marmoset Monkey ( <i>Callithrix jacchus</i> )	J. Yamate
Youko Nishimura	Studies on Establishment of Cardiotoxicity Biomarkers in Rats Based on Toxicogenomic Technologies	J. Yamate
Hiroshi Sasai	Retrospective study on incidence form of the fracture of the rabbit, examination about utility of the imaging using Micro Computed Tomography and fracture treatment in the small animal practice	K. Sasai
Md. Shamin Hasan Zahid	Effects of anethole on the growth and virulence expression of toxigenic <i>Vibrio cholerae</i> and its therapeutic effects in animal models	S. Yamasaki
Kohji Hosomi	Studies on molecular mechanisms of sporulation by <i>Clostridium botulinum</i> type B	M. Mukamoto
Mifumi Kawabe	Canine oral malignant melanoma: evaluation of radiotherapy and profiling of plasma metabolites using gas chromatography mass spectrometry	S. Takenaka
Tennakoon Mudiyansele Anusha Hemamali Tennakoon	Pathological Studies on Myofibroblast Properties in Thioacetamide-Induced Rat Liver Fibrosis and Cirrhosis with Special Emphasis on Glial Fibrillary Acidic Protein Expression.	J. Yamate
Miyuu Tanaka	Pathological and genetical studies on the novel myelin mutant VF rat	M. Kuwamura



## Doctoral Theses from 2010 to 2016

Author	Title of the thesis	Supervisor
2015		
Rajapaksa Rathnayaka Mudiyanselage Kavindra Kumara Wijesundera	Pathogenesis of Thioacetamide-Induced Rat Hepatic Fibrosis Based on Heterogeneous Functions of Macrophages	J. Yamate
Rina Sakai	Studies on identification of novel genomic biomarkers for classifying DNA damage-induced clastogenicity and application of a discrimination tool for clastogenicity screening based on toxicogenomics technologies	K. Kubo
Minoru Ohta	Studies on anesthetic management of thoroughbred racehorses anesthetized with sevoflurane	F. Ohashi
2014		
Suleiman Mzee Saidi	Dynamics of cholera outbreaks in endemic areas of Kenya	S. Yamasaki
Saki Koyashiki	Genetic and Biological analyses of <i>Cryptosporidium andersoni</i> novel type	K. Sasai
Akiko Yamashiro	Effects of amphotericin B on glial functions	Y. Nakamura
Toshiyuki Tanaka	Relationship between MHC class I expression and epigenetics in canine mammary gland tumor	F. Ohashi
Tetsuya Hasegawa	A retrospective study of canine epilepsy and gas chromatography mass spectrometry-based metabolic profiling of cerebrospinal fluid from epileptic dogs	M. Komori
Ai Takeshita	Involvement of adipisin in mouse pregnancy loss and fetomaternal immunotolerance	T. Okada
Emi Kashiwagi	Pathological studies on regenerating renal tubules in cisplatin-induced rat renal failure, with particular references to prostaglandin E <sub>2</sub> , neutrophil gelatinase-associated lipocalin and osteopontin	J. Yamate
Takahiro Yuasa	Pathological studies on Thy-1-expressing cells in rat renal interstitial fibrosis, with particular relation to myofibroblast development	J. Yamate
2013		
Ayaka Shima	Toxicity of cytolethal distending toxin produced by <i>Providencia alcalifaciens</i> and molecular epidemiology of genus <i>Providencia</i>	S. Yamasaki
Sharda Prasad Awasthi	Analysis of prevalence, genetic diversity, biological activity and expression of cholix toxin in <i>Vibrio cholerae</i> non-O1/non-O139	S. Yamasaki
Yukiko Morikage	Pharmacological effects of mosapride citrate hydrate, 5-HT <sub>4</sub> agonist, on gastrointestinal function	T. Takeuchi
Chiaki Kondo	Studies on toxicity biomarker research and usability validation based on toxicogenomic technologies: particular reference to drug-induced nephrotoxicity and myelosuppressive anemia	J. Yamate
Katuhito Sone	Studies on usefulness of canine pulmonary surfactant protein-A (SP-A) as a clinical biomarker of alveolar damage	F. Ohashi
2012		
Sucharit Basu Neogi	Ecological and genetic fitness of <i>Vibrio</i> populations in estuary, mangrove and ocean with particular focus on pathogenic <i>Vibrio cholerae</i>	S. Yamasaki
Sachi Shiramaru	Development and application of highly sensitive, quantitative and rapid diagnostic methods for <i>Campylobacters</i>	S. Yamasaki
Miyabi Omura	Improvement of canine oocyte <i>in vitro</i> maturation techniques	T. Inaba
Seiya Matsui	Functional roles of Fat2 expressed in adherens junctions on epidermal keratinocytes	T. Takeuchi

## Doctoral Theses from 2010 to 2016

Author	Title of the thesis	Supervisor
2012		
Dematadeni Pathirannehalage Indunil Nishantha Pathirana	Insulin-like peptide 3 (INSL3) secretion in male domestic animals and the effects of INSL3 on Leydig cells	N. Kawate
Hossain Md. Golbar	Pathological studies on the biliary fibrosis with special reference to macrophage properties in relation to myofibroblast development	J. Yamate
Yoshikazu Taketa	Pathological studies on the property changes of corpora lutea during incomplete estrous cycle and the luteal effects of ovarian toxicants in rats	J. Yamate
Junko Sakata	Studies on development of rapid Immunoassays for <i>Vibrio parahaemolyticus</i> in food	H. Kodama
Satoshi Kotoura	Studies on the evaluation of beef proteins in food by use of specific antibodies against bovine myoglobin	S. Kozaki
Haiyang Zhao	Characterization of the monoclonal antibody response to botulinum neurotoxin type A in the complexed and uncomplexed forms	S. Kozaki
Keiji Nakamura	Characterization of the neurotoxin produced by the isolate from bovine botulinum in Japan	S. Kozaki
Hideyuki Yamamoto	Specificity of botulinum protease for human VAMP family proteins	S. Kozaki
Hiroshi Nakagawa	Studies on regulatory machinery for ER-to-Golgi COPII vesicle transport	S. Matsuo
Yasuhira Ikegawa	Identification of anti-atopic peptides from silk and its molecular mechanism	M. Komori
2011		
S. M. Lutful Kabir	Comparison of molecular methods for the species identification of clinical <i>Campylobacter</i> strains and their antimicrobial resistance	S. Yamasaki
Norihiko Sugimoto	Development of a simple and rapid molecular epidemiologic method for Shiga toxin-producing <i>Escherichia coli</i> O157, O26 and O111	S. Yamasaki
Hidetaka Nishida	Study of bone marrow stromal cell transplantation therapy for spinal cord injury in dogs	T. Inaba
Kai Mito	Effect of interferon-gamma on dendritic cell-based immunotherapy against dog tumor models	T. Inaba
Yukiko Hanatani	An Assessment on Inactivated <i>Salmonella enterica</i> serovar Enteritidis (SE) Vaccine in Shell eggs, and Its Effective Antigen	K. Sasai
Ryusaku Yoshiuchi	Molecular epidemiological of gastrointestinal protozoal diseases in dogs and cats	K. Sasai
Vetnizah Juniantito	Pathological studies on macrophage properties in developing skin and cutaneous fibrosis in rats, with particular relation to myofibroblasts	J. Yamate
Tomoko Kohda	Studies on mechanism of receptor recognition for <i>Clostridium botulinum</i> type B neurotoxin	S. Kozaki
Manabu Kawata	Studies on the usefulness of ultrasound biomicroscopic evaluation of the iridocorneal angle on the diagnosis of canine glaucoma	T. Hasegawa
Mihoko Kato	Study on the protein component in <i>Toxoplasma</i> lysate antigen which induces <i>Toxoplasma</i> -specific Th1 immune response in mouse	K. Kubo
Kazuomi Oku	Studies on total intravenous anesthesia (TIVA) with propofol in horses	F. Ohashi
2010		
Shruti Chatterjee	Effect of natural spices extract on the virulence in <i>Vibrio cholerae</i>	S. Yamasaki

## Doctoral Theses from 2010 to 2016

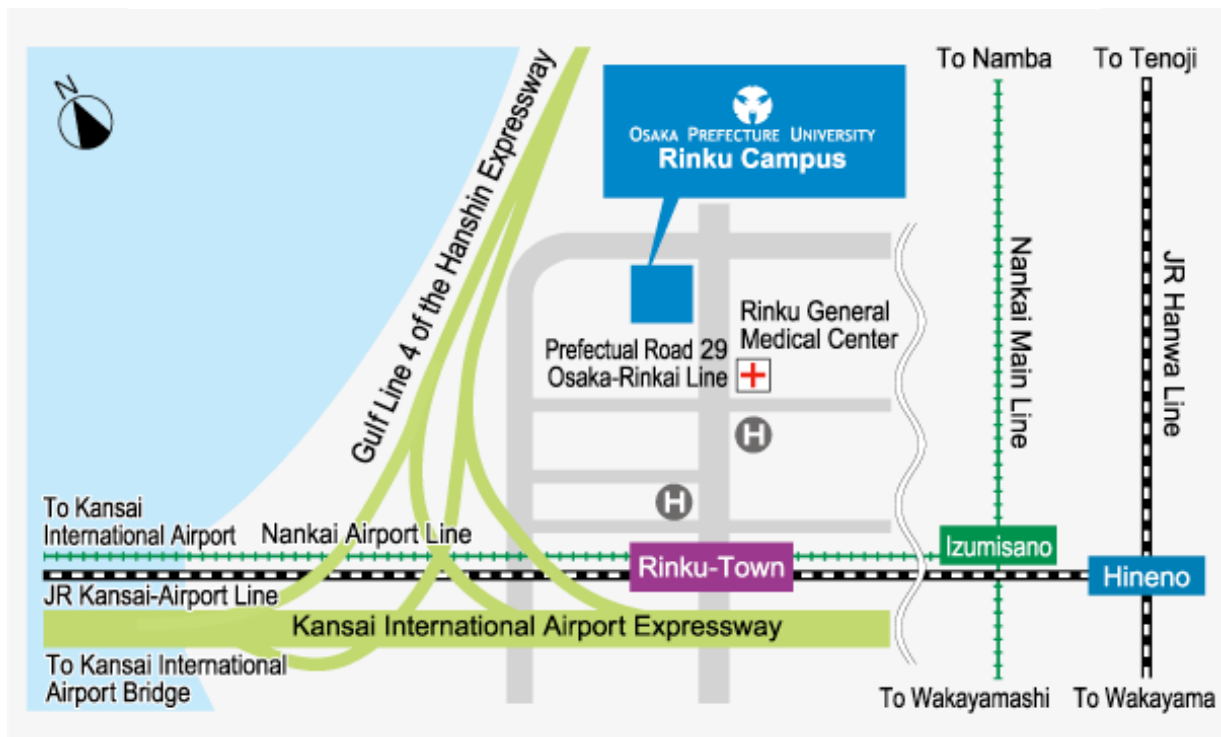
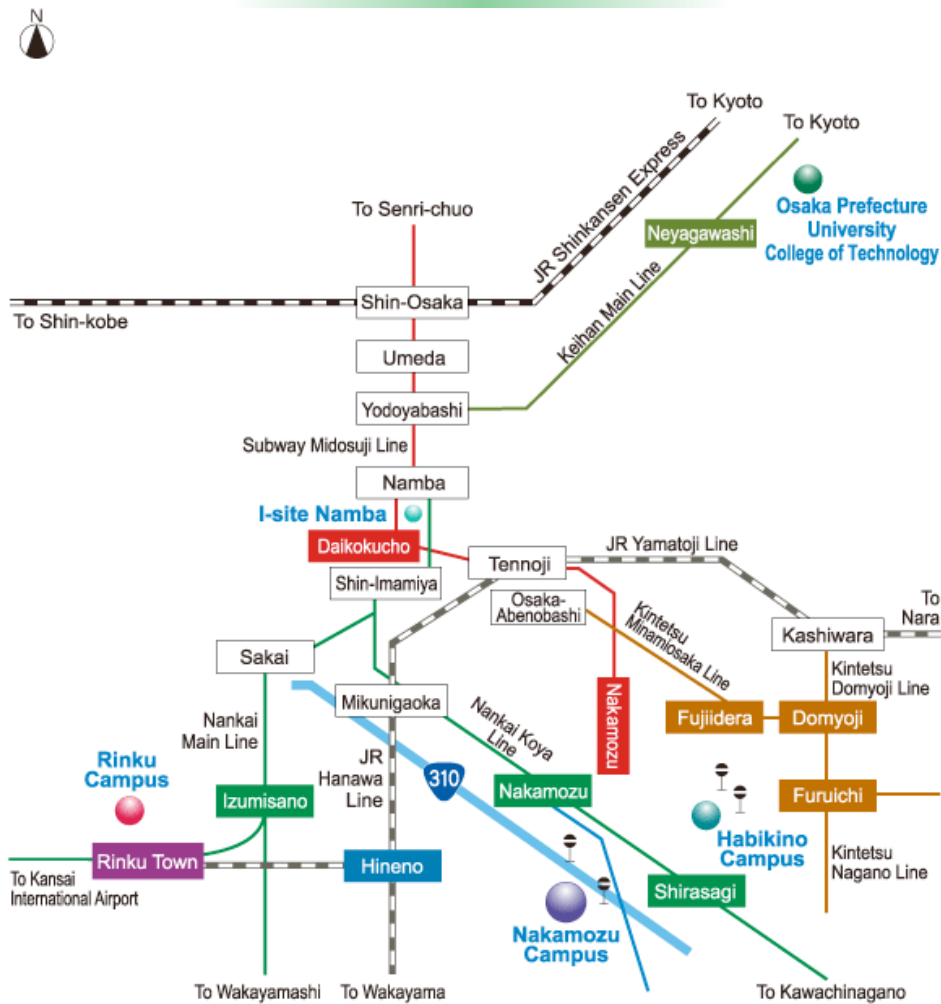
Author	Title of the thesis	Supervisor
2010		
Nityananda Chowdhury	Genetic diversity of superintegron and its implication in the development of molecular typing tools for epidemiological studies of <i>Vibrio cholerae</i>	S. Yamasaki
Soumya Haldar	Identification of <i>Vibrio campbellii</i> as an emerging shrimp pathogen and development of a hemolysin gene-based multiplex PCR for the detection of <i>V. campbellii</i> , <i>V. harveyi</i> and <i>V. parahaemolyticus</i>	S. Yamasaki
Yuluo Wu	Comparison of bacteriological characteristic and antimicrobial resistance of Shiga toxin-producing <i>Escherichia coli</i> isolated from healthy cattle and diarrheal patients	S. Yamasaki
Tsuyoshi Okuno	Basic study of embryonic stem cell transplantation therapy for Parkinson's disease	T. Inaba
Itsuki Mueller	EphB and ephrin-B expression and their function in the myocardial tissue	K. Ogawa
Masaru Ichihashi	Studies on preventive and improvement effects of a kampo medicine on the decline in reproductive functions and peripheral blood flow in aged female rats	K. Kubo
Kae Fujisawa	Toxicologic pathological study on expression patterns of heat shock protein 25 and adipophilin in different rat hepatic failure models	J. Yamate
Takeshi Izawa	Pathological studies on the cell characteristics and roles of glial cells in myelin mutant rats	M. Kuwamura
Kinji Kobayashi	Molecular pathological study on interstrain differences in the skeletal muscle lesions between dysferlin-deficient SJL and A/J mice	J. Yamate
Tomohiro Kondo	Study of a new cataract mouse model originated in the ddY strain	T. Okada
Umeda Kaoru	Genetic characterization of <i>Clostridium botulinum</i> associated with type A and B infant botulism in Japan	S. Kozaki
Yasushi Torii	Quantitative determination of botulinum toxins and their neutralizing antibodies using compound muscle action potential (CMAP)	S. Kozaki
Takao Kawai	Studies on antiviral activity of mannan-binding lectins against influenza A virus	S. Kozaki
Hiroshi Nakagawa	Studies on regulatory machinery for ER-to-Golgi COPII vesicle transport	S. Matsuo
Yasuhira Ikegawa	Identification of anti-atopic peptides from silk and its molecular mechanism	M. Komori



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# Access



JR Airport Line or Nankai Airport Line: a 6-minute walk from Rinku-Town Station (Exit 3)



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