Laboratory Animal Facilities

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General Summary

The purpose of the Laboratory Animal Facilities (LAF) is to support *in-vivo* research and to contribute to the development of basic and clinical medicine. In 2014, about 570 researchers were registered as users of the LAF. We undertake breeding of experimental animals and provide technical guidance to researchers in animal experimentation. In addition, we performed the following studies to develop basic medical sciences, including laboratory animal science.

Research Activities

Studies of parasite-vector and parasite-host interactions of African trypanosomes
African trypanosomiasis is a deadly protozoan disease of humans and animals. The disease is caused by African trypanosomes, which are transmitted by tsetse flies (*Glossina* spp.). To adjust to the mammalian host and insect vector environments, the parasite has a complicated lifecycle involving developmental stages. The lifecycle stage developments of *Trypanosoma congolense*, the cause of animal African trypanosomiasis, are reproducible *in vitro*. Taking advantage of this *in vitro* culture system, we are seeking targets to develop novel methods of controlling this disease. We are now studying molecular mechanisms underlying adhesion of parasite cells to host or tsetse tissues and lifecycle stage developments that are essential biological processes for the parasite to be transmitted. Based on the results of proteome and biochemical analyses, the characterization of molecules predicted to be involved in signal transduction or those expressed on the parasite cell surface is being carried out.

Development of a novel immunological method of fecal occult blood testing for dogs and fecal occult blood trend in digestive diseases
With advances in veterinary medicine, the lives of companion animals, such as dogs and cats, have been extended. On the other hand, neoplastic diseases have also been increasing, and the development of screening methods has become an urgent task. The fecal occult blood test (FOBT) is a method for detecting in feces a small amount of blood that is undetectable with the naked eyes or under a microscope. The FOBT was originally developed as a screening test for alimentary canal tumors in human patients. However, the FOBT remains rarely used in veterinary medicine. In addition, little is known about its clinical significance, because the chemical FOBT is based on the peroxidase activity of hemoglobin. Thus, this chemical test had low sensitivity and specificity and was not suitable for dogs, which live in various environments today. We developed a novel FOBT test using laser nephelometric immunoassay for dogs and investigated its performance. We demonstrated that our immunological FOBT method is independent of a dog's diet. We

also demonstrated that infection with a specific type of gastrointestinal parasite causes a significant increase of FOBT values in dogs and that this increase was significantly decreased with anthelmintic treatment. We are now evaluating cases of gastrointestinal cancer in dogs over time and investigating diagnostic value of our FOBT method.

Amino acid-related host nutrition dynamics during Plasmodium *infection*

Malaria, a major parasitic disease affecting more than 200 million people, is caused by the *Plasmodium* parasite. Preventive and therapeutic methods against malaria need to be established because of the expansion of areas suitable for malaria vector mosquitoes with changes in global climate and the emergences of multiple drug-resistant *Plasmodium* strains. *Plasmodium* parasites are incapable of most types of amino acid biosynthesis, depending on a part of the amino acid source on free amino acids in plasma. Thus, we are searching for the novel interactions between the parasite and host by performing the global analysis of amino acid composition in plasma (plasma aminogram analysis). With an *in vivo* murine model, we have shown that *Plasmodium* infection causes drastic alteration of plasma aminograms. Furthermore, the treatment of mice with food in which the amino acid composition has been modified significantly inhibited parasitemia. Currently, in an *in vitro* model, we are culturing the parasite with human sera from healthy individual donors (more than 3,000 sera are given by the Japanese Red Cross Society) to find aminograms that have an inhibitory effect on the proliferation of *Plasmodium falciparum*.

Publications

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