



Title	Laboratory of Veterinary Surgery (An Introduction of the four Departments composing the Graduate Scholl of Veterinary Medicine, Hokkaido University (2))
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Citation	Japanese Journal of Veterinary Research, 45(3), 174-175
Issue Date	1997-11-28
Doc URL	http://hdl.handle.net/2115/2606
Type	bulletin (article)
File Information	KJ00002398566.pdf



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Laboratory of Veterinary Surgery

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Teaching staff is composed of the above three veterinarians. Eight postgraduate and ten undergraduate students and two postgraduate research-fellows belong to this laboratory in 1997. Under the supervision of teaching staff, they conduct research on the basis of their own selected theme in the laboratory and practice clinical medicine in the surgical section of the Veterinary Teaching Hospital of the school.

In the research field, this laboratory has the following main research topics:

1. Veterinary clinical oncology¹⁾

In veterinary medicine, tumors are also a major cause of death. The greater life span has increased the likelihood of tumors developing in small animals. Most animals with malignant tumors are treated surgically. But their prognosis is usually poor because of recurrences and metastases. Therefore we are studying more effective radiotherapy and chemotherapy.

Radiotherapy is an effective treatment modality for local tumor control. As radiosensitivities of tumors are varied, prediction of their sensitivities is important. We have studied a new prediction assay of radiosensitivity using the frequency of apoptotic cells in the irradiated tumor tissue.

The role of chemotherapy is important because malignant tumors may be systemic. But most chemotherapeutic agents have serious toxicities to the tumor-bearing animals. We are therefore developing a prediction assay of traditional anti-tumor drugs for their efficacy, and tumor differentiating therapy using lesser toxic drugs such as vitamin A and D₃.

Additionally, we are studying the activation of cytotoxicity of canine T-cell by IL-2 for canine

transmissible venereal tumor cells.

2. Arthorology in horses and small animals²⁾

Articular cartilage is a highly specialized connective tissue with unique physicochemical properties suited to provide a frictionless bearing surface. At the onset of inflammatory joint diseases, these physiological conditions should be dramatically changed before clinical signs show up. However only few primary methods of diagnosis are available for the examination of pathological changes of these mechanism in the joints. Our special interests are on the understanding of articular cartilage metabolism in the case of joint diseases in horses and small animals, and the effectiveness of therapeutic attempts, such as intraarticular and intravenous injections.

An assay of serum keratan sulfate (KS) using anti-human KS is used as a parameter of cartilage catabolic activity. New monoclonal antibodies to equine cartilage components are being established for non-invasive analysis systems for cartilage metabolism to comprehend the pathophysiology of joint diseases in horses.

3. Non-invasive examination of heart, liver and kidney diseases³⁾

Ultrasound has been steadily gaining widespread acceptance as a non-invasive complementary diagnostic method in all aspects of veterinary medicine since its introduction in the late 1970s. This has been due an increase in the demand for more advanced diagnostic procedures similar to those in human medicine. In our laboratory research is being done in the use of Doppler ultrasound in the evaluation of heart, renal and hepatic hemodynamics in order to contribute to the early diagnosis, treatment and prognosis of different heart, renal and hepatic diseases. Its accuracy and usefulness in comparison to other diagnostic methods is also being investigated. In addition to the determination of flow status in the major abdominal vessels, anatomical information about the organs they supply is also being studied.

On heart disease, we are studying echocardiography and the natriuretic peptide family (atrial natriuretic peptide: ANP and brain natriuretic peptide: BNP) as non-invasive examination methods.

ANP and BNP are cardiac hormones which have the actions that are diuretic, natriuretic, vasodilation, and counterregulation against neurohumoral mechanism. Their actions are thought to benefit the failing heart. Human recombinant ANP (Carperitide) has been on the Japanese market and is used in human medicine. However in veterinary medicine, its clinical trial is insufficient. We are therefore studying the application of Carperitide to treat and manage canine heart failure.

4. Cell biology of wound healing using chitin and chitosan⁴⁾

Chitin and chitosan (deacetylated chitin) are cellulose-like biopolymer which are widely distributed in nature, for example in invertebrates, insects, fungi, and yeasts. Recent developments have enabled the use of these polymers in the medical and veterinary field. Chitin and chitosan have been observed to accelerate wound healing properties and the attainment of a good-looking healing skin surface. However, the precise mechanisms of these actions are unknown. The effects of chitin and chitosan on the function of various cell lines in vitro (ie. proliferation and cytokine production of fibroblasts and umbilical vein endothelial cells, macrophage activation, and collagen synthesis) are being investigated in this laboratory.

5. Periodontal therapy in dogs

There is an increasing need for periodontal reconstruction in clinical veterinary dentistry. In our laboratory, we are studying the use of recombinant human bone morphogenetic protein-2 (rhBMP-2) for periodontal therapy in dogs. We are using fibrous collagen membrane (FCM) as a carrier of BMP in order to increase its efficiency. An artificial root cementum defect at molars of a dog is prepared. Then rhBMP-2 combined with FCM is implanted. We hope that cementum and periodontal ligament might be regenerated with BMP.

References

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