Veterinary Bioscience: Cardiovascular System

WEEK 3 – REGULATING FLOW AND PERTURBATIONS OF FLOW

LECTURER: ASSOCIATE PROFESSOR JENNY CHARLES

As a veterinary graduate of the University of Sydney, Jenny Charles undertook specialist training in veterinary anatomic pathology at the University of Melbourne and the University of Guelph. She also worked in the United Kingdom on the clinical diagnosis and eradication of bovine spongiform encephalopathy before returning to Australia. She is a Diplomate of the American College of Veterinary Pathologists and previously served as a member of the international WSAVA multi-disciplinary team responsible for refining diagnostic criteria for hepatobiliary disorders of dogs and cats. Jenny's research interests include disorders of the liver, pancreas, and cardiovascular and reproductive systems of domestic animals, diseases of New World camelids, causes of wastage in the horse racing industry, and applied aspects of clinical pathology.

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INTENDED LEARNING OUTCOMES

At the end of this lecture you should be answer the following questions:

- hemostasis in the event of vessel injury?
- What is the role of thrombin in coagulation?
- What role do platelets and endothelial cells play in maintaining hemostasis?
- What are the major factors which limit clot formation?

KEYWORDS

Haemostasis, coagulation cascade, biochemical regulation.

LECTURE 15 – HAEMOSTASIS AND CONTROL OF COAGULATION

The bloodstream is the means by which the tissues and organs are nourished as well as an elaborate communications system which conveys complex commands between tissues and organs. Its composition is maintained by an elegant and elaborate series of internal checks and balances and its very retention within veins and arteries where it belongs is the subject of this lecture. The retention of blood within veins and arteries is called **haemostasis.** Extensive blood loss is life threatening - hence the evolution of the blood coagulation system. However excessive coagulation is also life threatening as it can result in a lethal blockade of blood circulation - hence the evolution of sophisticated natural mechanisms to limit and confine it. Every veterinarian needs to have a clear, commonsense understanding of how blood coagulation is controlled both naturally and in an interventionist, deliberate, beneficial way. Such an understanding leads to ability to administer appropriate drugs and to

recognize and then treat patients with certain genetic diseases. Equally this understanding leads to practical insights into how certain natural (and unnatural) toxins affect the animals they target and examines how poisoning episodes are treated.

The aim of this lecture is to identify the central players in blood coagulation, to explain how they work and to account for the physiologic effects of their absence or dysfunction. A good understanding of the material presented should at very least enable the student to comfortably study more applied material on haemostasis in pharmacology and clinical medicine.

FURTHER READING

The veterinary clinics of North America (1988) 18 (1)

This entire volume describes what is known about haemostasis in companion animals and its clinical implications. It is an excellent reference work for the working veterinarian in a small animal practice as well as undergraduate students with a solid grounding in biochemistry and physiology.

C M Jackson, and Y Nemerson. Annual Review of Biochemistry. (1980) 49 765-811

This is a review article which examines the detailed relationship between the structure and function of most of the coagulation factors discussed.

J. Evan Sadler. Annual Review of Biochemistry. (1998) 67 395-424

This review article focuses on the formation of the platelet plug and the biological role of von Willebrand's factor.

USEFUL WEB STES

This web site contains useful additional information on diseases of the blood coagulation pathway of humans.

http://www-admin.med.uiuc.edu/hematology/index.htm

The following web addresses contain some additional details on Canto and canine haemophilia).

http://www.workingdogs.com/doc0155.htm http://www.gsdhelpline.com/haemohist.htm