Veterinary Bioscience: Cells to Systems

Lecture 29 - Disorders of Tissue Mass and Cell Differentiation 2

Lecturer: A/Professor Jenny Charles

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Email: charlesj@unimelb.edu.au

Intended Learning Outcomes

At the end of this lecture, you should be able to:

- use appropriate terminology to describe acquired lesions characterised by excess tissue mass or altered tissue differentiation
- explain the factors that promote tissue hypertrophy, hyperplasia, metaplasia and/or dysplasia
- explain the potential consequences of these processes.

Keywords

hypertrophy, hyperplasia, metaplasia, squamous metaplasia, glandular metaplasia, acquired dysplasia, neoplasia, anaplasia

Lecture Overview

An increase in mass is a common adaptive response of tissues to an increase in workload, hormonal stimulation or functional demands. The increase in tissue mass is reversible and may reflect an increase in the size of the component cells (hypertrophy) or an increase in the number of component cells (hyperplasia), or a combination of both processes. Pertinent veterinary examples will be utilised to illustrate these processes in health and disease, their triggers and the potential consequences.

Tissues that are chronically irritated may undergo metaplasia, an adaptive response in which cellular differentiation is altered to result in transformation of the original cell type to a related but less vulnerable type. Metaplasia may permit cell survival in a hostile environment but is often associated with the loss of specialised functions, particularly in affected epithelium. Examples of squamous and glandular metaplasia of epithelium and of metaplasia within connective tissues will be provided.

Metaplasia is usually a reversible process that is often accompanied by orderly hyperplasia of the affected cells. However, the process can become disorderly, a phenomenon known as acquired dysplasia. Although acquired dysplasia is essentially a reversible process, it often progresses to tumour formation (neoplasia). Failure or loss of differentiation (anaplasia) is a microscopic feature of malignant tumours.

Further Reading

MA Miller and JF Zachary. Mechanisms and Morphology of Cellular Injury, Adaptation and Death. In: *Pathologic Basis of Veterinary Disease*. 6th ed. Ed. JF Zachary. Elsevier, Inc., St Louis, USA (2017), pp. 2-43 (emphasis on pp. 22-26 and 41-43)