Veterinary Bioscience: Cells to Systems

Practical Class 5 – Cell Degeneration and Necrosis

Class Leader: A/Prof Jenny Charles and Dr Yuchi Chen

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Where: Learning and Teaching building Room 331 and 410, Werribee

When: Thursday 28th April 2023

Group A: 2-3.30 (Gross) & 3.30- 5.00 pm (Histo)

Group B: 2-3.30 (Histo) & 3.30- 5.00 pm (Gross)

Learning Outcomes

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

- Describe in both lay terms and the appropriate medical terms the gross and histological appearance of lesions involving tissue degeneration as well as cellular degeneration and necrosis.
- Apply your theoretical knowledge to interpret the gross and histological appearance of lesions in terms of the most likely underlying disease process, the possible cause or causes, and the potential consequences.
- Construct a morphological diagnosis to describe concisely and accurately gross and histological lesions of tissue degeneration as well as cellular degeneration and necrosis.

Practical Class 5 – Degeneration and Necrosis

This practical class provides the opportunity to view and manipulate a collection of fixed (preserved) wet specimens and museum pots that illustrate animal diseases characterised by tissue degeneration as well as cellular degeneration and cell necrosis. Short videos discussing the more important specimens in this set will also be available via Canvas.

The museum pots and wet specimens will be accompanied by laminated sheets that pose a series of questions relating to each specimen. The questions will prompt you to describe accurately and concisely the gross abnormalities you can see and/or feel, to practise constructing a morphological diagnosis, and to apply the knowledge that you have gleaned from the relevant lectures to speculate as to the possible disease processes involved, their causes and potential consequences. Answers to these questions will be provided during the class and will be made available for download from Canvas to aid your revision.

For the wet specimen component of this class, you are expected to wear appropriate clothing (fully enclosed, water-proof shoes). A clean laboratory coat and gloves will be provided. Some of the fixed specimens may emit formalin fumes. If any student is affected adversely by these fumes, he or she should notify an attending staff member.

During the histopathology class, you will have the opportunity to view digitised histological tissue sections in the SLICE platform via the BEST network. The purpose of the histopathology class is to deepen your understanding of how the various disease processes can alter tissue structure (and hence function) at the light microscopic level, and to allow extrapolation from the gross to the microscopic appearance of lesions and vice versa. Short videos outlining the important features of these slides will be available via Canvas.

Information on how to access the histopathology slides will be provided through Canvas before the practical class.

Keywords

cloudy swelling, hydropic degeneration, fatty degeneration, fatty change, lipidosis, amyloid, amyloidosis, necrosis, apoptosis, oncotic necrosis, coagulative necrosis, liquefactive necrosis, caseous necrosis, gangrene, fat necrosis, fibrinoid change, collagen flame figures, dystrophic mineralisation, metastatic mineralisation

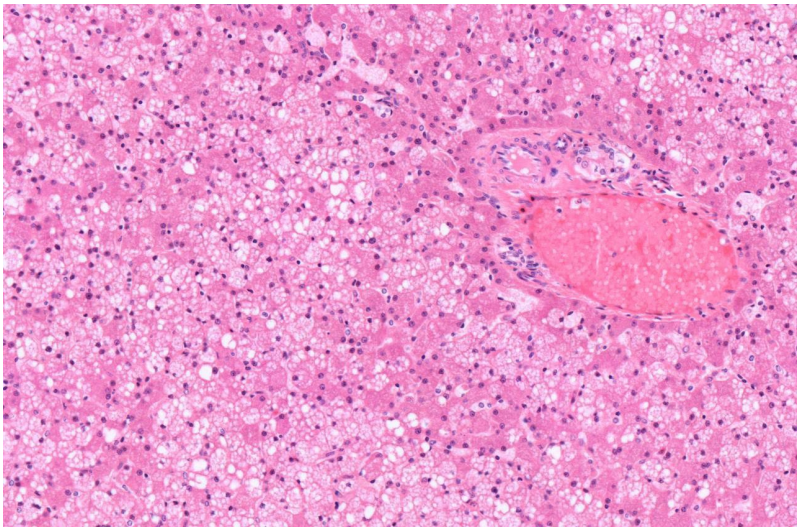
Further Reading

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. 8-21)

Degeneration Slide 1 Canine Liver – Diabetes mellitus

Go to https://slice.edu.au/s/ae575364

What are the main histological features of lipidosis in cells?



What is the gross appearance of a liver with hepatic steatosis/lipidosis?

What are the main causes of hepatic lipidosis?

Describe the process (pathogenesis) of lipid accumulation in the liver.

What other organs or systems are commonly affected by lipid degeneration? Give examples.

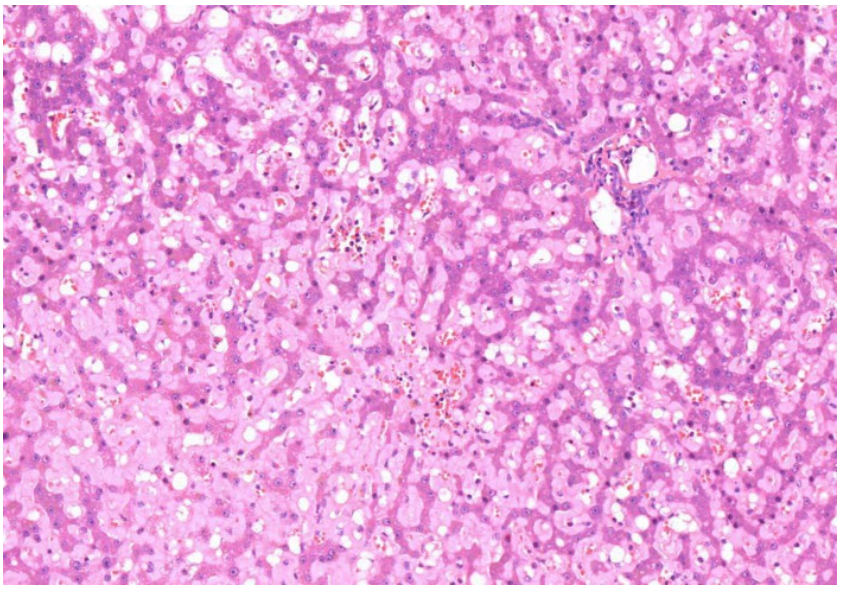
Degeneration Slide 3 Feline Liver - Hepatomegaly

Go to https://slice.edu.au/s/d23af689

Name the different types of amyloidosis and their causes.

Find the following structures:

- **Portal triads**
- **Bile ducts**
- **Central vein**
- **Hepatic arterial branch**
- **Portal vein**
- **Lymphatics**



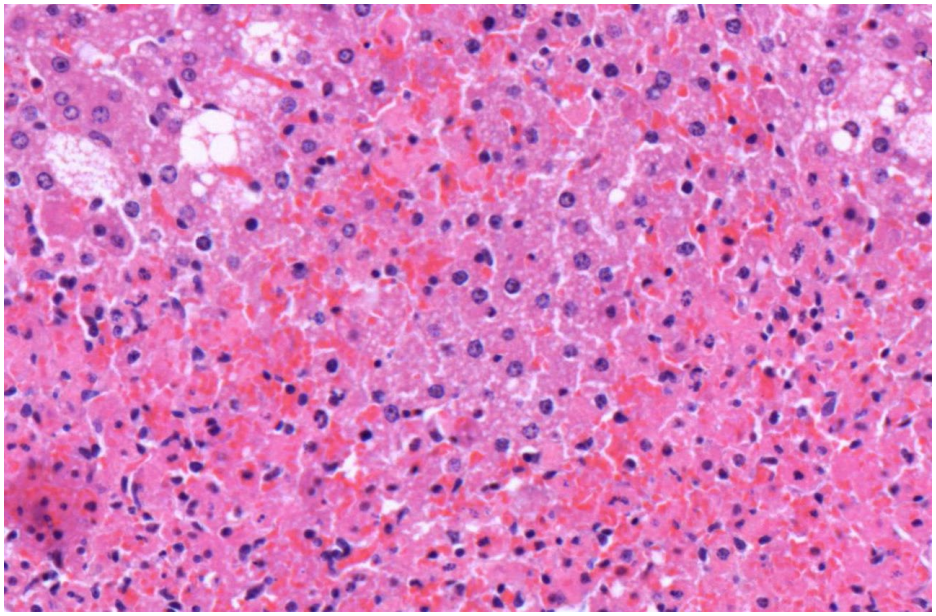
Zoom in and look for the areas of pallor. Describe the location of the amyloid accumulation and what structures are affected.

What are the main effects of amyloidosis?

Degeneration and Necrosis Slide 4 Rat Liver – CCl_4 Treatment 1 day prior

Go to https://slice.edu.au/s/b3e0271f

Look for evidence of degeneration and necrosis. Describe the histological differences between the degenerate cells and necrotic cells.



Name the types of nuclear changes seen in a necrotic cell.

What are the differences between apoptosis and oncotic necrosis?

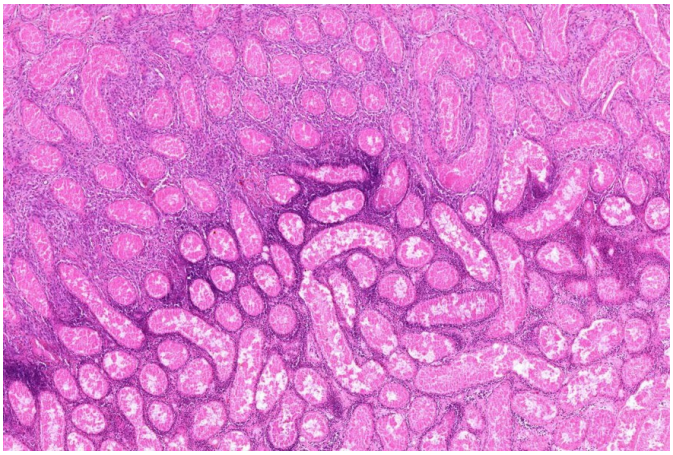
Necrosis Slide 2 Ovine Testicle and Epididymis – Elastration ring for castration

Go to https://slice.edu.au/s/0dfcedf5

Find the following structures:

- **Testis**
- **Epididymis**
- **Tunica albuginea**
- **Tunica vaginalis**

Find the area of coagulative necrosis. Describe the histological features of this type of necrosis.

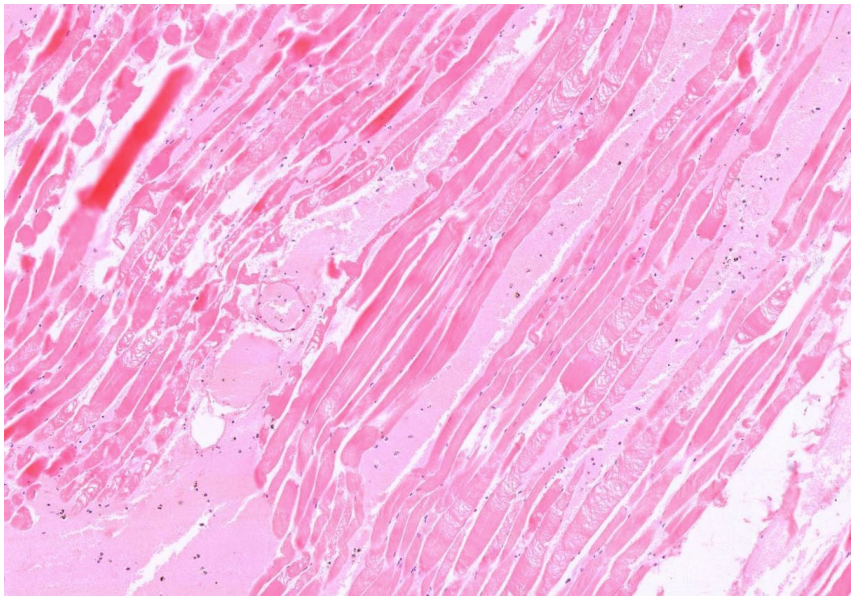


Give examples of tissues susceptible to coagulative necrosis.

Necrosis Slide 3 Ovine Skeletal muscle – Sudden death

Go to https://slice.edu.au/s/5d60c4b3

Describe the changes to the tissue that you can recognize.



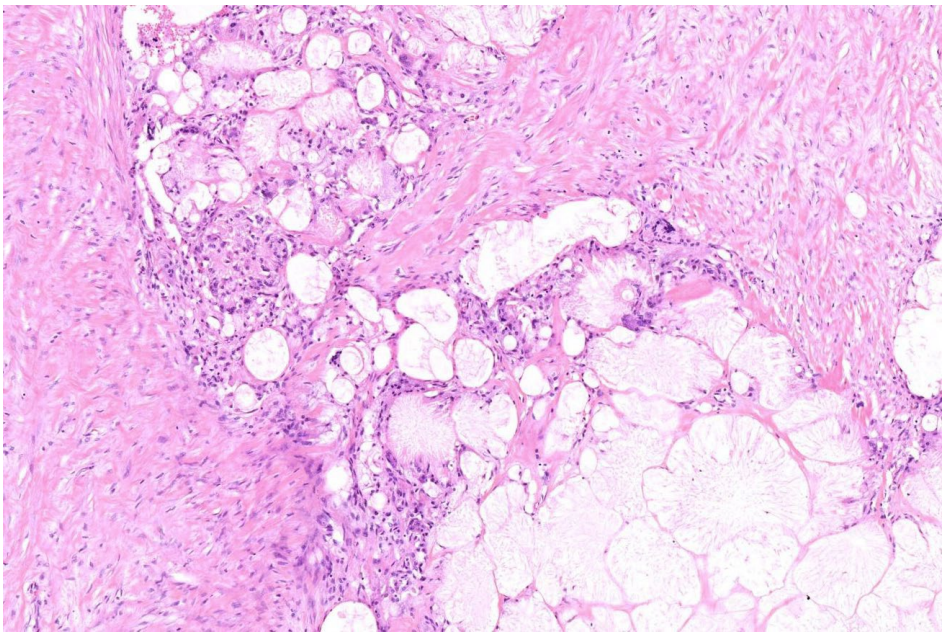
What causes this type of necrosis?

Name the types of gangrene and describe their difference.

Necrosis Slide 4 Bovine Adipose tissue – Incidental change in abdominal fat

Go to https://slice.edu.au/s/45daa6c5

What is the normal morphology of adipocytes? Are any of these cells normal adipocytes?



Describe the histological changes.

What other types of cells can you recognise in this slide?