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DEPARTMENT OF VETERINARY PATHOLOGY

PIGMENTS AND OTHER TISSUE DEPOSITS

- Many pathologic processes are accompanied by accumulations of material either within the cell (intracellular) or in the extracellular space

1. **Lipid Accumulation**
2. **Glycogen Accumulation**
3. **Protein Accumulation**
4. **Amyloid and Amyloidosis**
5. **Endogenous Pigments**
6. **Pathologic Calcification (Mineralization)**
7. **Crystals**
8. **Exogenous Pigments**
9. **Parasite Pigments**

Lipid Accumulation

a) Intracellular Lipid Accumulation

i. Triglycerides (Fatty Change)

- seen with metabolic / nutritional disorders, toxins, hypoxia, etc

ii. Inherited Storage Diseases (Lipidosis)

iii. Cholesterol accumulations

- **Inflammation and necrosis: foamy macrophages**
- **Atherosclerosis: smooth muscle & macrophages**

Fatty Change (in liver)

- **Also known as**
  - **Fatty Liver**
  - **Hepatic Lipidosis**
  - **Hepatic Steatosis**

Etiology

- Inadequate amounts of oxygen
  - Anemia
  - Circulatory disturbance
- Hepatotoxins
  - Carbon tetrachloride
  - Chloroform
- Metabolic diseases
  - Diabetes mellitus
  - Ketosis
- Deficiency of Lipotropic factors
- Miscellaneous
  - Protein malnutrition, corticosteroids, starvation, obesity, and certain chronic illnesses

Pathogenesis

- Excessive delivery of free fatty acids either from the gut or from adipose tissue
- Decreased β-oxidation of fatty acids to ketones and other substances because of mitochondrial injury (toxins, hypoxia)
- Impaired synthesis of apoprotein (CCl_4 toxicity, aflatoxicosis)
- Impaired combination of triglycerides and protein to form lipoprotein (uncommon)
- Impaired release (secretion) of lipoproteins from the hepatocyte (uncommon)

Gross Pathology

- Mild fatty change may not be detectable
- In notable lipidosis lesions found
- Liver enlarged, yellow, soft and friable, and the edges of the lobes are rounded and broad instead of sharp and flat
- When incised, the cut surface of severely affected livers can bulge and has a greasy texture
- Small tissue float in water or formalin.

Microscopic Pathology

- Intracellular vacuolation
- Extent of the vacuolation depending on the severity of the lipidosis.
- Initially, there are a few small clear vacuoles that increase in size and number and eventually coalesce into larger vacuoles.
- Nucleus can be displaced to the periphery
- Alcohol and clearing agents used during the tissue processing dissolved fat

Thrush breast

- Also known as 'tigered' effect
- Intracellular deposits of fat create bands of yellow myocardium, alternating with bands of darker, red-brown, uninvolved myocardium.

Fatty Infiltration

b) Extracellular - Adipose (Fatty) Tissue Infiltration

- Seen in skeletal muscle & myocardium (aka muscle steatosis)
- Normal fat tissue replaces lost muscle fibers (congenital or acquired loss)
- Usually not associated with functional disturbance

Glycogen Accumulation

- excessive intracellular deposits with abnormalities of glucose / glycogen metabolism
- Seen in
  - In renal tubular epithelium with diabetes mellitus
  - In hepatocytes of dogs with excess corticosteroids ("steroid hepatopathy")
  - In glycogen storage diseases (glycogenoses)

Endogenous pigments

- Melanin
- Lipofuscin
- Derivatives of Haemoglobin
  - Hemosiderin
  - Porphyria
  - Bilirubin

Important terms

- **Acanthosis nigricans**, an increased amount of melanin within the skin, is frequently observed in the dog

- **Albinism** is the complete absence of melanin within an individual

- **Leukoderma**:- There is local loss of the pigment. It is commonly observed in areas where there have been collar, saddle, or harness injuries.

- **Vitiligo** is a disorder characterized by partial or complete loss of melanocytes in the epidermis

EXOGENOUS PIGMENTS

Siderosis:
deposition of iron in the lungs

Silicosis:
deposition of silicon (silicon dioxide, i.e., stone dust) in the lungs

Plumbism:
pigmentation of tissues resulting from the presence of both lead and hydrogen sulphide

chalicosis:
deposition of calcium carbonate in the lungs

Argyrosis:
deposition of silver compounds in the lungs