Primary Hematopoietic Neoplasia

Hematopoietic Neoplasia

Lymphoproliferative Disease

Lymphoma

Lymphoid leukemia

Plasma cell tumours

Histiocytic Neoplasia

Myeloproliferative Disease

Myeloid leukemia

Myelodysplastic Syndrome

Mast cell tumour
Bovine Lymphoma

Multiple forms:
- Enzootic Bovine Lymphoma
- Sporadic Bovine Lymphoma
  - Calf form
  - Juvenile form / Thymic form
  - Cutaneous form
Bovine Lymphoma – Enzootic bovine lymphoma

- Adult cattle (~5-8 years old)
- Bovine leukemia virus (retrovirus)
  - 30% of infected cattle → persistent lymphocytosis
  - < 5% of infected cattle → lymphoma
- Multicentric lymphoma of B cell origin
- More common in dairy cattle - due to management practices and average animal age

Transmission:
- Natural breeding
- Contaminated needles, dehorning and ear-tagging equipment
- Rectal sleeves*
- Blood sucking arthropods
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Bovine Lymphoma – Enzootic bovine lymphoma

Four commonly affected sites**
Bovine Lymphoma – Enzootic bovine lymphoma

Four commonly affected sites**
Bovine Lymphoma – Sporadic bovine lymphoma

- Not associated with a viral infection!
- Affects young animals, 3 forms:

1. Calf Form
   - Less than 6 months of age
   - Symmetrical lymphadenopathy
   - Bone marrow involvement (leukemia)
   - Kidney, liver, spleen, etc

Multicentric Lymphoma
2. Juvenile Form = Thymic Form

- Young (< 2 years) beef cattle
- Mediastinal (thymic) mass
3. Cutaneous Form

- 2 – 3 year old cattle
- Plaques or nodular, raised skin lesions
- Head, sides, and perineum
- Waxing and waning
- Eventual systemic involvement
- Survive 12 – 18 months
Porcine Lymphoma

- Most common neoplasm of pigs
- Multicentric
- Often < 1 year old
- Females > males
- Familial (hereditary) form
  - Large White pigs

Photos: Dr Aburto, AVC
Equine Lymphoma

- Lower incidence than dogs/cats
- Separate forms based on anatomic location:
  - Multicentric
  - Subcutaneous form
  - Alimentary form
  - Abdominal form
  - Splenic form
Plasma cell tumours

1. Cutaneous Plasmacytoma
   - Common skin masses in dogs
   - Surgical excision is usually curative

2. Extramedullary Plasmacytoma
   - Arising at sites other than BM / skin
   - Often affect the GI tract
   - More aggressive, may metastasize to the lymph nodes
3. Multiple Myeloma

- Uncommon in domestic animals: dogs > cats
- Malignant tumour of plasma cell origin arising in the bone marrow
- Neoplastic (clonal) plasma cells secrete immunoglobulin leading to hypergammaglobulinemia:
  - Monoclonal gammopathy on serum electrophoresis
  - Hyperviscosity syndrome
  - Bence-Jones proteinuria
3. Multiple Myeloma

- **Gross**: Pale pink to dark red gelatinous masses replace bone marrow – typically multiple masses!
- **Histologically**: Sheets of round cells– with plasmacytoid morphology

Masses may occur in any bone, but most often occur in the vertebrae
Can see hypercalcemia due to ↑ osteoclastic activity *
Clinical diagnosis of multiple myeloma is based on finding 2 - 3 + of the following features:

- Increased plasma cells in bone marrow
- Punched out lesions on radiographs
- Monoclonal gammopathy
- Hypercalcemia
- Light chain (Bence-Jones) proteinurin
Hematopoietic Neoplasia

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Mast cell tumour
Histiocytic Proliferative Disorders

1. Cutaneous histiocytoma
   - Common benign skin mass
   - Young dogs
   - Spontaneously regress

2. Reactive histiocytosis
   - Immunoregulatory disease
   - Waxing and waning, progressive
   - Cutaneous histiocytosis
   - Affects the skin
   - Systemic histiocytosis
   - Affects skin and viscera

http://vetmedicine.about.com/od/diseasesandconditions/tp/Lumps-Bumps.htm
3. Histiocytic Sarcoma

- Malignant neoplasia of macrophages or dendritic cells
- Breed predispositions
  - Bernese Mountain dog, Rottweiler, Flat-coated Retriever
- Can be solitary or multiple:
  - Solitary lesions
    - Surrounding joints, subcutis
    - Lymph nodes, spleen or liver
  - Multiple lesions
    - Disseminated histiocytic sarcoma (malignant histiocytosis)
Histiocytic Proliferative Disorders

3. Disseminated histiocytic sarcoma (malignant histiocytosis)

- Aggressive multisystemic disease
  - Tumour masses in several organs: spleen*, bone marrow*, lymph nodes*, lung, skin
  - Splenomegaly, hepatomegaly

Histiocytic sarcoma, hilar and mesenteric lymph nodes

Courtesy of Dr A Lopez, AVC
Histiocytic Proliferative Disorders

3. Disseminated histiocytic sarcoma (= malignant histiocytosis)

- **Histology**: Masses / diffuse infiltrates composed of atypical histiocytes
  - May be avidly hemophagocytic causing a non-regenerative anemia
Mast cells are widely distributed in the connective tissues - however they originate in bone marrow

1. Cutaneous mast cell tumour
   - Common skin tumours of dogs

2. Alimentary mast cell tumour
   - Intestinal or gastric masses

3. Systemic mastocytosis
   - Involves primarily the hematopoietic system
3. Systemic mastocytosis = Visceral mast cell tumours

- Primarily involves the hematopoietic system
  - Spleen, bone marrow
- Rare in animals: cats
- **Gross:** Diffuse splenomegaly +/- nodular surface
Mast cell neoplasia

3. Systemic mastocytosis = Visceral mast cell tumours

- Primarily involves the hematopoietic system
  - Spleen, bone marrow
- Rare in animals: cats
- Gross: Diffuse splenomegaly +/- nodular surface

Can see diffuse hepatic enlargement
3. Systemic mastocytosis = Visceral mast cell tumours

Histology:
Cords and sheets of mast cells efface the parenchyma
Secondary Bone Marrow Neoplasia

- Results of metastasis of a tumour from a distant site to the bone marrow
- Can be a carcinoma or a sarcoma

Metastasis of a malignant pheochromocytoma to the rib, dog
Lymph nodes

**Function:**
- Filtration of lymph
- Immune response

**Structure:**
- Outer cortex ➔ follicles (mostly B cells)
- Inner cortex ➔ paracortex (mostly T cells)
- Medulla ➔ mostly B cells and macrophages

**Lymph circulation:**
- Afferent lymphatics ➔ subcapsular sinuses ➔ trabecular sinuses ➔ medullary sinuses ➔ efferent lymphatics ➔ thoracic duct

Modified from Pathologic Basis of Veterinary Disease
**Lymph nodes**

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# Lymph node: General response to injury

Two basic responses: Decrease in size or increase in size

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<th>Small lymph nodes</th>
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Lymph node: General response to injury

Lymphadenopathy

- Enlargement of the lymph node(s) of unknown cause
- Can be localized or generalized

Enlarged lymph nodes

- Lymphadenitis*
- Lymphoid hyperplasia*
- Hyperplasia of the monocyte/macrophage system
- Primary neoplasia*
- Secondary neoplasia*

Enlargement of the right retropharyngeal LN sheep
Lymph node: Inflammation

**Lymphadenitis**

- An inflammatory response to an infectious agent within the node

- As opposed to reactive hyperplasia which is an antigen driven immunologic response

**Acute Lymphadenitis**

- Usually the result of a regional lymph node draining a site of inflammation and becoming infected

Cervical and sternal lymphadenitis with sepsis
Lymph node: Chronic lymphadenitis

- With chronicity the lymph nodes become large, irregular, and firm due to fibrosis
- Chronic suppurative lymphadenitis*
- Chronic granulomatous lymphadenitis*

*Rhodococcus equi in a foal
Lymph node: Chronic suppurative lymphadenitis

- Gross lesions:
  - Swollen lymph node with pus-filled center = Lymph node abscess
  - Response to pyogenic bacteria
  - Can fistulate to the skin surface
Equine Strangles

- *Streptococcus equi* subsp *equi*
- Inflammation of the URT → abscesses in the mandibular, retropharyngeal and parotid lymph nodes
- May fistulate to the surface
- Can spread to the viscera → “Bastard Strangles”
Pathogenesis:
• Enters via contamination of shear wounds; less often by mucosal wounds or inhalation
• Drains to regional lymph nodes
  – Superficial nodes are affected more often than internal nodes
    • Prescapular LN
    • Prefemoral LN

Caseous lymphadenitis: *Corynebacterium pseudotuberculosis*
• Chronic suppurative lymphadenitis in sheep & goats
• Ulcerative lymphangitis in horses and cattle
• Pectoral abscesses in horses

Image source unknown
Lymph node: Chronic suppurative lymphadenitis

Caseous lymphadenitis: *Corynebacterium pseudotuberculosis*

Goat, caudal mediastinal lymph nodes: lymph node abscesses
Lymph node: Chronic suppurative lymphadenitis

Caseous lymphadenitis: *Corynebacterium pseudotuberculosis*

- Chronic suppurative inflammation, caseous necrosis & fibrosis
- As lesion progresses → characteristic concentric laminations**

With time, there may be systemic involvement with abscesses in the internal organs
Questions?