

LYMPHOMA IN DOGS AND CATS

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ADVANCED CARE FOR PETS

May 19, 2017

LYMPHOMA IN DOGS: OVERVIEW

- Breed predisposition
- Presenting complaint
- Diagnosis
- Staging
- Grade
- Prognosis
- Treatment



CANINE BREED PREDISPOSITION

Boxer

Bull Mastiff

Basset

St. Bernard

Airedale

Bulldog

Scottie



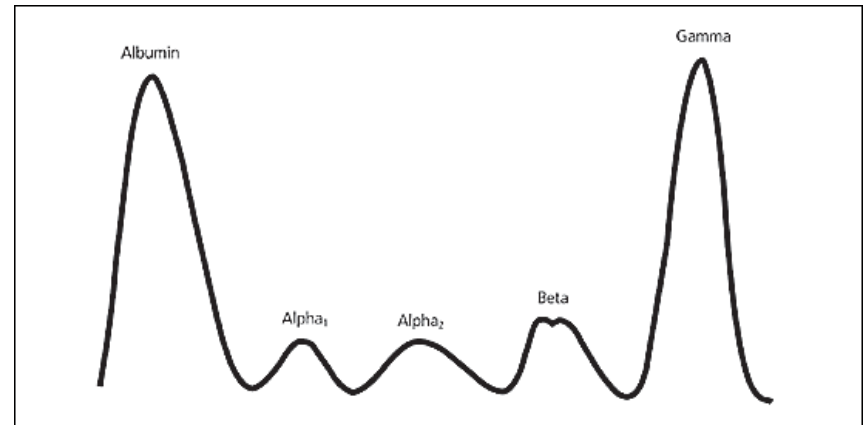
PRESENTING COMPLAINT

Lymphadenopathy
Pre-caval syndrome
Abdominal distension
Dyspnea, cough
PU/PD
Lethargy
Cachexia
Anterior uveitis
Weight loss
Vomiting/diarrhea



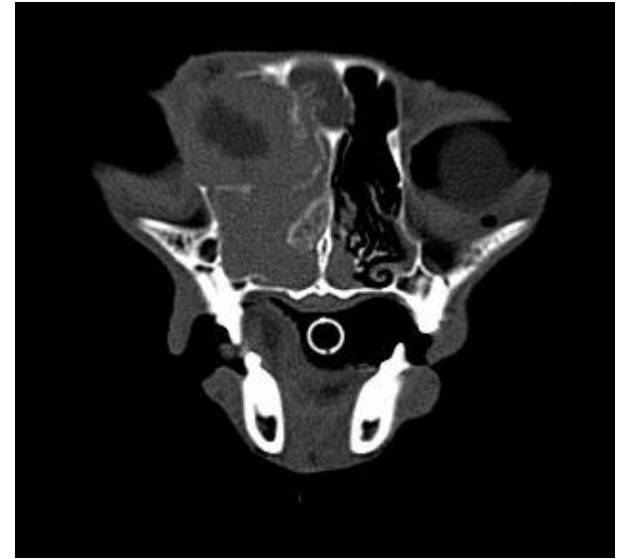
PARANEOPLASTIC SYNDROMES

- Hypercalcemia
- Anemia
- Thrombocytopenia
- Hyperglobulinemia
- Fever
- Cachexia



DIAGNOSIS

- FNA + cytology
- Nasal: CT/rhinoscopy
- Mediastinal: FNA + cytology
- GI: endoscopy or surgical biopsy
- Abdominal: u/s guided FNA + cytology
- CNS: MRI, CSF tap
- Nodal biopsy
- PARR, IHC, ICC, Flow cytometry



LYMPHADENOPATHY DIFFERENTIALS

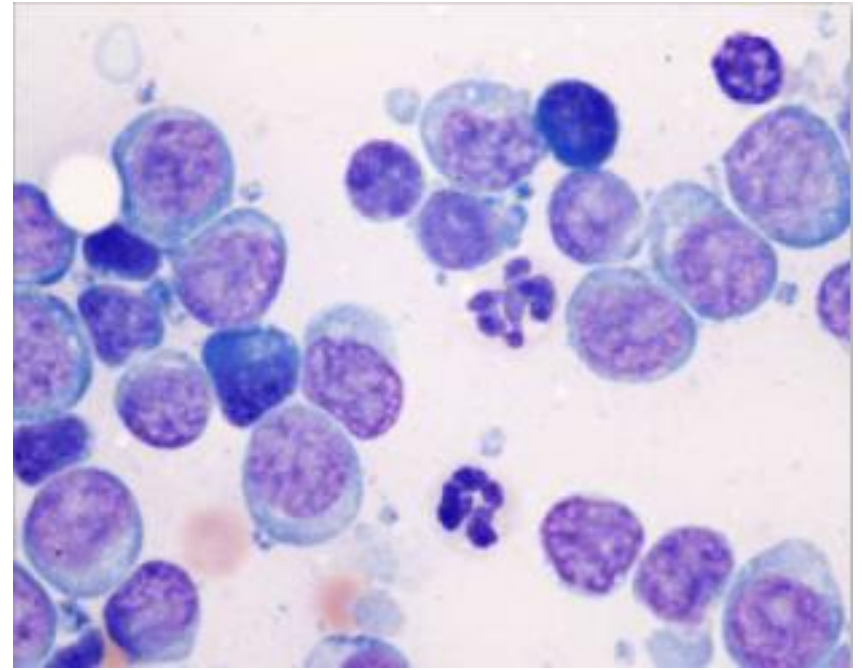
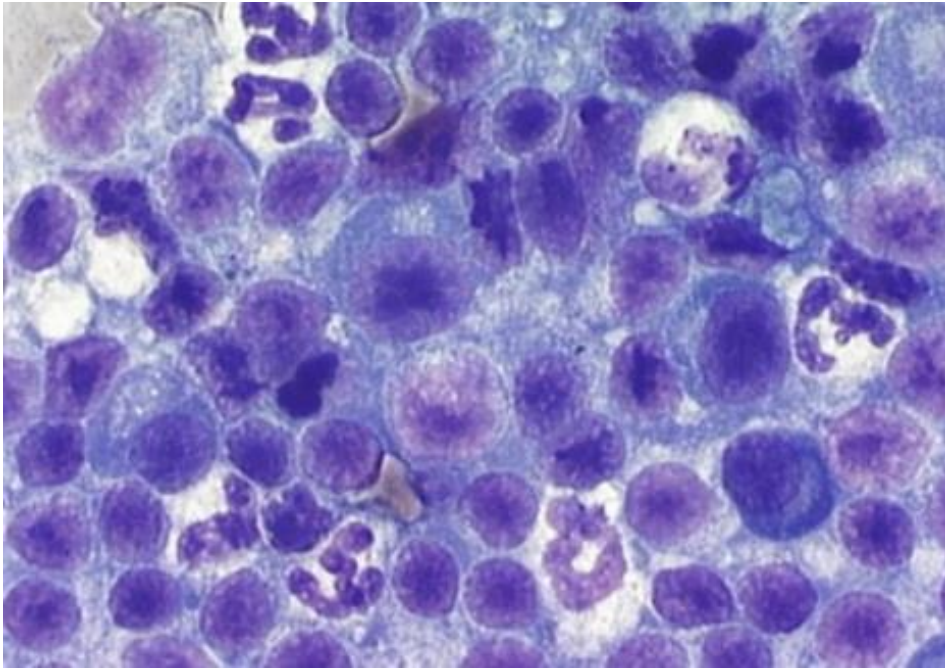
- Bacterial, fungal, viral, rickettsial infections
- Travel history is important
- Benign lymphadenopathy in cats
- Immune-mediated disease
- Other hematopoietic tumors
- Metastatic tumors



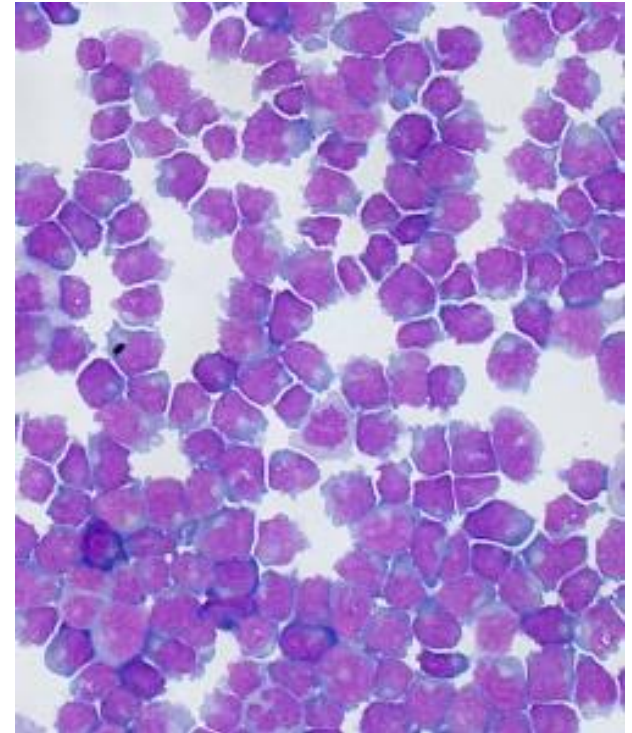
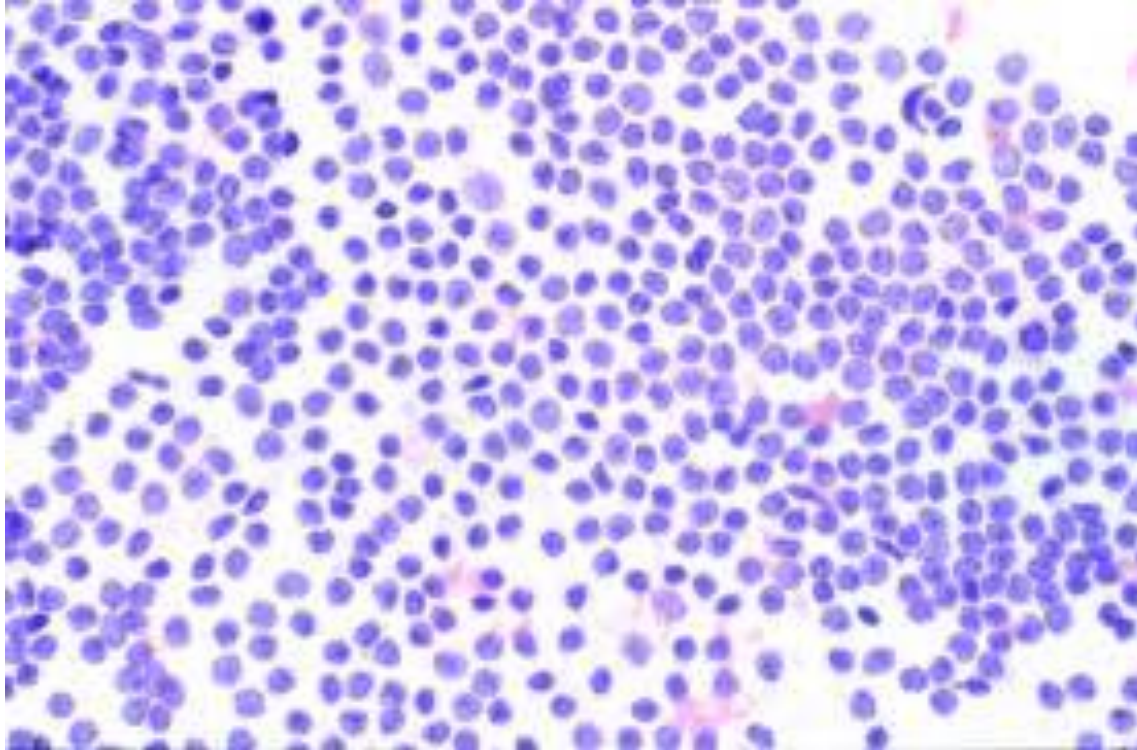
FINE NEEDLE ASPIRATION



DIAGNOSING LYMPHOMA



DIAGNOSING LYMPHOMA



WHEN TO DO A BIOPSY?

Low grade B cell lymphoma



LYMPHOMA IS NOT LYMPHOMA

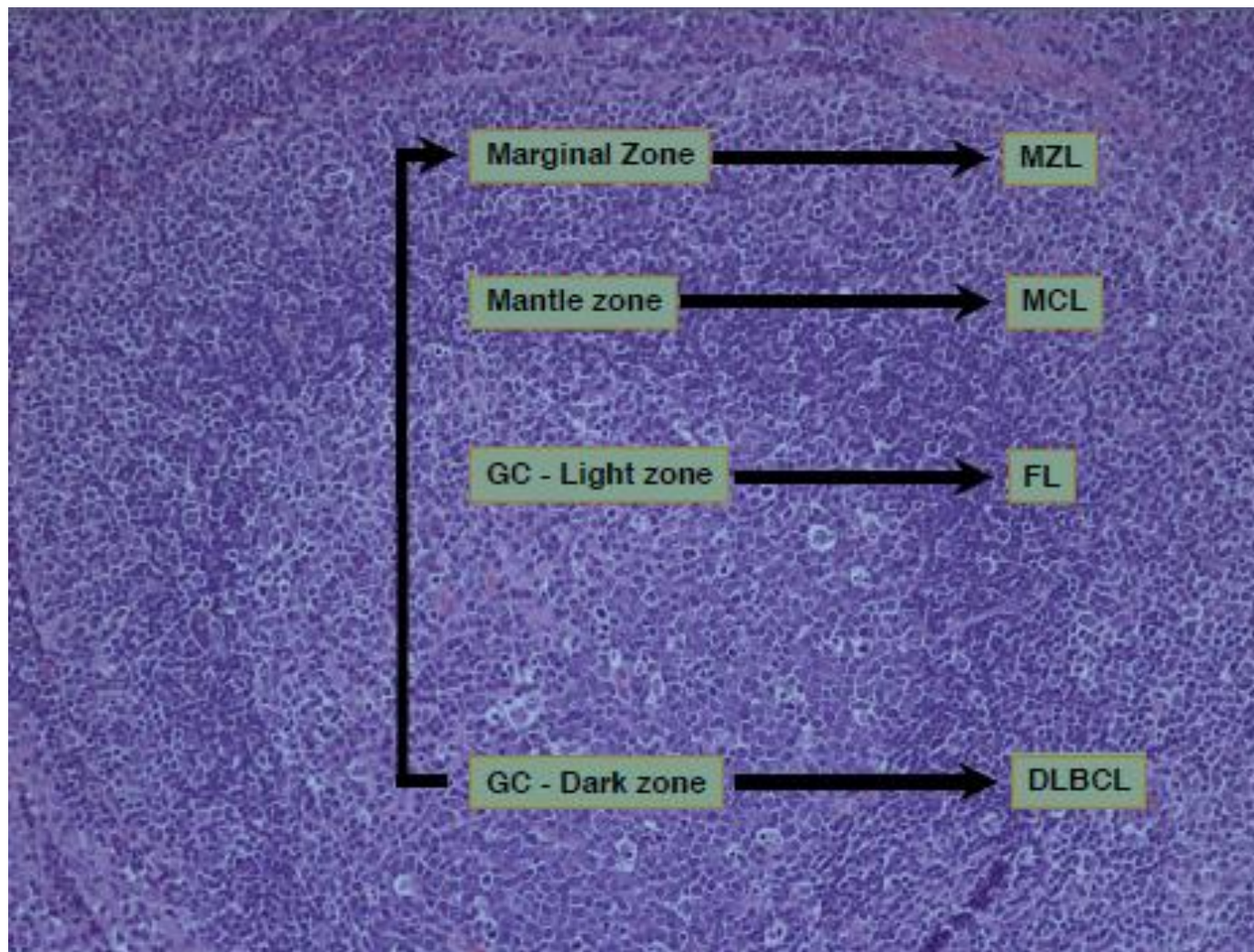
Low grade:

- Small cell B cell LSA
- Marginal zone
- Follicular
- T zone lymphoproliferative dz
- B cell CLL

High grade:

- Lymphoblastic
- Centroblastic
- Immunoblastic





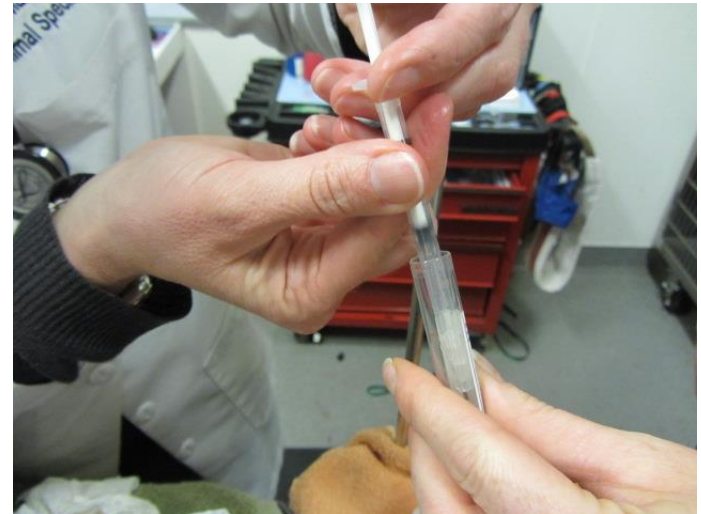
Diffuse Large B cell Lymphoma

- **Origin:** centroblasts in GC dark zone
- Lymph nodes; spleen; extranodal
- Most prevalent lymphoma in dogs
- High grade lymphoma - high proliferative fraction



IMMUNOPHENOTYPING: T & B

- Immunohistochemistry: biopsy
 - Least affected by mutations
- Flow Cytometry:
 - FNA of enlarged node
 - Ascites
 - Blood
- Immunocytochemistry
 - Most affected by mutations
 - Unstained cytology slides
- PARR: clonality



IMMUNOPHENOTYPING

- Low grade LSA is more likely T cell
- Boxer T cell
- Golden split equally
- Dobe, Cocker B cell
- Null 5%
- Mixed T and B in 22%



FLOW CYTOMETRY IS PREFERRED

- Best method for immunophenotyping
- Wider array of antibodies assessed than IHC
- Multiple antigens evaluated for prognosis
 - Class II MHC
- Size assessed
- 94% correlation to IHC
- Superior to PARR



STAGING

- Multicentric 80%
 - PLNs, liver/spleen, +/- BM
- GI focal or diffuse 6%
- Mediastinal 2%
 - Hypercalcemic
 - 40% AMM
 - 40% BM involved
- Atypical/extranodal
 - CNS, cutaneous, renal, ocular, oral
- CBC, Chem, UA
- Three view thoracic rads
- Abd u/s
- Liver/spleen aspirates
- Bone marrow aspirate
- Cytology or biopsy
- Flow Cytometry



ASSESS LYMPH NODES SIZE



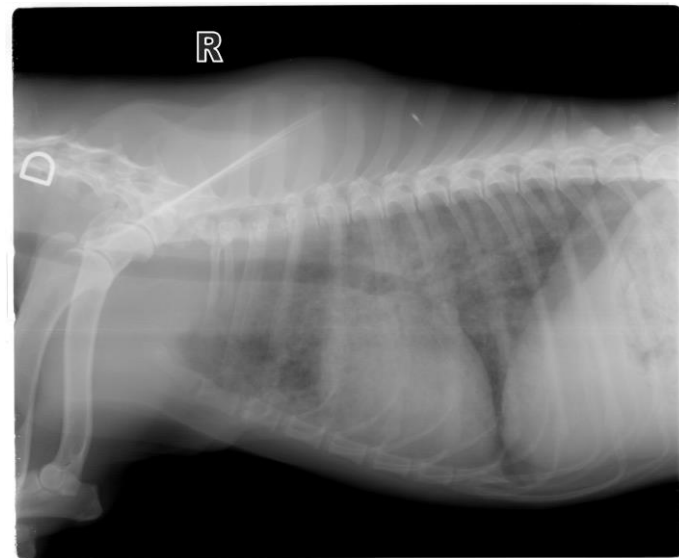
STAGING

- I: single node
- II: multiple nodes, one side of diaphragm
- III: both sides
- IV: liver/spleen
- V: BM, extra-nodal site

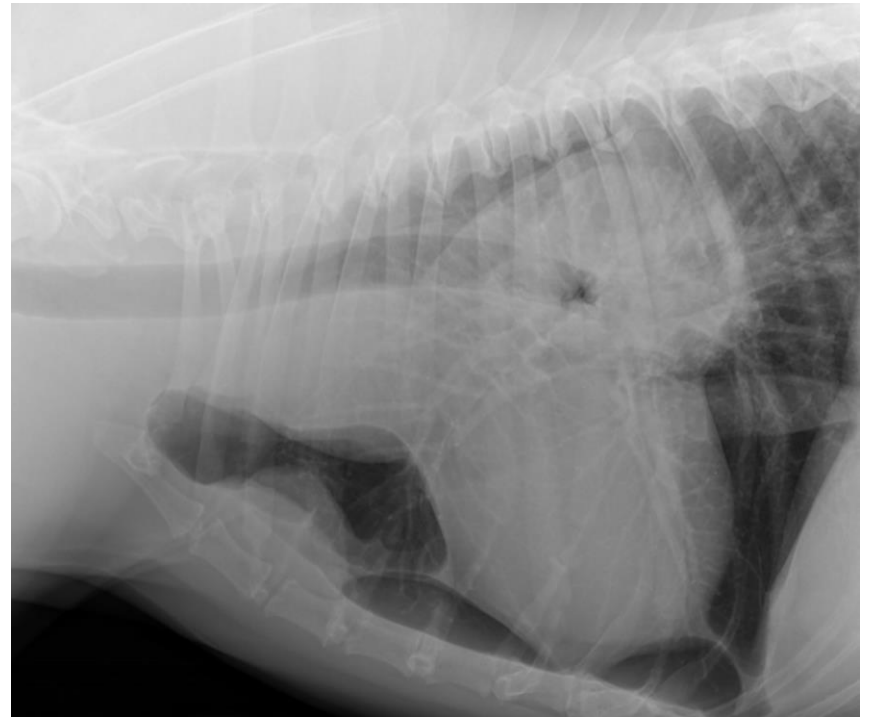
Subtage

a: well

b: sick



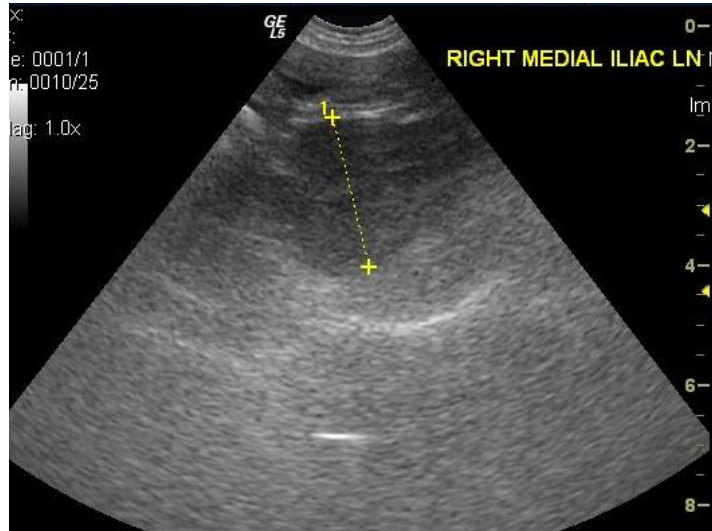
THREE VIEW THORAX RADIOGRAPHS



THREE VIEW THORAX RADIOGRAPHS



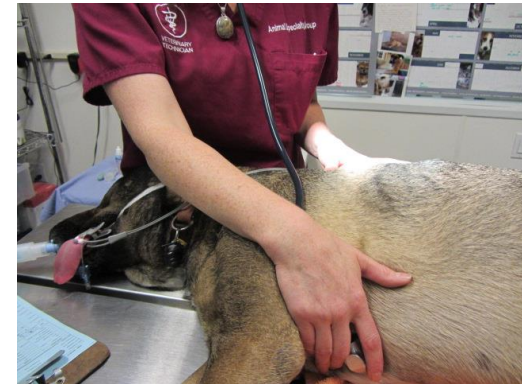
ABDOMINAL ULTRASOUND



BONE MARROW ASPIRATION



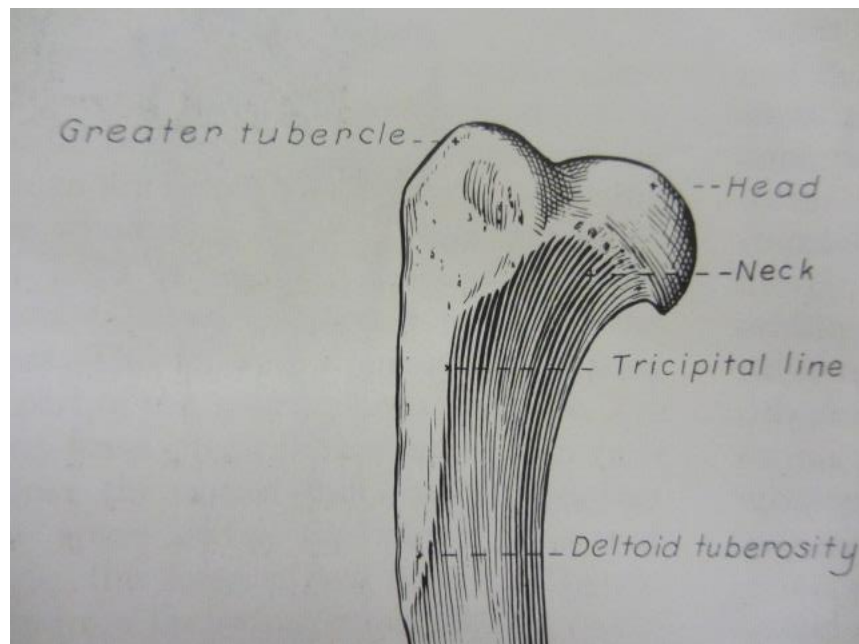
BONE MARROW ASPIRATION



Torb 0.2-0.4mg/kg IM
Midazolam 0.2mg/kg IM
Propofol 2-6mg/kg IV to effect
Gas anesthesia
Blood pressure monitoring



BONE MARROW ASPIRATION



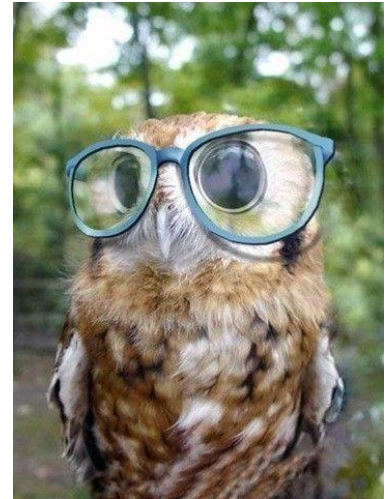
DESCRIBING LYMPHOMA

- Location (GI, CNS, nasal, mediastinal)
 - Stage I-V
- Substage (a = well, b = sick)
- Grade (high vs low)
- Immunophenotype (B, T, null)
- Remission status
 - Assists in monitoring remission
 - Assists in predicting prognosis



LYMPHOMA TREATMENT

- CHOP protocol is the gold standard
- 19-24 weeks
- No maintenance



LYMPHOMA TREATMENT

Less intense options:

- **Modified CHOP**
- **Oral Lomustine q 3w**
- **IV Adria q 3w**
- **Pred alone**



LYMPHOMA TREATMENT

Less routine options:

- Radiation therapy
 - Definitive, SRT, palliative, half body
- Immunotherapy
- BM transplant



NEW TREATMENTS

- Tenovea
- Monoclonal antibodies



We believe TANOVEA-CA1 represents a major breakthrough in canine lymphoma treatment



- Label supports use in both naïve and relapsed LSA cases
- Generally well tolerated, most adverse events are manageable¹
- Convenient for clinics and owners
 - Five doses, every three weeks
- Commitment to development
 - Studied in over 500 cases, with more studies ongoing/planned²

¹Less frequent, but more serious AEs can occur (see package insert)

²Not all studies support the current conditional label (see VetDC representative)

 **TANOVEA-CA1**
(rabacfosadine for injection)



TANOVEA-CA1

- Rabacfosadine: similar MofA to cytosar
- VetDC company – large advisory board
- Conditional FDA approval: must use according to the label or violates the law
- First-line or rescue setting in dogs only
- Infusion over 30min q 3w x 5 doses
- Response rate 77% for 134 days



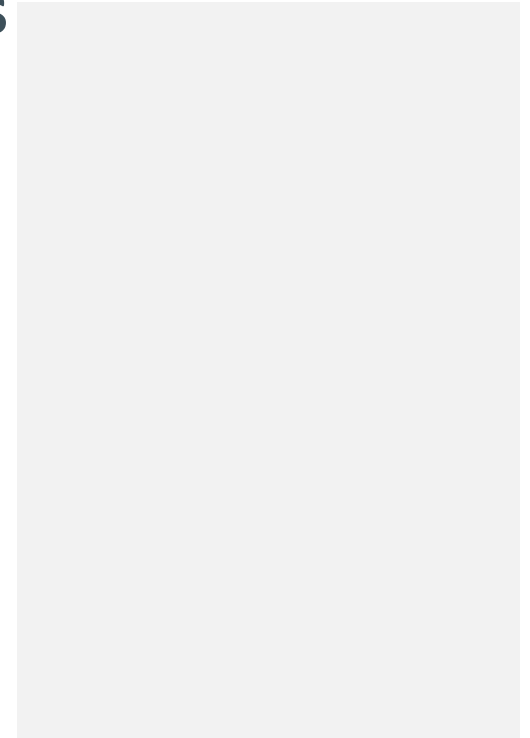
IMMUNOTHERAPY

Canine specific monoclonal antibodies

B-Cell lymphoma = BLONTRESS®

T-cell lymphoma = TACTRESS®

Both fully licensed by USDA



INDOLENT LYMPHOMA TREATMENT

May not require therapy or chronic, low intensive therapy:
Chlorambucil/Pred or oral lomustine



Mycoses fungoides

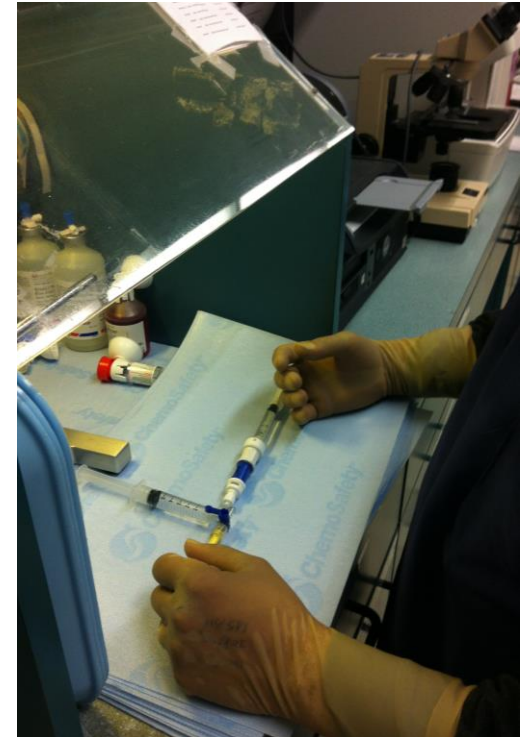


RBC	5.81	M/ μ L	(5.50 - 8.50)	<div></div>	<div><div></div></div>	<div></div>
HCT	42.6	%	(37.0 - 55.0)	<div></div>	<div><div></div></div>	<div></div>
HGB	14.9	g/dL	(12.0 - 18.0)	<div></div>	<div><div></div></div>	<div></div>
MCV	73.3	fL	(60 - 77)	<div></div>	<div><div></div></div>	<div></div>
MCH	25.64	pg	(18.5 - 30.0)	<div></div>	<div><div></div></div>	<div></div>
MCHC	35.0	g/dL	(30.0 - 37.5)	<div></div>	<div><div></div></div>	<div></div>
WBC	27.51	K/ μ L	HIGH (5.50 - 16.90)	<div></div>	<div><div></div></div>	<div><div></div></div>
Neutrophil	7.98	K/ μ L	(2.00 - 12.00)	<div></div>	<div><div></div></div>	<div></div>
Lymphocyte	11.34	K/ μ L	HIGH (0.50 - 4.90)	<div></div>	<div><div></div></div>	<div><div></div></div>
Monocyte	6.38	K/ μ L	HIGH (0.30 - 2.00)	<div></div>	<div><div></div></div>	<div><div></div></div>
Eosinophil	1.79	K/ μ L	HIGH (0.10 - 1.49)	<div></div>	<div><div></div></div>	<div><div></div></div>
Platelets	237	K/ μ L	(175 - 500)	<div></div>	<div><div></div></div>	<div></div>

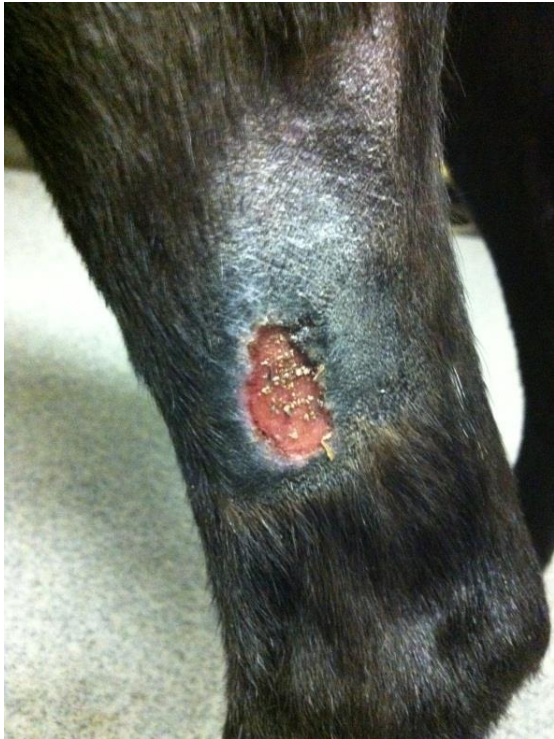


TREATMENT CONSIDERATIONS

- Staff safety
- Patient safety
 - Breeds with MDR1 mutations
 - Knowledge of nadir
 - Knowledge of adverse effects
- Client safety



EXTRAVASATION



PROGNOSIS IN DOGS

- Grade: indolent vs high grade
- Substage
- Immunophenotype
- Location: GI, CNS, renal, cutaneous, mediastinal
worse
- Hypercalcemia
- Chemo protocol used
- Prior pred usage



PROGNOSIS IN DOGS

- Overall 90% RR
- MST 1 year, 25% 2 year
- T cell 80% RR for 8-9 mos
- Indolent is different



LYMPHOMA IN CATS: OVERVIEW

- Predisposing factors
- Presenting complaint
- Diagnosis
- Staging
- Grade
- Treatment
- Prognosis



PREDISPOSING FACTORS

- Siamese breed
- FeLV
- FIV
- Transplant patients



PRESENTING COMPLAINT

- Location specific
- Nasal discharge
- V/D/A
- Weight loss
- Dyspnea

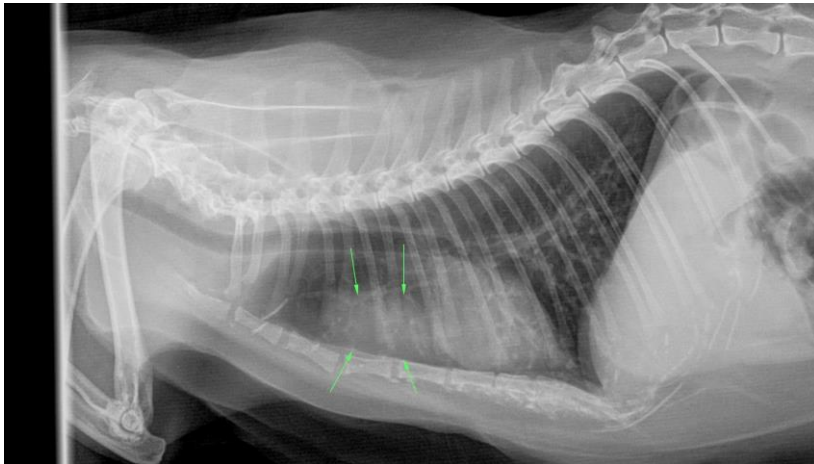


DIAGNOSTICS

- Staging tests less helpful in predicting prognosis
- Retroviral testing
- Unclear prognostication regarding immunophenotyping
 - Flow Cytometry: limited antibodies
 - Sensitivity 80%
- Benign lymphadenopathy and IBD
 - LN excision, full thickness GI biopsy
 - PARR



STAGING



- CBC, Chem, UA
- Three view thoracic rads
- Abd u/s
- CT or MRI for extranodal sites: nasal, renal, CNS, laryngeal, ocular



GRADE IN CATS

- Alimentary lymphoma: mucosal low grade T cell most common (MST 30mos)
- Hodgkin's lymphoma less aggressive



TREATMENT IN CATS

- Low grade: Chlorambucil / Pred
- High grade: CHOP best
 - Adria: monitor renal > cardiac
 - CHOP 25w protocol: if CR: 40% 1yr, 30% 3yr
 - Overall 70% RR for 6-8 months



PROGNOSIS IN CATS

- Location: CNS, renal, LGL: poor
- FeLV positive: poor
- Nasal: good
- Stage I Hodgkin's lymphoma: good
- Complete remission: good
- Low grade: good



DIFFERENCES FROM DOGS

- Lower overall response rate
- Shorter overall survival times
- Virus associated
- Low grade GI more common
- Must differentiate from benign diseases





Colorado State University

COLLEGE OF VETERINARY MEDICINE
AND BIOMEDICAL SCIENCES



VCS
VETERINARY
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