

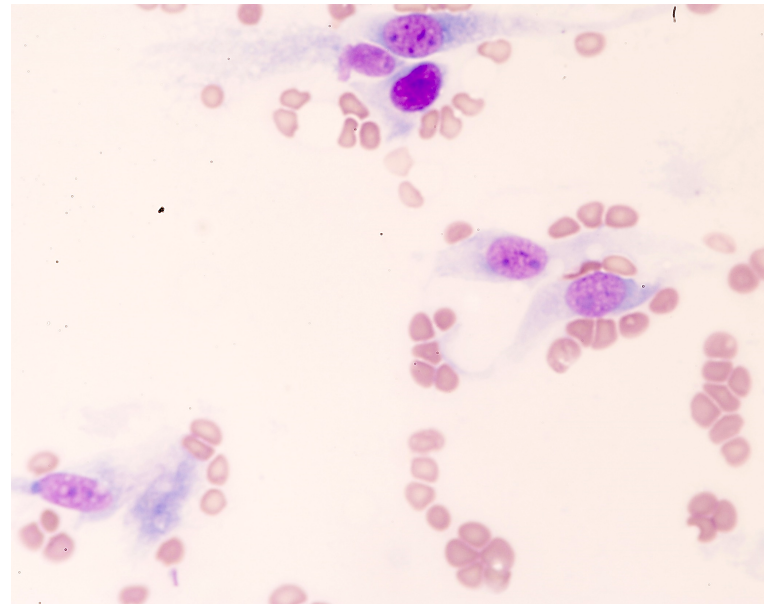
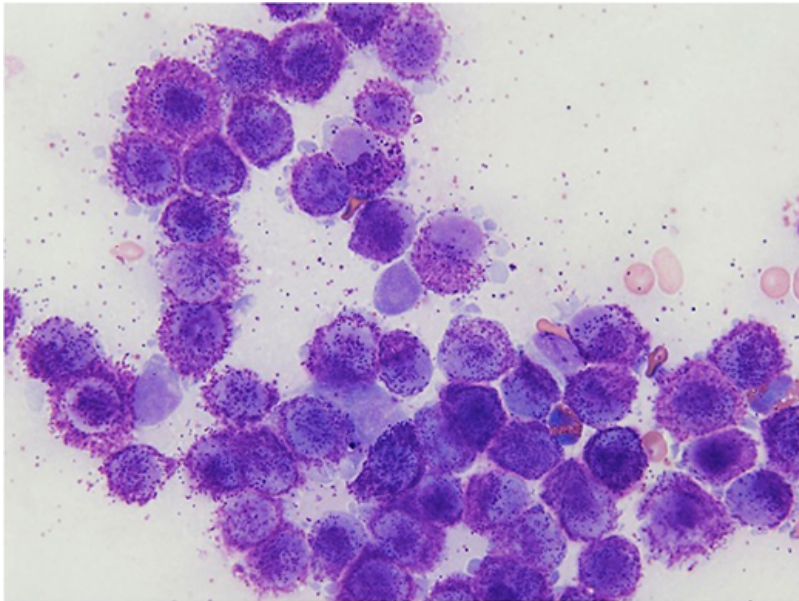
# Cancer Staging

Why, When, and What Tests?

Jeanne Lane, DVM, DACVIM (Oncology)

# Cancer Staging

- Ideal to start with a diagnosis
  - Cytology



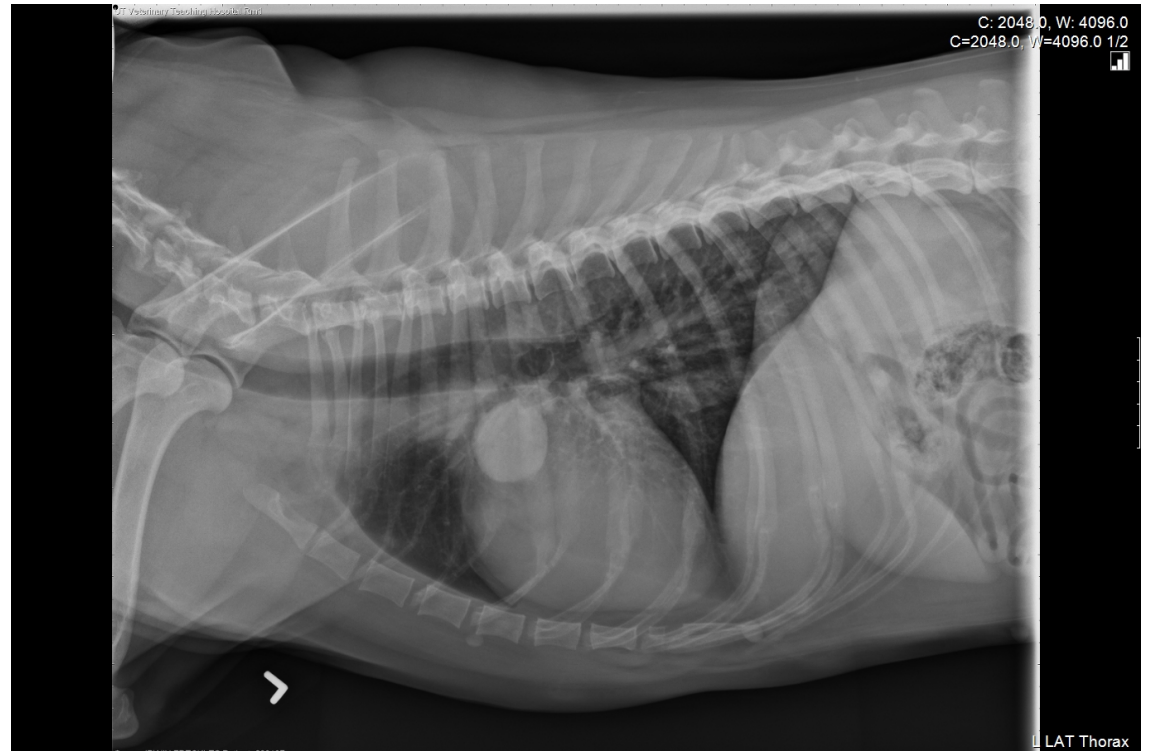
# Cancer Staging

- Ideal to start with a diagnosis
  - Cytology
  - Incisional biopsy
    - Indications:
      - Inconclusive cytology
      - Difficult or extensive surgery
      - Suspect high grade tumor
      - Oral tumors
      - Suspect injection-site sarcoma



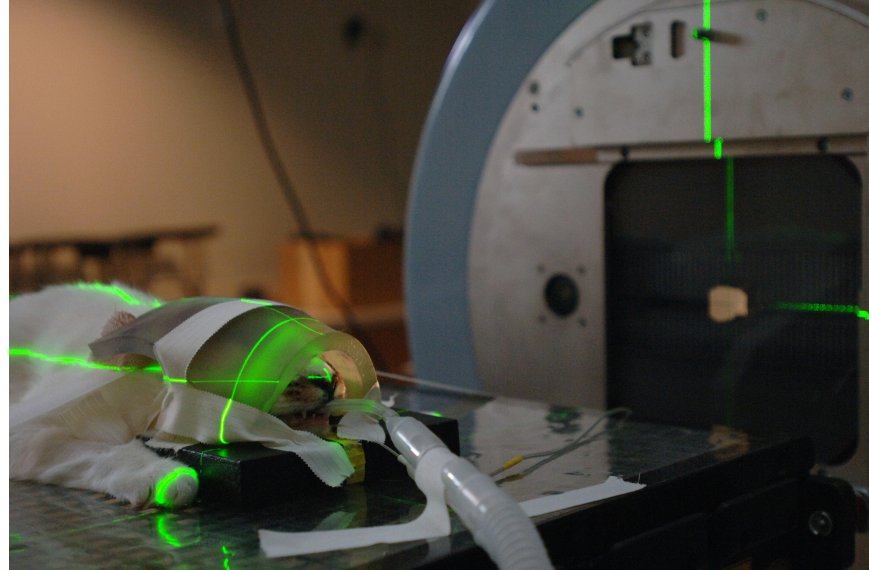
# Cancer Staging

- Ideal to start with a diagnosis
  - Cytology +/- incisional biopsy
  - May need to make educated guess



# Cancer Staging – Why? When?

- Staging performed prior to treatment
  - Localized treatments: Surgery, radiation therapy
    - Will the patient benefit from this treatment?
  - Systemic treatments: Chemotherapy, immunotherapy
    - Baseline for comparison



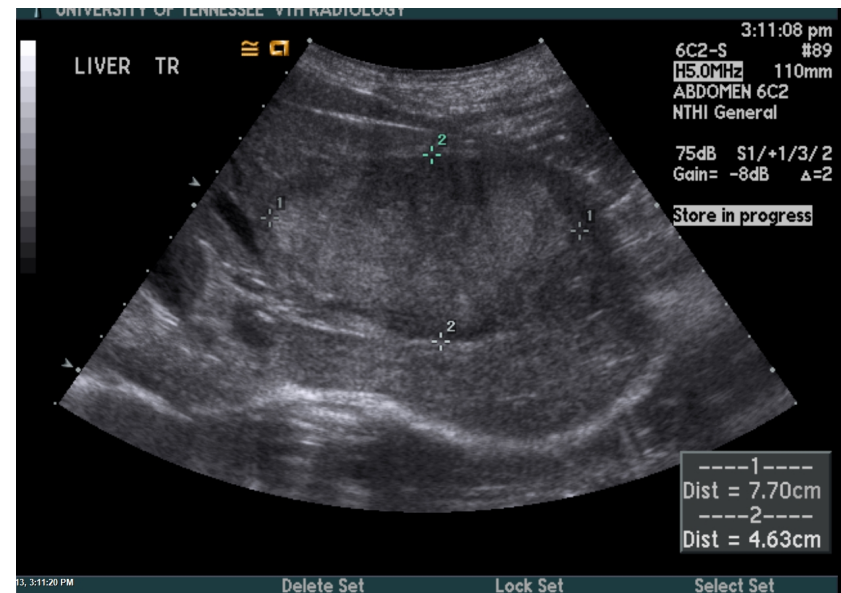
# Cancer Staging – Why? When?

- “Re-staging” tests – Often Q3 months
  - Evaluate response to treatment, long-term monitoring



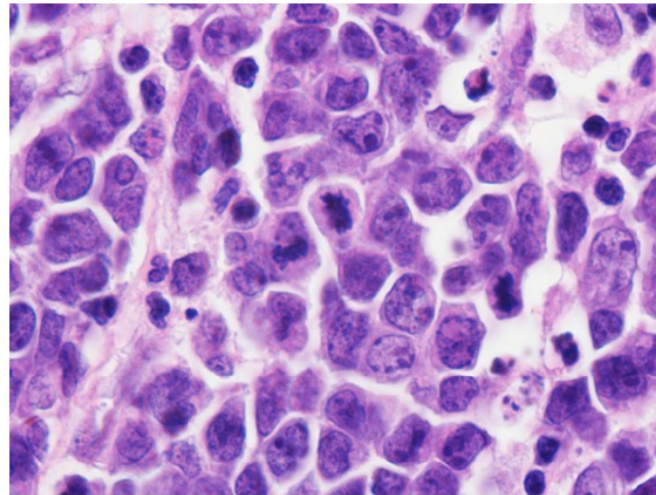
# Cancer Staging – What Tests?

- Evaluation of the extent of cancer within the body
  - Tumor size
  - Three view thoracic radiographs
    - Thoracic CT scan
  - Abdominal ultrasound
  - Lymph node cytology
  - Organ cytology
  - Bone marrow cytology



# Vs. Cancer Grading

- Histologic features as seen on a biopsy
  - Mitotic index
  - % Necrosis
  - Degree of differentiation
  - Cellular atypia
  - Multinucleation
  - Invasiveness
- For comparison:
  - Grade III Mast cell tumor
  - Stage III Splenic hemangiosarcoma





# How Do Certain Tumor Types Spread?

# How Do Certain Cancer Types Spread?

- Round cell tumors

- Lymphoma, mast cell tumors, plasma cell tumors, histiocytic tumors, transmissible venereal tumor (+/- melanoma)
- Spread primarily via lymphatics

- ✓ Lymph nodes

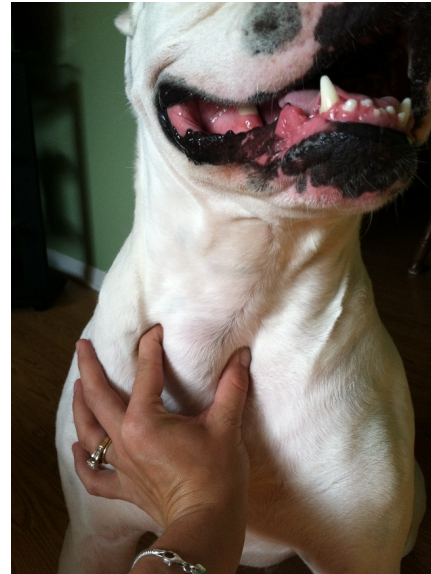
- ✓ Abdominal organs

- ✓ +/- Lungs (depending on cancer type)



# How Do Certain Cancer Types Spread?

- Epithelial (Carcinomas)
  - Thyroid carcinoma, squamous cell carcinoma, mammary carcinomas, transitional cell carcinoma, anal sac carcinoma
  - Spread primarily via lymphatics
    - ✓ Lymph nodes
    - ✓ Abdominal organs
    - ✓ Lungs



# How Do Certain Cancer Types Spread?

- Mesenchymal (Sarcomas)

- Osteosarcoma, soft tissue sarcomas, hemangiosarcoma
- Spread primarily via blood

- ✓ Lungs
- ✓ Abdominal organs
- ✓ Rarely lymph nodes



# What Influences Metastatic Potential?

# What Influences Metastatic Potential?

- Tumor Type
- Tumor Grade
- Tumor Size
- Tumor Location



# What Influences Metastatic Potential?

- **Tumor type**

- Oral tumors
  - Melanoma
  - Squamous cell carcinoma
  - Fibrosarcoma
  - Ameloblastoma



# What Influences Metastatic Potential?

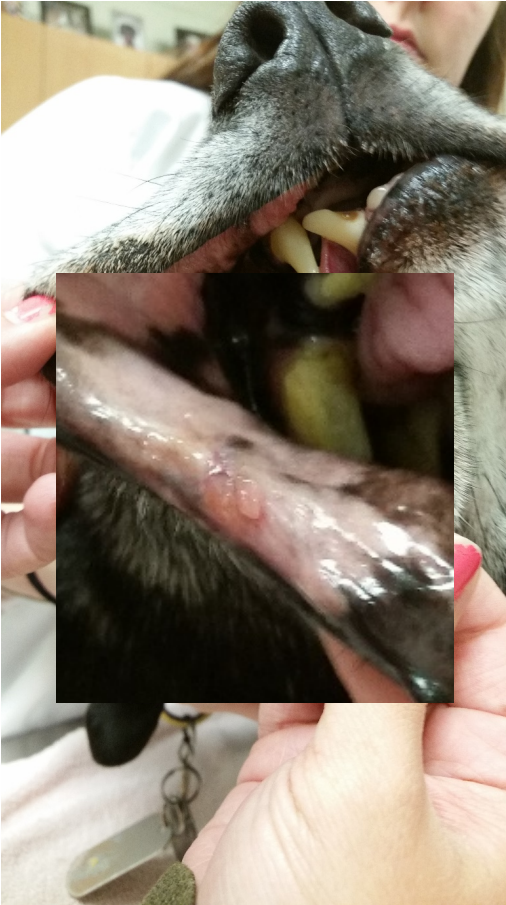
- **Tumor type**

- Oral tumors
  - Melanoma – Highly metastatic
  - Squamous cell carcinoma – 20%
  - Fibrosarcoma – 30%
  - Ameloblastoma – Do not met.
- Recommend: LN cytology, thoracic radiographs, biopsy





# Side Note: Oral Tumor Biopsy



# Side Note: Oral Tumor Biopsy

- Document tumor size
- Take photographs
- Dental chart or detailed description of location
- Incisional biopsy



# What Influences Metastatic Potential?

- **Tumor grade**
  - Mast cell tumors
  - Soft tissue sarcomas
  - Pulmonary carcinomas
  - Mammary carcinomas
  - Lymphoma
- NOT osteosarcoma, hemangiosarcoma, transitional cell carcinoma, anal sac carcinoma

# What Influences Metastatic Potential?

- **Tumor grade – Requires a biopsy**
  - Mast cell tumors –
    - Low grade/Grade I-II vs High grade/Grade III
  - Soft tissue sarcomas –
    - Low grade/Grade I-II vs High grade/Grade III
      - Hemangiopericytoma
      - Peripheral nerve sheath tumor
      - Perivascular wall tumor
      - Liposarcoma
      - Fibrosarcoma
      - Myxosarcoma
      - (NOT hemangiosarcoma, NOT histiocytic sarcoma)



# What Influences Metastatic Potential?

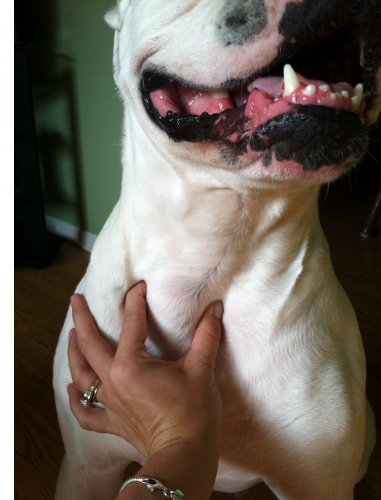
- **Tumor size**

- Thyroid carcinomas

- Metastatic rate ~35-40%
  - ~100% when tumor volume  $>100\text{cm}^3$
  - Especially bilateral tumors

- Anal sac carcinomas

- Larger tumors more frequently associated with sublumbar and distant metastasis
- Tumors  $<2$  cm diameter often non-metastatic, long survival times with surgery alone
  - But this can be highly variable!



# What Influences Metastatic Potential?

- **Tumor location**

- Mast cell tumors

- Locations associated with higher metastatic potential

- Muzzle, prepuce

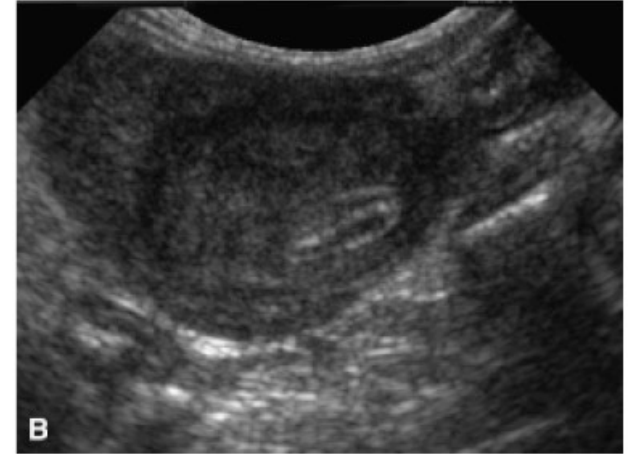
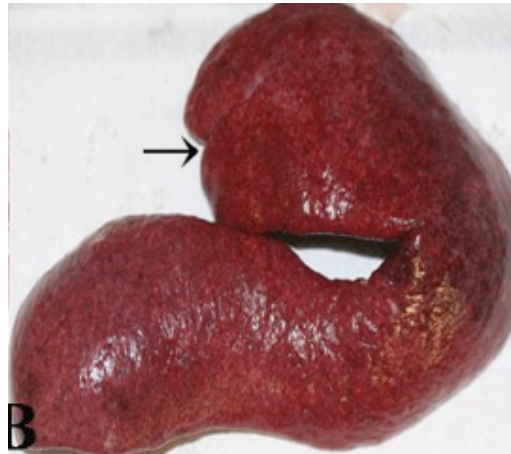


# What Influences Metastatic Potential?

- **Tumor location**

- Mast cell tumors

- Cats – Cutaneous vs splenic vs intestinal



# What Influences Metastatic Potential?

- **Tumor location**

- Hemangiosarcoma

- Cutaneous vs subcutaneous/intramuscular





# Are Staging Tests Worth the Expense?

# Comorbidities

**Detection of comorbidities and synchronous primary tumours via thoracic radiography and abdominal ultrasonography and their influence on treatment outcome in dogs with soft tissue sarcomas, primary brain tumours and intranasal tumours\***

Marcello et al  
VCO 2013

- All dogs underwent thoracic radiographs and abdominal ultrasound
- 97% had some sort of abnormality
  - 9% had serious comorbidity that changed recommendations
  - 3% had additional tumor type – TCC, prostate carcinoma, thymoma

# The “Bonus” Cancer

## Multiple Distinct Malignancies in Dogs: 53 Cases

Rebhun et al JAAHA 2010

- 3% of dogs presenting to CSU Oncology Center over 18 months had more than one primary tumor
- Dogs with MCT, melanoma, and thyroid carcinoma were significantly overrepresented
  - More likely to be diagnosed with multiple tumor types
  - 33% of dogs with thyroid tumors had additional distinct tumor

# Are Staging Tests Worth the Expense?

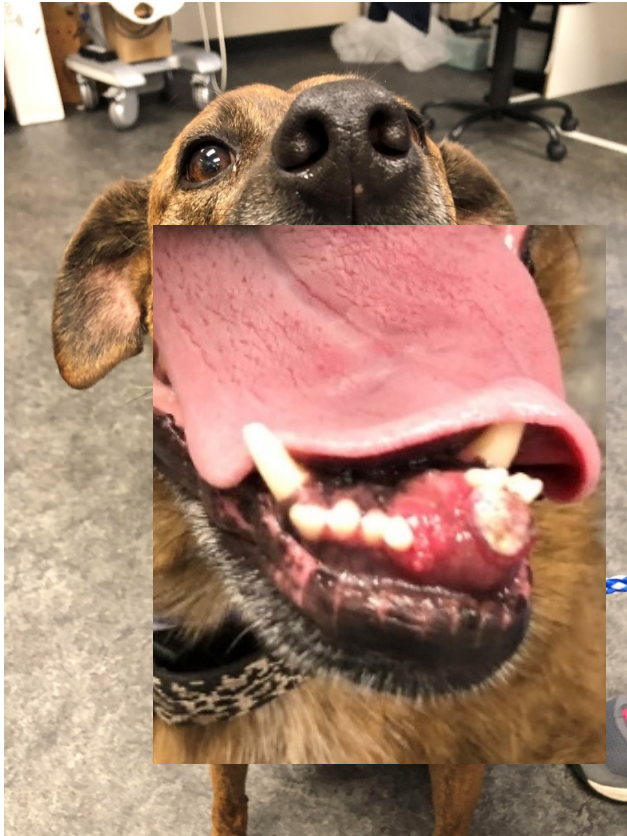
- I think so!
- Especially:
  - Dogs and cats >7 years of age
  - Upcoming expensive surgery, high morbidity
  - Ensure current treatment is effective
  - Early cancer detection



# Case Examples

Oral Tumor

# Oral Tumor



- 5-year-old SF Boxer Mix
- Incidentally noted pink left rostral mandibular oral tumor
- Mandibular lymph nodes palpate small and soft
- Recommend
  - Incisional biopsy
  - LN cytology
  - 3V thoracic radiographs
  - +/- AUS

# Lymphatic Drainage From Oral Tumors

- General rule of thumb:
  - Mandibular tumors – Mandibular LN
  - Maxillary tumors – Retropharyngeal LN
- Ipsilateral, contralateral metastasis

**Patterns of lymph node metastasis identified following bilateral mandibular and medial retropharyngeal lymphadenectomy in 31 dogs with malignancies of the head**

Skinner VCO 2016

- Neck ultrasound and/or CT scan

# Oral Tumor

- No evidence of metastasis; oral squamous cell carcinoma



- Other lymph nodes appeared normal
- Rostral mandibulectomy



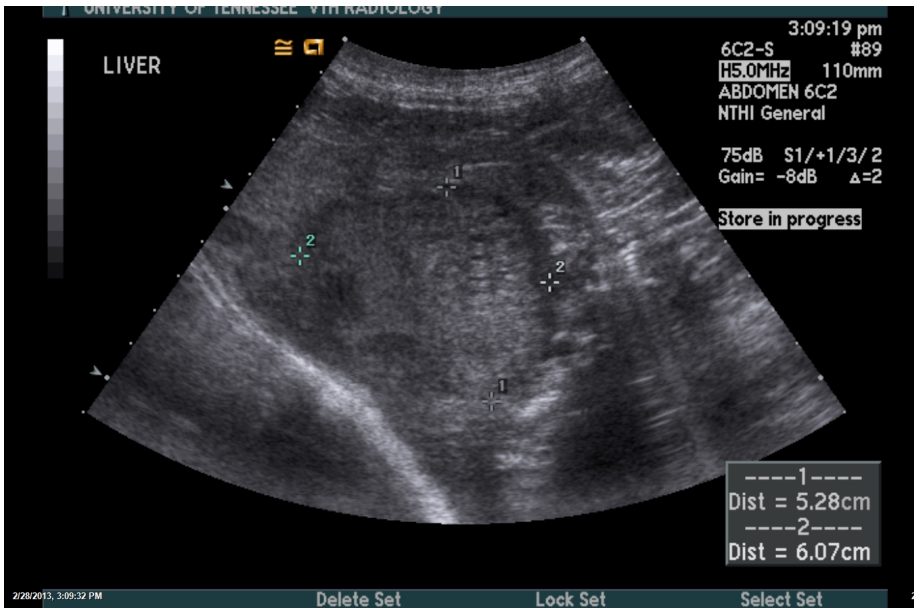
# Case Examples

Osteosarcoma

# Osteosarcoma

- 5-year-old CM Great Dane
- LF lameness for 2 weeks
- Firm swelling proximal to carpus
- Recommend
  - Limb radiographs
  - 3V thoracic radiographs
  - Abdominal ultrasound





- Solid liver mass
  - Metastatic?
  - Primary liver tumor?
- Cytology
  - Consistent with hepatocellular carcinoma
- Options
  - Amputation and liver lobectomy
  - Amputation and monitoring
  - Palliative care

# Case Examples

## Mast Cell Tumors

# What staging tests are recommended for MCT?

- For this tumor?



- For this tumor?



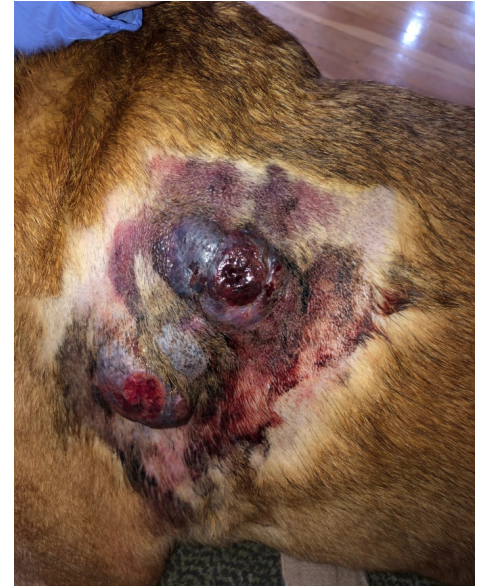
# What staging tests are recommended for MCT?

- For small, easily resected tumors
  - Palpate draining LN +/- cytology if possible
- Indications for staging:
  - Known high grade MCT
  - Tumor site predictive for metastasis
  - Large tumor (difficult surgery)
  - Rapidly growing or ulcerated
  - Patient is sick
  - Enlarged/metastatic lymph node
  - Owner preference



# What staging tests are recommended for MCT?

- Staging tests:
  - LN cytology
  - Three view thoracic radiographs
  - Abdominal ultrasound
  - Liver cytology
  - Spleen cytology



# Case Examples

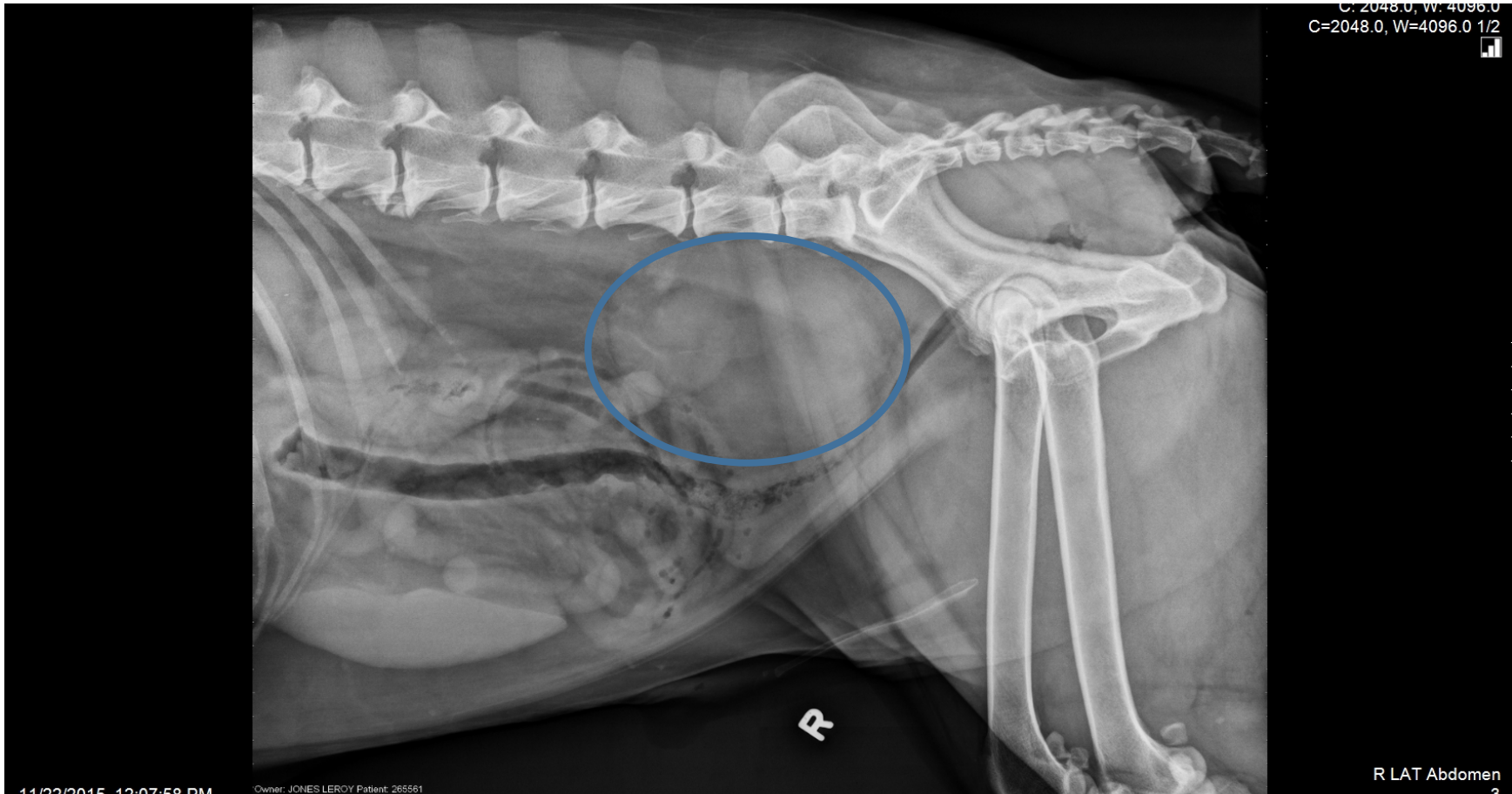
Anal Sac Carcinoma



# Anal Sac Carcinoma



- 8-year-old CM Hound mix
- Tenesmus, PU/PD
- 2.5cm left anal sac mass
  
- Recommend:
  - Cytology
  - Surgery?
  - Staging first!



# Anal Sac Carcinoma

- Hypercalcemia
- Metastatic sublumbar LN
- Options:
  - Anal sacculectomy and sublumbar lymph node removal
  - Palliative radiation therapy
  - Palladia chemotherapy
  - Palliative care



# Conclusions

- Cancer staging is highly recommended
- Specific tests based on cancer type, prognostic factors
- There is value in full imaging
- Contact us for advice or consults!
  - [jeanne.lane@medvet.com](mailto:jeanne.lane@medvet.com)



# What questions do you have?

