

# Oncology in Clinical Practice

Chamisa Herrera, DVM DACVIM

#### About Me

- Childhood in New Mexico then Washington
- B.S. Eastern (4y)
- DVM- WSU (4y)
- Internship- Mizzou (1y)
- Residency- Mizzou (3y)
- Now- Bellingham
  - Farm
  - Family
  - Work





## Housekeeping

- Session 1: 90 minutes
  - Anytime: "Questions for Speakers" on the left of HOME screen
  - Questions at 9:20
- Break: 9:30-10
- Session 2: 90 minutes
  - Mini #1: Oral Tumors- Questions at 10:40am
  - Mini #2: Mast cell Tumors- Questions at 11:20
- This session is generously sponsored by Boundary Bay Veterinary Specialty Hospital





# Basic Principles



#### Normal: response to damage

• Checkpoint identifies a problem  $\rightarrow$  Apoptosis





#### Normal: response to damage

• Loss of cell to cell adhesion  $\rightarrow$  Anoikis





## From Normal cell to cancer cell

- Oncogenes- gene that can transform a cell into a tumor cell
  - Growth factors-
    - Produce own
    - Convince neighbor cells to produce
  - Growth factor receptors-
    - Upregulate
    - Activation without ligand
- Transcription factorsactivate an oncogene





#### From Normal cell to cancer cell

- Tumor Suppressor Genes- genes that slow down cell division, repair DNA mistakes, or tell cells when to die
  - Ex. P53
    - Responsible for pushing cells into arrest or apoptosis  $\rightarrow$  failure to activate leads to uncontrolled cell division
    - Most frequently inactivated gene in human cancer



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- A collection of related diseases (over 200)
- Cells that divide uncontrollably



- Why is uncontrolled cell division bad?
  - Destroy surrounding tissue
  - Invade other tissues  $\rightarrow$  dysfunction





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• Able to metastasize





#### Osteosarcoma as an example







Able to survive and thrive

- Compete for nutrients
- Avoid immune system
- Teach immune system to protect it
- Convince blood vessels to feed it



## Importance of Oncology

- Cancer happens to most species
  - Leading cause of death
  - 1 in 4 dogs get cancer
  - Half of dogs over 10 die of/with cancer
  - 1/3 of cats die from cancer
- Human-Animal bond
  - Pet is a family member
  - Owners expect a high standard of care



## Importance of Oncology

Google Scholar

Any time Since 2019 Since 2018 Since 2015

Custom range...

Sort by relevance Sort by date

I include patents I include citations

Create alert

Articles

- Making the decision to treat
  - Quality of life is my #1 priority in making a treatment plan Histologic classification and immunophenotyping of canine non-Hodgkin's cell Wmphomas: unexpected high frequency of T cell tymphomas with B cell Histologic classification and immunophenotyping of canine non-Hodgkin's Cell ymphomas with B cell ymphomas: unexpected high frequency of T cell ymphomas with B morphology.

canine lymphomas

About 33,100 results (0.06 sec)

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M Canietti, P Roccabianca, <u>E Scanziani</u>, Veterinany ..., 1996 - journals.sac Veterinany ..., 1996 - journals.sac

compining morphologic and immunocytochemical anal SD Cited by 90 Related articles All 11 versions

What is the evidence?

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Cost?

## Common Terminology

- Grade
  - Microscopic
  - Pathologist
- Stage
  - Where is it?
- Recurrence
  - Same area
- Metastasis
  - Distant area





## Why don't we have a cure yet?

- Billions of dollars, millions of people
- Not a single disease
- Evolves within a patient
- Different populations of cancer cells within a single patient



## Why don't we have a cure yet?

- Cancer cells interact with immune system and nearby cells
- Cancer stem cells → resistant to chemo and radiation, but if ANY left behind, cancer can return
- Masters of adaptation

We are learning more everyday, and we are making progress





Oncology in Clinical Practice

#### Approach to tumors

- What is it?
  - Suspicion
  - Definitive Diagnosis
- Where is it?
  - Staging
- How bad is it?
  - Prognostic factors
- What can we do about it?





Cell Type	Normal Examples	Cancer Examples	Route of Metastasis	Staging
3				



Cell Type	Normal Examples	Cancer Examples	Route of Metastasis	Staging
Round Cell				
Mesenchymal				
Epithelial				



Cell Type	Normal Examples	Cancer Examples	Route of Metastasis	Staging
Round Cell	Mast Cell Plasma Cell Lymphocyte Macrophage			
Mesenchymal				
Epithelial				



Cell Type	Normal Examples	Cancer Examples	Route of Metastasis	Staging
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Epithelial				



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Epithelial	Lining Gland			



Cell Type	Normal Examples	Cancer Examples	Route of Metastasis	Staging
Round Cell	Mast Cell Plasma Cell Lymphocyte Macrophage	MCT, Plasma cell tumor, Lymphoma, Histiocytoma, TVT*		
Mesenchymal	Connective Tissue-Fascia, Muscle, Bone			
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### What is it?

- Suspicion
  - Owner complaint
  - History
- Definitive Diagnosis
  - Fine Needle Aspirate → Cytology
  - Biopsy  $\rightarrow$  Histology
  - Advanced diagnostics → molecular profile, immunohistochemistry, PARR, immunocytochemistry




### What is it? : Cytology

### • NOT a biopsy









A proper biopsy does not spread cancer



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• Incisional vs. excisional



• Incisional vs. excisional







- Why biopsy before treatment?
  - Willingness to treat/prognosis
  - Create optimal treatment plan
  - Principles
    - Do no harm
    - Do appropriately



# Principles of Biopsy

- Clip and Sterile prep
- If skin is intact  $\rightarrow$  incision



- No need to remove skin if not involved/attached
- Remove wedge or punch
- Close
- Ensure any biopsy tract will not compromise future surgery\*\*\*
  - NO need for composite of normal and abnormal tissue in cancer biopsy



- Questions to ask
  - Tumor Type
  - Margins (+/-)
  - Grade
  - Other: molecular prognostic factors, vascular invasion, mitotic index





### What is it? : Advanced Diagnostics

- Immunohistochemistry
- Flow cytometry
- PARR
- DNA mutation analysis
  - C-kit mutation
  - Braf





# Where is it? : Staging

- Tumor Size
- Regional Lymph Node Analysis
- 3-View Thoracic Radiographs
- Abdominal Ultrasound
- Advanced imaging: CT/ MRI
- Bloodwork





# Where is it?: Lymph Node Cytology

- Normal lymph nodes may contain micrometastasis
  - Common in
    - Mast cell tumor
    - Melanoma
- Technique
  - I prefer a 22G needle and 5cc syringe
  - Tattoo method
  - Gentle pressure with slides at 90 degrees
- Clinically suspicious but cytology (-)/(?)  $\rightarrow$  remove







### What Can We Do About It?

- Surgery
- Radiation
- Chemotherapy
- Immunotherapy



### What Can We Do About It?





### What Can We Do About It?





### What Can We Do About It- Local Control

- Surgery
  - It can't hurt/be infected/interfere with function if it is not there
  - How big of a surgery does this need?







Surgical Plan: "Wide excision"

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- Oncologic Surgery <u>Goal</u>: Remove as much a necessary to achieve a cure but not more
- Other surgical approaches (terminology)
  - Marginal excision → remove all gross disease, do not intend to achieve histologic margins
  - Debulk → gross disease left behind, hard to justify for a cancerous tumor



- A chance to cut is a chance to cure
  - In humans 60% of those cured of cancer are cured by surgery alone
  - The FIRST surgery is the best chance for cure



### Importance of tumor tendrils





### Planning Surgery

- Palpation
- Imaging
  - CT
  - Ultrasound
  - MRI
- What you know about the tumor



Wrong

Correct





# Surgical Margins

- Gross Margin
- Histologic Margin





# Surgical Margins

- Gross Margin
- Histologic Margin



# An <u>oversimplified</u> approach to gross surgical margins



### Two teams in human medicine





#### Reconstruction



# Other principles

- Gentle tumor handling
- Copious lavage
- Separate packs/gloves for clean and dirty
- Separate packs/gloves for each tumor
- Ink or mark tumor margins





# Marginal Excision

(aka: cytoreductive surgery)

- Intent?
- A purposeful decision with a follow-up plan
  - Accept risk for recurrence
    - what is that risk (%, time)?
  - Adjuvant therapy

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- Mark extent of surgery
- Work with a (radiation) oncologist to plan



## Palliative Surgery?

- Rare instances- Plan is marginal excision with purposeful decision not to pursue additional therapy
  - Infected tumor
  - Bleeding tumor





# Miscellaneous Oncologic Surgery

- Ports
  - Chemotherapy delivery
  - Pain management
  - Evacuation of malignant effusions





### What Can We Do About It?





### What Can We Do About It- Local Control

- Radiation Therapy
  - Where surgery can't reach
  - Where surgery is not anticipated to be or was not effective





# Radiation therapy

- Terminology
  - Treatment # x dose (ex. 12 x 6 Gy)
    - Fine fractionation/<u>Full</u> <u>Course</u>/Definitive (12-18 treatments, daily)
    - Course fractionation/<u>Short</u> <u>Course</u>/Palliative (2-6 treatments, weekly)
    - Stereotactic
- Side effects
  - Acute
  - Late





### Where is it available?

- Seattle, WA- BluePearl North Seattle
- Pullman, WA- Washington State University
- Calgary, AB- Western Veterinary Specialist & Emergency Centre
- Cost
  - Palliative: \$2K-5K
  - Definitive/Stereotactic: \$5.5K-15K



### What Can We Do About It?





## What Can We Do About It?

- Chemotherapy
  - NOT like people
  - <20% vomiting or diarrhea
  - <5% serious side effect
  - Do NOT lose hair
  - Goal: Maintain or improve quality of life





### Terminology

- Induction Chemotherapy
- Neoadjuvant chemotherapy
- Adjuvant chemotherapy
- Maintenance
- Rescue
- Palliative



### Chemotherapy MOA

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#### What Can We Do About It?





#### What Can We Do About It?

- Immunotherapy: Oncept
  - For treatment of melanoma after local control
  - Mechanism of action: human tyrosinase
  - Side effects





#### What Can We Do About It?

- Immunotherapy: ELIAS
  - For treatment of osteosarcoma
  - Mechanism of action
    - Autologous vaccine
    - T-cell infusion
  - Available at BBVSH Bellingham

# ELIAS®





### Case Examples

#### Zip-9 year old MC husky mix

- Presents for enlarged lymph nodes & lethargy
- What?
  - Lymphoma
- Where?



Pearl: Never say "there's nothing we can do"

#### Zip-9 year old MC husky mix

- What can we do?
- Chemotherapy: CHOP
  - 16 treatments over 6 months
  - 12-14 month MST
  - GOOD quality of life



- Appointments generally < 30 min with lots of positive reinforcement</li>
- Less aggressive options
- Palliative care



#### Missy-4 year old FS DSH

- Lump between shoulder blades, seems to be growing quickly
- What?
  - How?
  - Vaccine Associated Sarcoma
- Where?



#### Missy-4 year old FS DSH

- What can we do about it?
  - Remove as much as you can
    - 2 months to recurrence
  - 5cm lateral margins, 2 facial planes
    - 97% of cats have long term tumor control



Pearl: Never vaccinate a cat between the shoulder blades



- Owner noticed a black mass on his lower jaw
- What?
  - Biopsy during a dental
  - Melanoma
- Where?



- What can we do about it?
  - Surgery- BONE











- What can we do about it?
  - Surgery- BONE



- What can we do about it?
  - Surgery- BONE
    - Prognosis
      - <2cm-18 months
      - 2-4cm-6 months
      - >4cm- 3 months
  - Melanoma Vaccine





#### Pearl:

Always measure the mass and record location. Take pictures!

#### Betsy-7 year old FS Boxer

- Presents for a mass on her knee that comes and goes, now the size of a quarter
- What?
  - Cytology
  - Mast cell tumor
- Where?



#### Betsy-7 year old FS Boxer

- What can we do about it?
  - Surgery
    - how big?
  - What do we ask pathologist?
    - Grade?- low grade II
    - Margins? One lateral margin is dirty
    - Now what?









Cancer and Prognosis Summary

#### Tumors with Survival of >3years

- Acanthomatous epulis
- Infiltrative lipomas
- Mast cell tumors (grade I and II)
- Mammary carcinomas (low grade, canine)
- Low grade soft tissue sarcomas
- Perianal adenomas
- Small cell lymphoma
- Thyroid carcinomas (canine)
- Thyroid adenomas and carcinomas (feline)
- Transmissible venereal tumors



#### Tumors with Survival of 1-3years

- AGASacA
- Brain tumors
- Ceruminous gland ca of ear canal
- Lymphoma (canine; feline solitary extranodal)
- Mammary carcinoma (high grade, canine; feline)
- Mast cell tumor (grade III)
- Nasal tumors

- Oral SCC (canine)
- Pulmonary carcinomas
- Osteosarcoma
- Salivary gland tumors
- Spinal cord tumors
- Thymomas
- TCC
- Vaccine associated sarcomas (feline)



## Tumors with significant extension of life vs. no treatment

- Brain tumors (gliomas)
- Hemangiosarcoma
- Oral melanomas
- Prostatic carcinoma
- Feline GI lymphoma (large cell)



#### We are only a phone call away!





#### Our Mission

- Provide accurate information about the disease process
- Provide a range of options for treatment
- To treat or not to treat without judgment
- Provide a good quality of life
- Replace misperceptions and fear with knowledge and hope



