MEDVET

# Principles Of Oncologic Surgery

...Beyond the Lumpectomy

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MedVet Toledo

"Complete surgical removal of localized cancer cures more patients than any other form of treatment."

*SJ Withrow*

## Outline

- Principles
- MCT
- Oral
- Thoracic Wall
- Hemipelvectomy
- Feline Injection Site Sarcoma

## Principles

- Therapeutic Goals
  - Cure
  - Cytoreduction
  - Palliation

## Principles

- Preoperative
  - Staging
    - CBC/Chemistry
    - UA
    - Chest radiographs
    - Abdominal US
    - LN FNA

## Principles

- Surgical Planning
  - FNA
  - Biopsy
    - Incisional
    - Excisional
  - CT

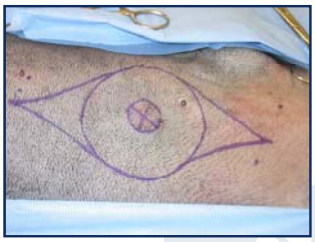
## Principles

- Biopsy
  - Plan the site
    - Easily removed during definitive surgery
  - Avoid seroma/hematoma
    - Contaminates site
  - Don't traumatize tissue
  - Clean closing instruments

## Principles

- Surgery
  - The First Chance is your best chance!
    - Drape off the tumor
    - Avoid contact with the tumor/ulcerated areas
    - Sharp not blunt dissection
    - Establish margins
    - Remove any FNA/biopsy tracts
    - Do not "Wedge"
    - Clean closure pack

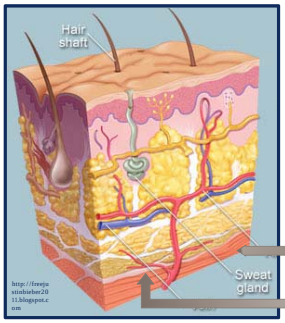
## Principles



## Principles

- Margins
  - Marginal < 1 cm
    - lipoma
  - Wide 1-3cm
    - MCT
    - ST SA
  - Fascial plane
    - "Sheaths, sheets or other dissectible connective tissue aggregations visible to the unaided eye"
      - ...not adipose tissue

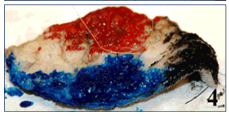
## Principles

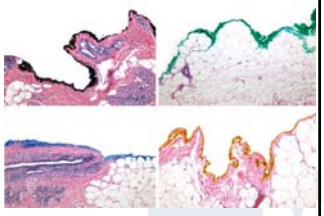



Muscle

Fascia

- Margins
  - Ink and or tag



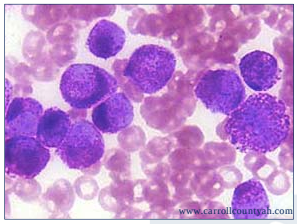


www.vectorsurgical.com

www.addl.purdue.edu

## Mast Cell Tumors

- Solitary
- Multiple 11-14%
  - De novo
- Trunk 50-60%
- Limbs 24-40%



www.carrolltountgah.com

(Macy, 1986, Thamm, 2001, Nielsen, 1958, Hottendorf, 1967, Tams, 1981)

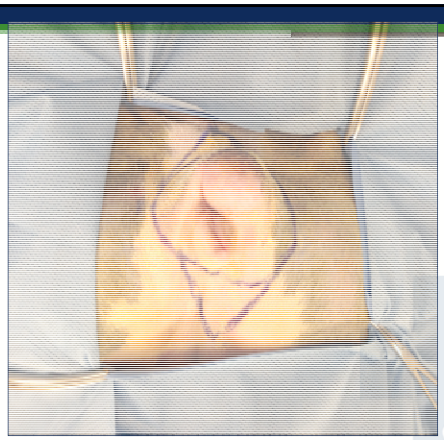
## Mast Cell Tumors

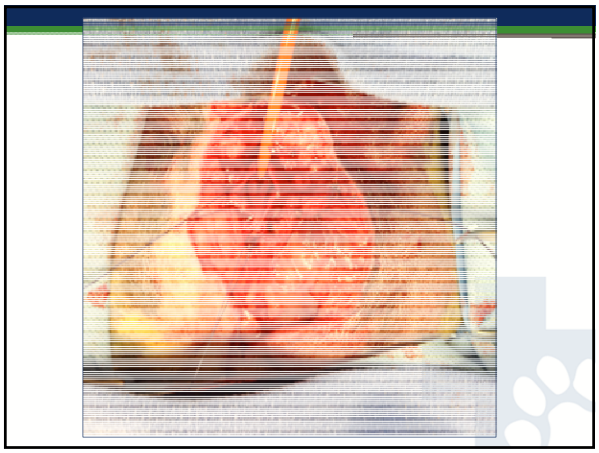
- Margins…
  - 3cm , 1 fascial plane
    - Withrow, 2001
      - References???
  - Evaluation of surgical margins required for complete excision of cutaneous mast cell tumors in dogs (Simpson et al, 2004)
    - 2cm lateral margin and 1 fascial plane
      - Adequate for Grade I and II MCTs in dogs

## Mast Cell Tumors

- Evaluation of a modified proportional margins approach for surgical resection of mast cell tumors in dogs: 40 cases (2008-2012) (Pratschke et al, 2013)
  - Lateral margin equivalent to the widest measurement of the tumor
  - Minimum 1 fascial plane deep
  - 47 tumors
    - 40 clear margins
    - 7 incomplete
    - No local recurrence (1 suspect)
  - Included cutaneous and SQ

## Mast Cell Tumors





## Mast Cell Tumors

- Adjunctive therapy?
  - Clinical outcome of dogs with grade-II mast cell tumors treated with surgery alone: 55 cases (1996-19999). (Seguin et al, 2001).
    - Most do not require systemic Tx
    - Complete resection, tumor < 4 cm
      - 5% local recurrence
      - 11% developed another at different site
      - 5% metastasis

## Mast Cell Tumors

- Complete v incomplete?
  - Prognosis following surgical excision of canine cutaneous mast cell tumors with histopathologically tumor-free versus nontumor-free margins: a retrospective study of 31 cases. (Michels, et al 2002)
    - Lack of statistical difference in local recurrence

## Mast Cell Tumors

- Multiple
  - Worse prognosis?
    - 1 year survival 87%
    - 2-5 year survival 85%
    - Metastatic rate
      - 15%
    - Overall good Px for long term survival with adequate excision

Mullins et al, 2006

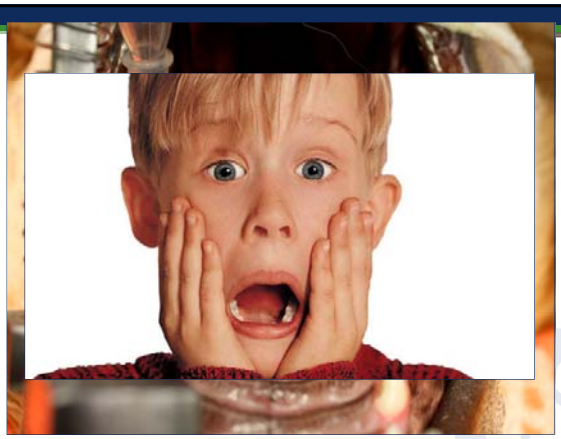
## Mast Cell Tumors

- Muzzle?
  - Biologic behavior and prognostic factors for mast cell tumors of the canine muzzle: 24 cases (1990-2001). (Geiger et al, 2003).
    - Prognostic factors
      - tumor grade and
      - presence of metastasis at diagnosis.
    - Local control rate was 75% at 1 year and 50% at 3 years
    - Muzzle MCT are biologically aggressive tumors with higher regional metastatic rates than previously reported for MCT in other sites

## Mast Cell Tumors

- Inguinal/perineal?
  - Prognostic factors for survival of dogs with inguinal and perineal mast cell tumors treated surgically with or without adjunctive treatment: 68 cases (1994-2002) (Cahalane et al, 2004).
    - May have survival times and tumor-free intervals similar to dogs with MCTs in other locations
      - Mean TFI 1,635 days

## "Jack"



## The three rules of good oncology: Biopsy, Biopsy, Biopsy!

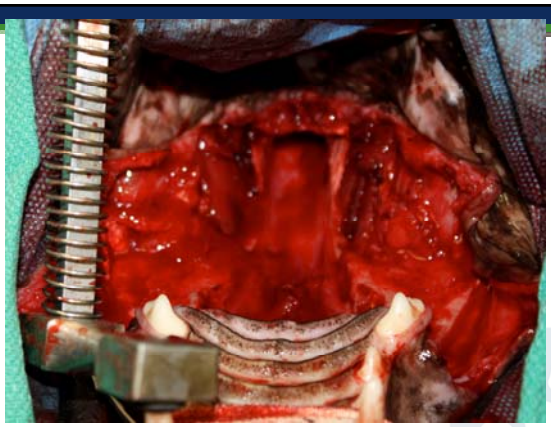
(S Withrow. JAAHA, 1991)

- *"There is little question that a properly timed, procured, fixed, and interpreted biopsy is the cornerstone of good oncology practice."*

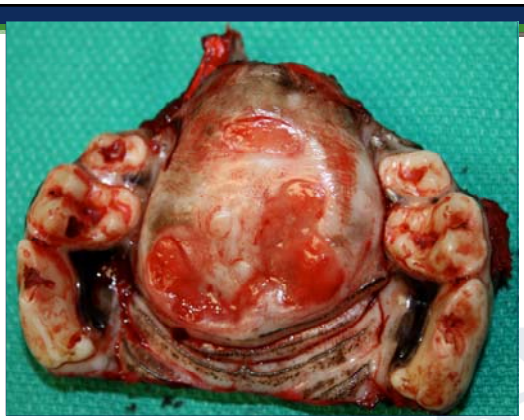
## Multilobular Osteochondrosarcoma (MLO)

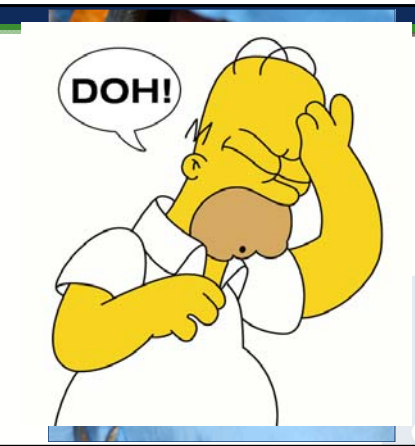
- Multilobular osteoma, multilobular chondroma, multilobular tumor of bone, multilobular osteosarcoma
- Middle to older aged large breed
- Flat bones of skull
- Slow growing, locally invasive
- Variable metastatic pattern
- Stippled mineralization radiographically
  - "popcorn ball"

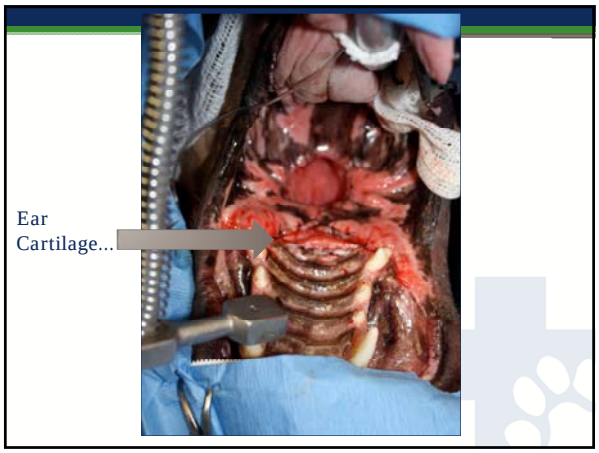

Dernell et al, 1998)

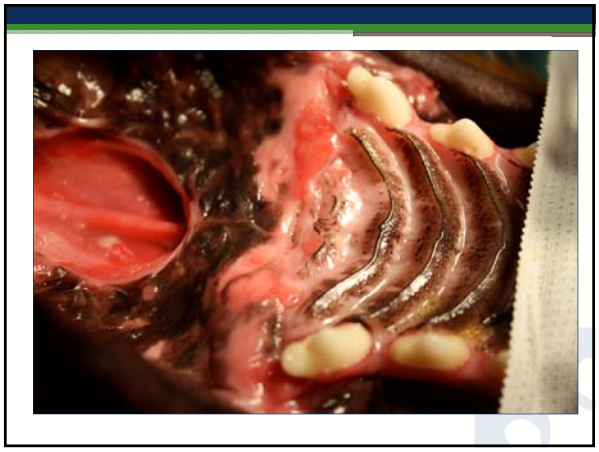


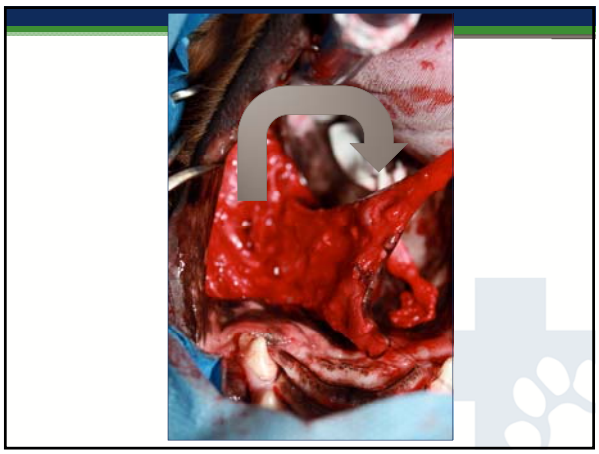
## Now What…

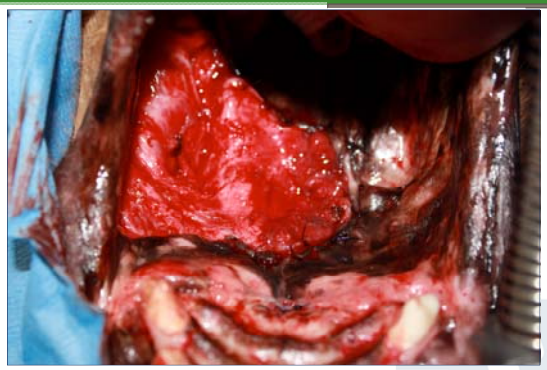



DOH!


Ear
Cartilage...







One year postop

"Just Jack"

2 years later…

## MLO

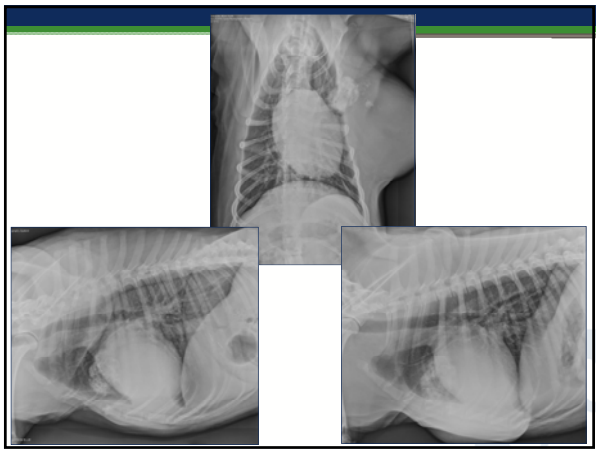
- Multilobular Osteochondrosarcoma in 29 dogs: 1979-1993. (Dernell et al, 1998).
- 47% local recurrence
  - Median 797 days
    - Complete margins – median time not reached
    - Incomplete margins – 320 days
- 56% metastasis
  - Median 542 days
- Median survival time 797 days

## MLO

- Outcome
  - Histologic grade
    - Grade III -78% locally recurred
    - Grade II -47% locally recurred
    - Grade I -30% locally recurred
  - Surgical margins
  - Tumor location
    - Mandible favorable

Dernell et al, 1998)

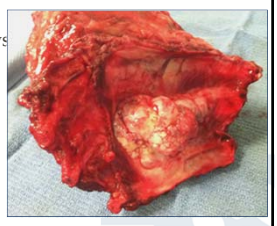
## "Ellie"



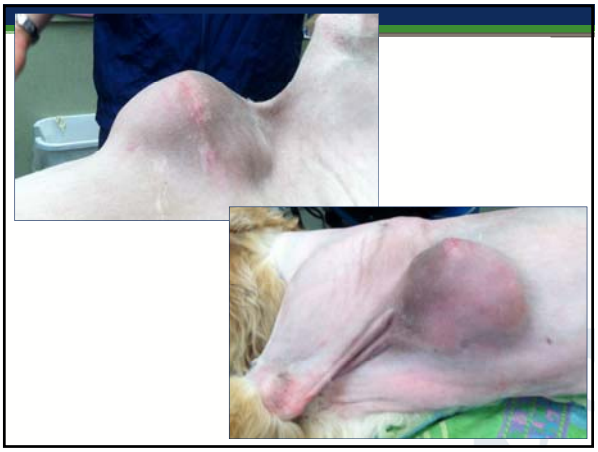
- Biopsy, Biopsy, Biopsy!
- CT

## Chest Wall Tumors

- Osteosarcoma
  - MST 290 days
    - Inc ALP 210 days v 675 days
    - Sx + adjunctive Tx
- Chondrosarcoma
  - Mean 1301 days
  - Sx alone
- Hemangiosarcoma



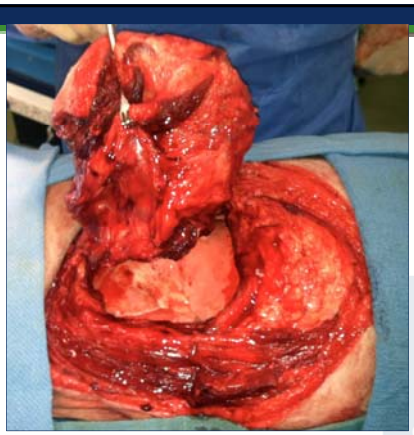
Oncologic outcome after curative-intent treatment in 39 dogs with primary chest wall tumors (1992-2005). Liptak et al, 2008



## Chest Wall tumors

- > or = 3 cm margins
- Minimum 1 rib cranial and 1 caudal
  - Up to 6
  - Can resect rib 1
- Remove entire rib?
  - Intramedullary extension
- Remove adhesions
  - Lung lobectomy
  - Pericardectomy
  - Tumor adhesions have histologic invasion

Liptak, 2008

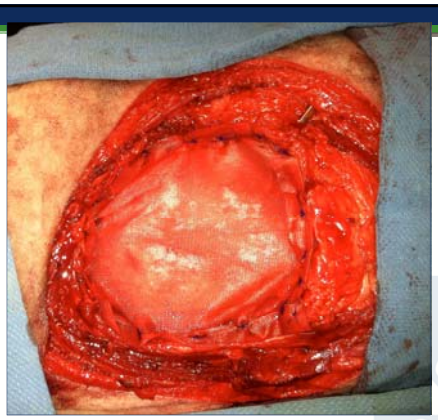


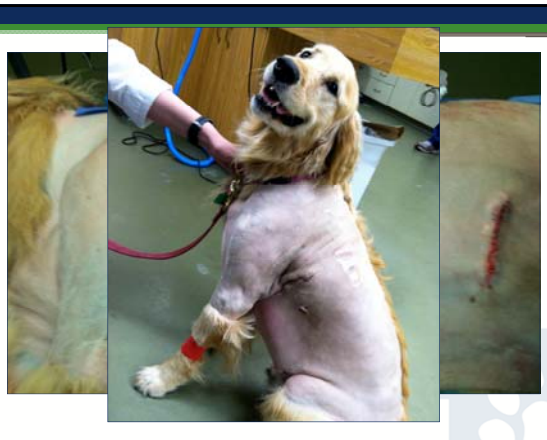
## Chest Wall Tumors

- Reconstruction
  - Autogenous techniques
    - Muscle flap
      - Latissimus dorsi, deep pectoral
    - Diaphragmatic advancement
      - 9-13th ribs
  - Prosthetic mesh
  - Composite techniques
    - Prosthetic mesh
      - + autogenous muscle
      - Or + omental pedicle flap

## Chest Wall Tumors

- Reconstruction of Chest Wall Defects After Rib Tumor Resection: A Comparison of Autongenous, Prosthetic, and Composite Techniques in 44 Dogs. (Liptak et al, 2008)
  - Complications: Seroma, pleural effusion, peripheral edema, infection
    - Autogenous 10.3%
    - Prosthetic 66.7%
    - Composite 25%





## Chest Wall Tumors

- Paradoxical Respirations
  - Does not affect ventilatory function in dogs

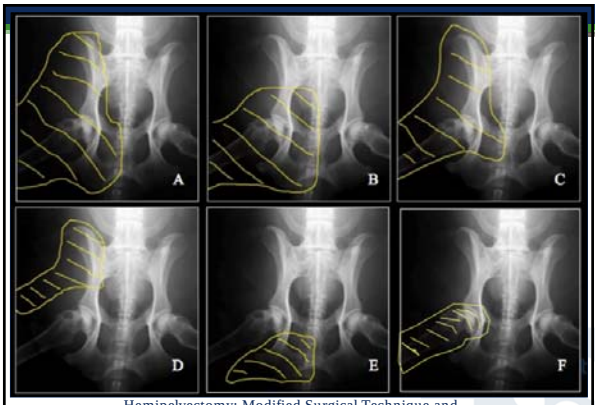
## Hemipelvectomy

- Primary bone tumor
  - OSA
  - CSA
  - HSA
- Soft tissue SA of thigh/pelvis

## "Abela"

## Hemipelvectomy

- Presenting signs
  - Lameness
  - Mass lesion
  - Tenesmus and constipation




Hemipelvectomy: Modified Surgical Technique and Clinical Experiences From a Retrospective Study. Bray et al. 2014

## Hemipelvectomy

- Hemipelvectomy: Outcome in 84 dogs and 16 cats. A Veterinary Society of Surgical Oncology Retrospective Study. (Bray et al, 2014).
  - Intraop hemorrhage in 7
  - Iatrogenic laceration of urethra
  - 1 major postop complication
  - 11 minor postop complications

## Hemipelvectomy

- All patients ambulatory within 24 hours
- Median hospitalization of 3 days
- Long term function excellent from 94 owners

## "Winnie"

## Signalment/History

- 
- 
  - 
- Ate at 6:30AM
- BG 40 (in house)
- Tremors diminished after eating

Slide 002

- Blood glucose: 37 mg/dL
- Blood insulin 174.9 microu/ml (N5-20)

INSULINOMA…

## Diagnostics

- Paired Insulin/Glucose sample
  - Fasted
  - Collect when BG < 60mg/dL
  - Increased or inappropriately normal insulin levels
  - Only sepsis and nonpancreatic neoplasias have also been demonstrated to have elevated insulin levels with hypoglycemia

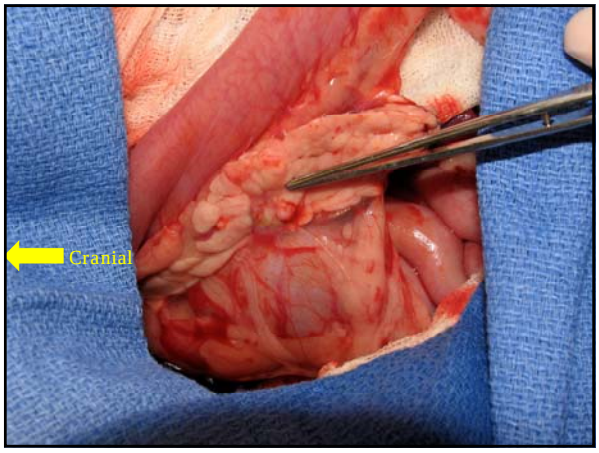
## Insulinoma

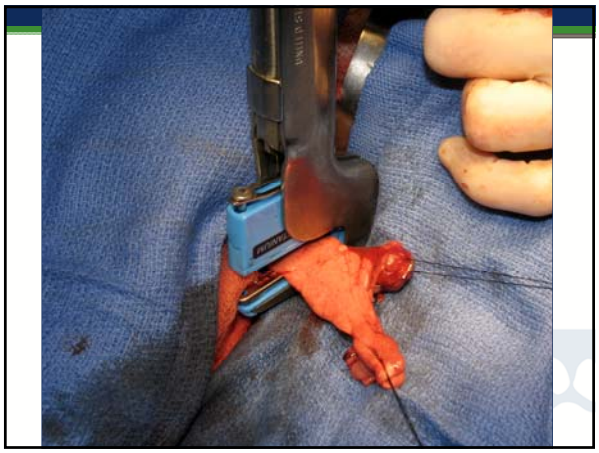
- Uncommon in dogs
  - Middle age to older
  - Medium to Large breeds predisposed
- More uncommon in cats
- Typically malignant
  - Unlike in humans

- AUS
  - Only 30% identified
- CT/MRI
  - Good only when hepatic or lymph mets or with tumors > 1cm diameter
  - Combine MRI with dynamic gadolinium enhancement and fat suppression or short time inversion recovery imaging
- Nuclear scintigraphy
  - Indium -111 labeled octreotide

## Treatment

- Surgical
  - Mainstay of Tx
  - Cure unlikely
    - Metastatic Dz typically present
      - Grossly detectable in 36-51% of cases (Liver, LN)
  - Complications
    - Pancreatitis
    - Diabetes
      - Typically transient
    - EPI
      - 85-90% of pancreas removed or ducts transected





## Intraoperative Localization

- Methylene blue
  - Azo dye
  - Concentrates in parathyroid and endocrine pancreas
  - Complications: Heinz body anemia, renal failure
- Ultrasound
  - Intraop success in humans 90%

- Medical
  - **Glucocorticoids**
    - Antagonizes effects of insulin
  - **Diazoxide**
    - Decrease insulin release from beta cells
  - **Octreotide**
    - Inhibits insulin synthesis and secretion

- Chemotherapeutics
  - Streptozotocin
    - Direct toxic effects on beta cells
    - Nephrotoxic
    - Complete or partial remission in 30%, all relapsed

## Insulinoma

- Short term prognosis
  - Good
- Long term prognosis
  - Guarded to poor
    - Mean survival time for medically Tx = 12 mos
    - Dogs Sx Tx w/o visible mets = 50% free of hypoglycemia at 14 mos,
    - Dogs Sx Tx w/ mets = 20% free of hypoglycemia at 14 mos
    - 50% w/ liver mets, dead at 6 mos
    - Aggressive tumor and met debulking, some alive at 2 yrs

## Feline Injection Site Sarcoma

- Fibrosarcoma
- Highly aggressive
- Locally invasive
- Do not behave the same as other ST SA


Seguin, 2002

## Feline Injection Site Sarcoma

- Inflammation
  - Uncontrolled proliferation of fibroblasts/myofibroblasts...malignant transformation
  - Injection site sarcoma
  - Killed aluminum adjuvant RV
  - Killed aluminum adjuvant FeLV

Seguin, 2002

## Feline Injection Site Sarcoma

- Treat when small and early
- 3,2,1 rule
  - Mass @ injection site >3mos post
  - Mass > 2 cm
  - Mass increasing in size 1 mo after

Seguin, 2002

## Feline Injection Site Sarcoma

- FNA = unreliable
- INCISIONAL Biopsy
  - Plan appropriately
  - Do not attempt marginal excision/excisional bx
    - Worsens prognosis

Seguin, 2002

## Feline Injection Site Sarcoma

- Staging
  - CBC/Chem/UA
  - 3 view thoracic radiographs
  - Local LN evaluation
  - CT/MRI
    - Tumor 2x as large on CT as on PE

Seguin, 2002

## Feline Injection Site Sarcoma

- Surgery
  - Aggressive surgery as a first attempt!
    - Local recurrence 26-59%
    - 3cm margin, 1 fascial plane?
    - More?

Seguin, 2002

## Feline Injection Site Sarcoma

- Radical excision with five-centimeter margins for treatment of feline injection-site sarcomas: 91 cases (1998-2002) (Phelps, 2011)
  - 5cm margins
  - 2 muscle planes or bone
    - Spinous process, partial scapulectomy, pelvectomy

## Feline Injection Site Sarcoma

- Radical excision with five-centimeter margins for treatment of feline injection-site sarcomas: 91 cases (1998-2002) (Phelps, 2011)
  - Complete margins 97%
    - Local tumor recurrence 14%
    - MST 1,461 days

## Feline Injection Site Sarcoma

- Radiation therapy
  - Pre/post operatively
- Chemotherapy

## Key Points

- Early, Deep, Wide
- Biopsy, Biopsy, Biopsy
- Have a Plan
- Cancer is not a 4 letter word

## Questions?