



THE CANCER CONUNDRUM:

A realistic oncologist's perspective

& your role in general practice



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LOTUS
PET ONCOLOGY

A yellow diamond-shaped sign with a black border and two silver fasteners at the top and bottom. The sign is mounted on a metal post. The background is a bright blue sky with wispy white clouds. The entire scene is framed by a light blue rounded rectangle, which is set against a white background with teal and light blue abstract shapes in the corners.

**Cancer
Sucks!**

Today's Discussion



Oncology basics

Diagnostics

Treatment categories

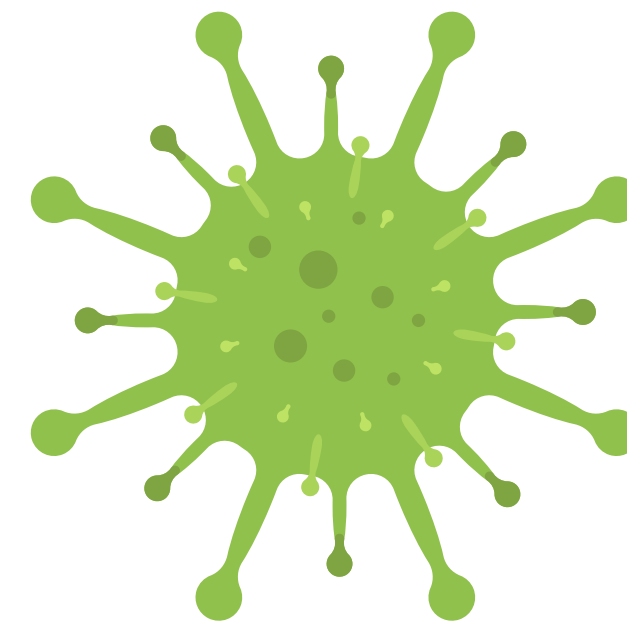
Formulating a plan

Oncology care in general practice

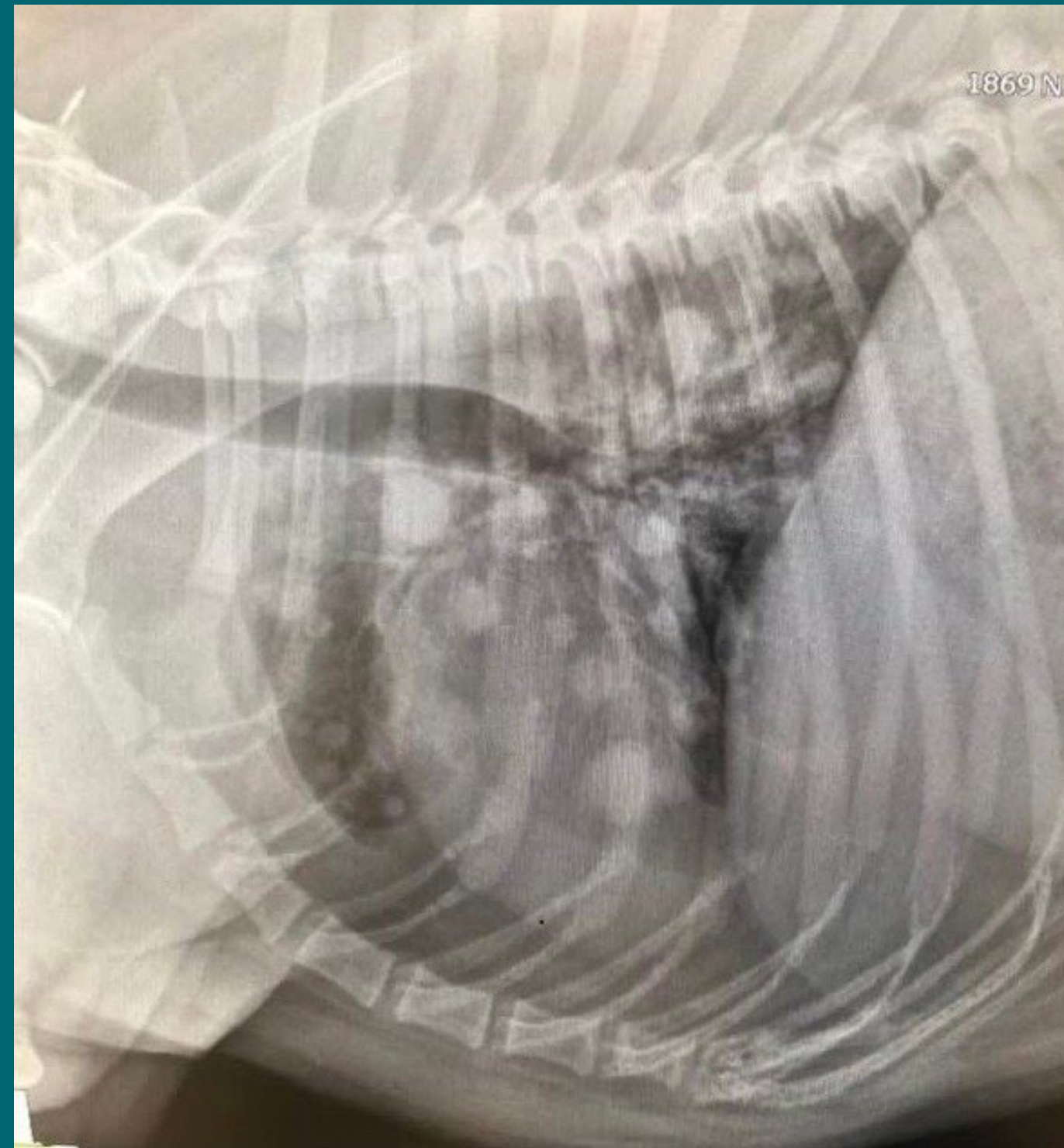
How can we make it better?

Oncology Basics

- **CANCER:** uncontrolled cell growth
 - Locally invasive
 - Ability to metastasize
 - Occurs in 1 of 4 dogs
 - ~50% of dogs >10 years die of cancer
 - No single cause



Oncology Basics

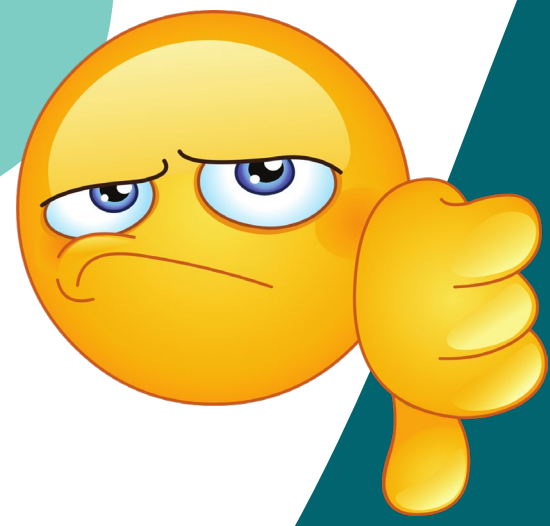


GRADE

- Describes how abnormal the cells look on histopathology
- High grade = more aggressive
- Estimates expected outcome & progression
- Subjective

STAGE

- How far the cancer has spread
- Size
- Regional (LN) vs distant metastasis
- TNM system



Metastasis

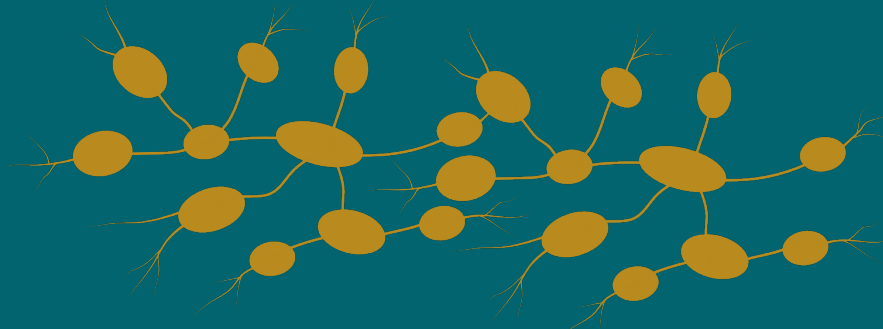


- Spread from the primary to regional & distant sites
- Inefficient, complicated process
- Estimated that 4 million tumor cells per gram of tumor are released into circulation daily
- Dormancy
 - Just because things are fine now doesn't mean they will be in the future

Metastasis

CARCINOMAS

{Round cell tumors
Melanoma}



Spread via lymphatics

LYMPH NODES
LUNGS

~40% of normal sized LNs
have mets

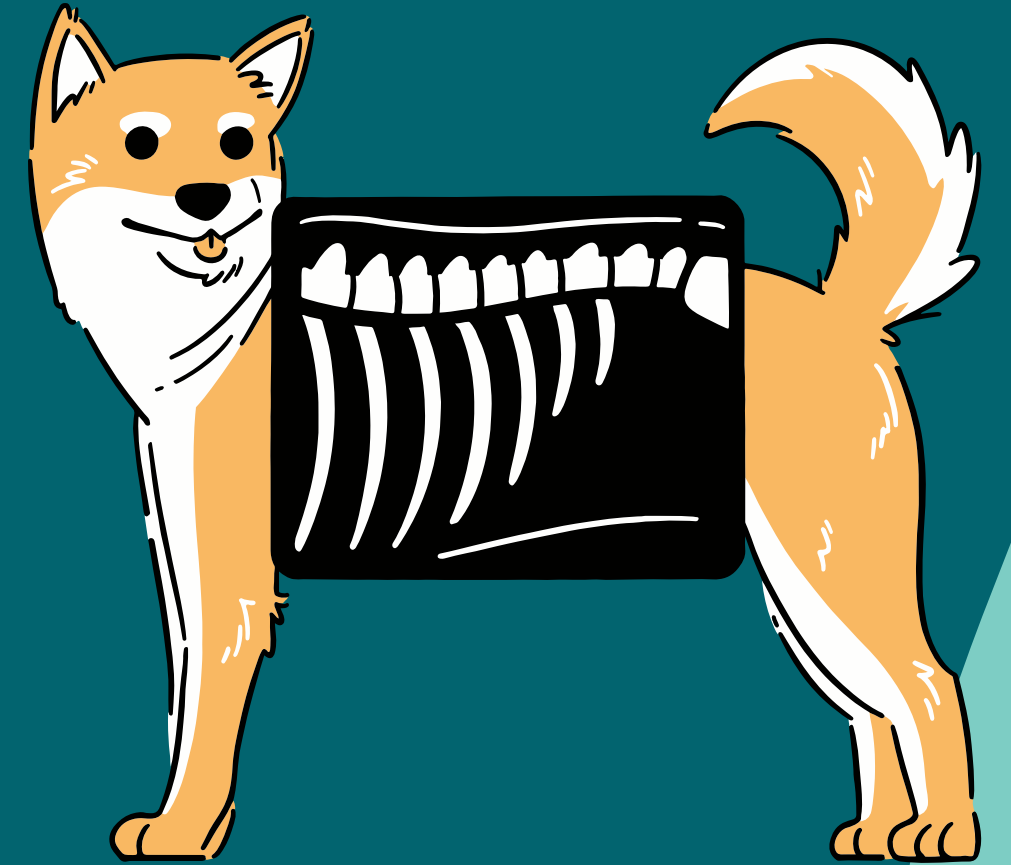
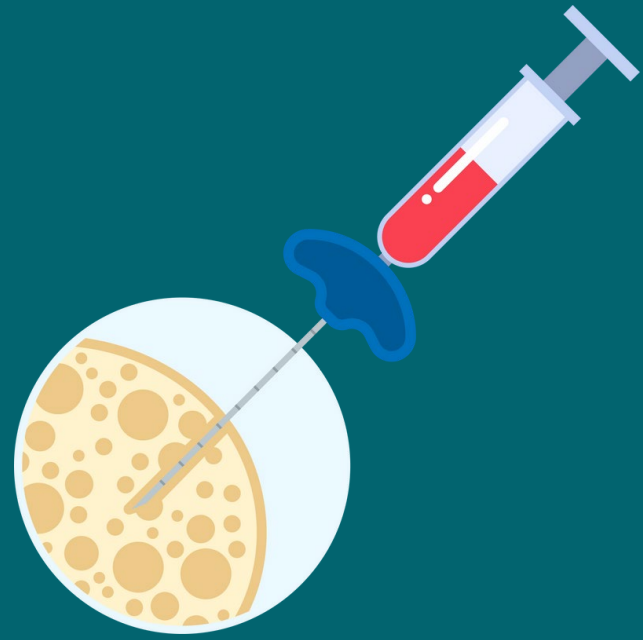
SARCOMAS



Spread
hematogenously

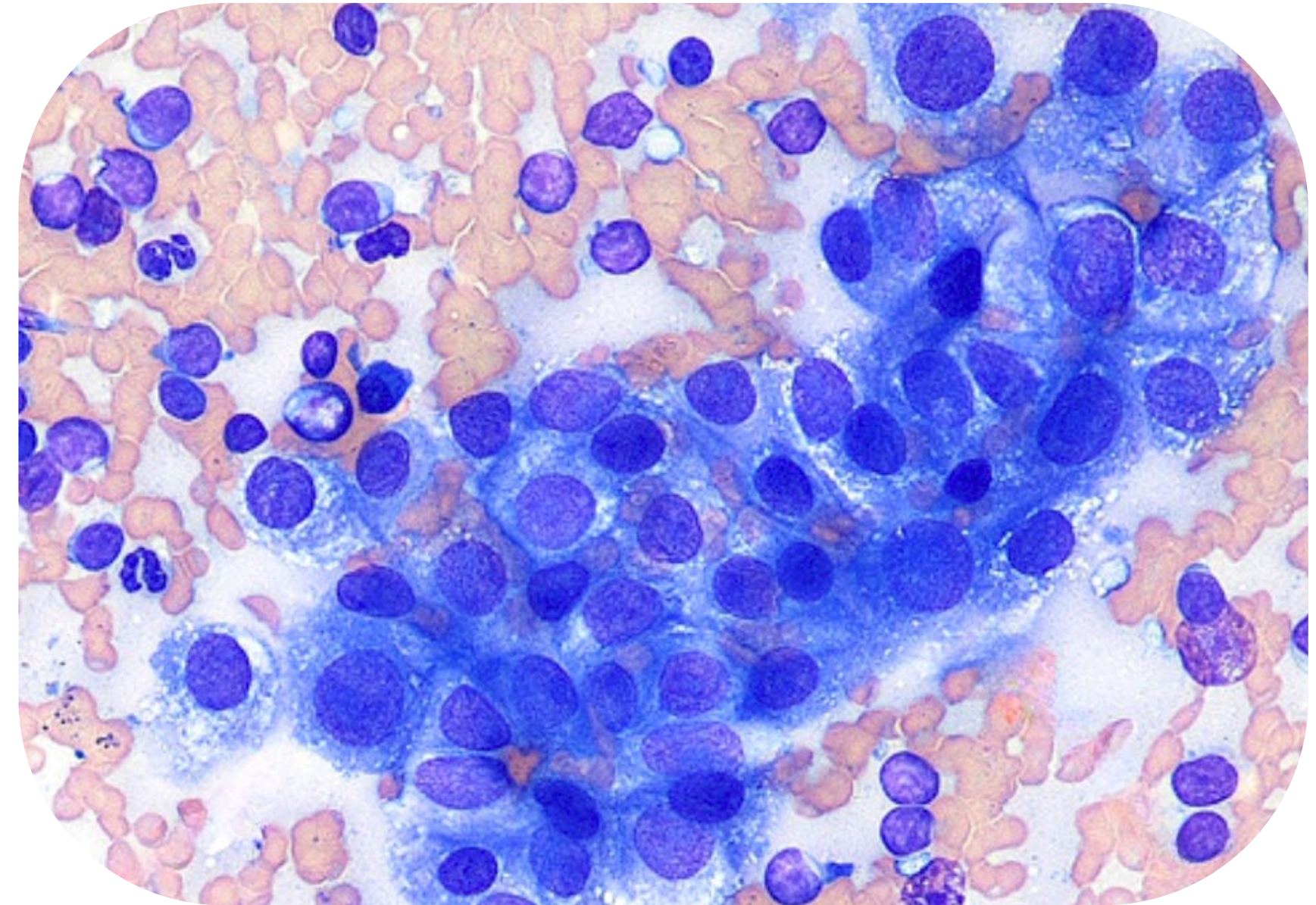
LUNGS

Diagnostics

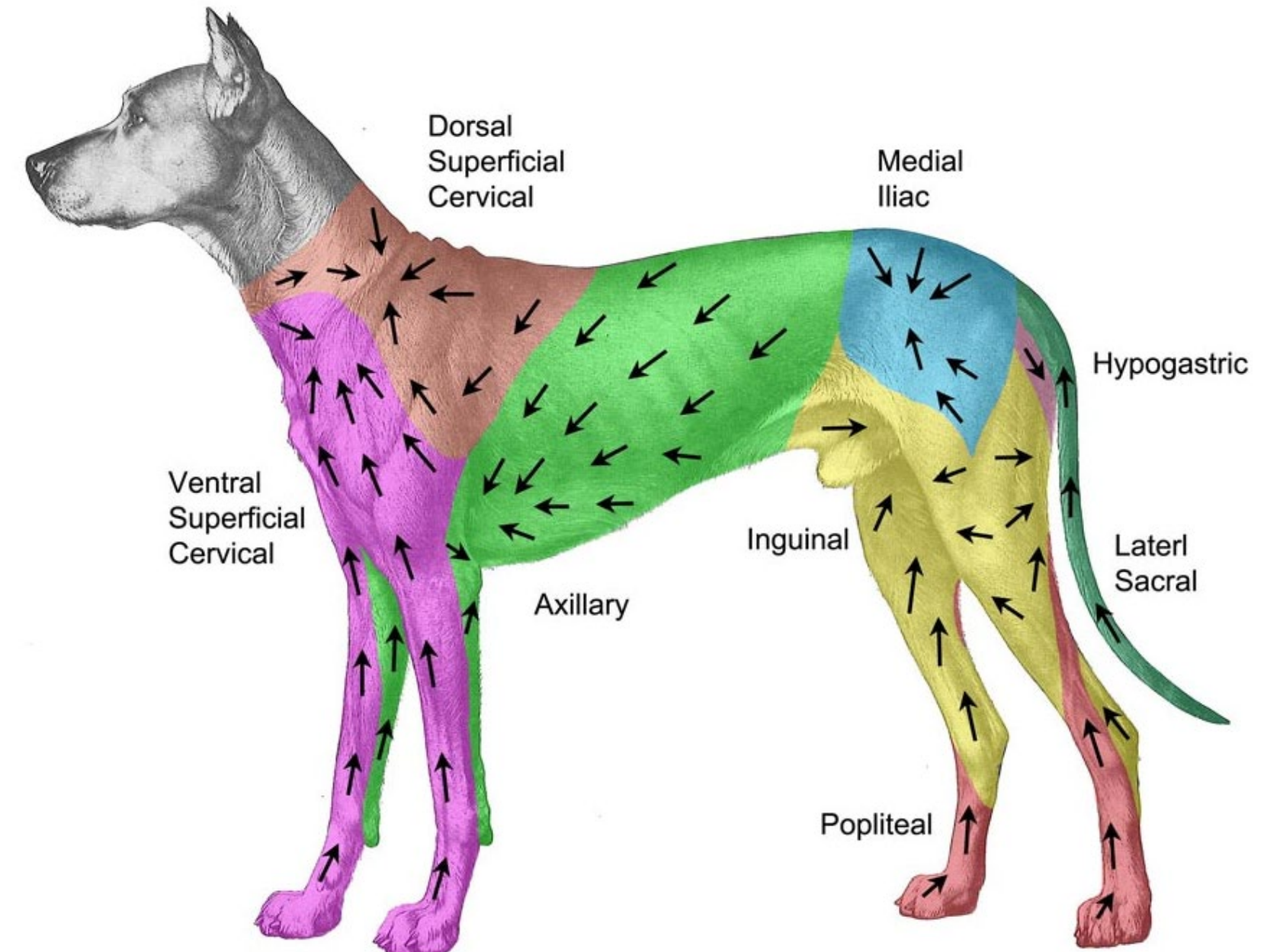
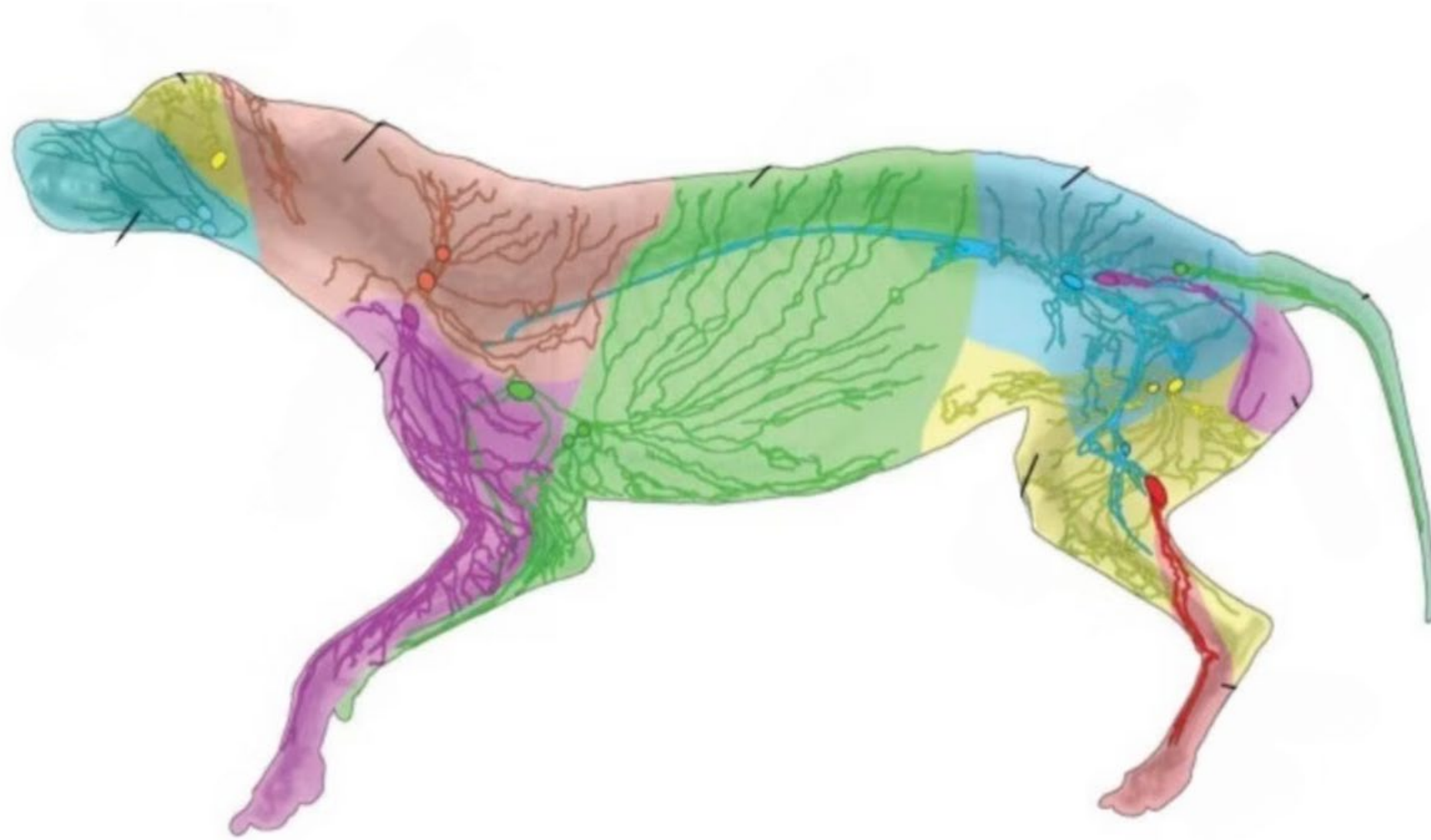


Basic Staging Tests - Diagnostics

- CHEST X-RAYS
 - OSA
 - HSA
- ABDOMINAL ULTRASOUND
 - AGASACA
 - MCT (caudal body)
- CYTOLOGY
 - Regional draining lymph node
 - Melanoma
 - MCT



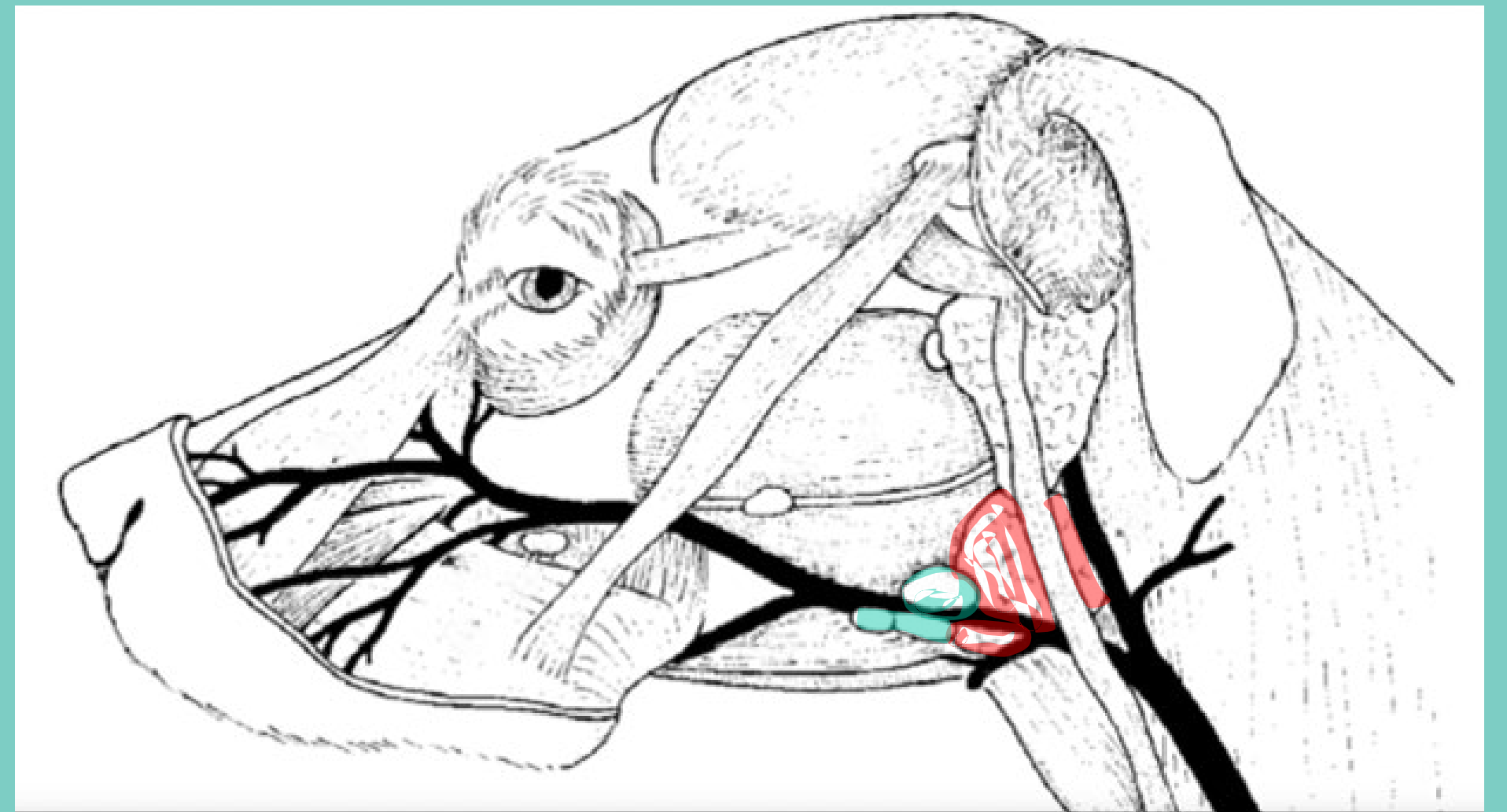
Lymph node aspirates



Lymph node aspirates

SUBMANDIBULAR LYMPH NODES

- First. . . you have to find them
- Salivary gland: more caudal and tucked under the ramus
- Slide hand rostral & ventral to find the node
- Feel them from behind
- Less restraint is better
- Hold onto it tightly to FNA



How to do a perfect FNA

3S's: SAMPLE - SEPARATE - SMEAR

Supplies

- Needles
 - 22 g 1"
 - 25 g if bloody
 - 20g if not exfoliating (bone)
 - Long needle if large mass
- 6 cc syringe
- Frosted edge slides
(Tray, pencil)

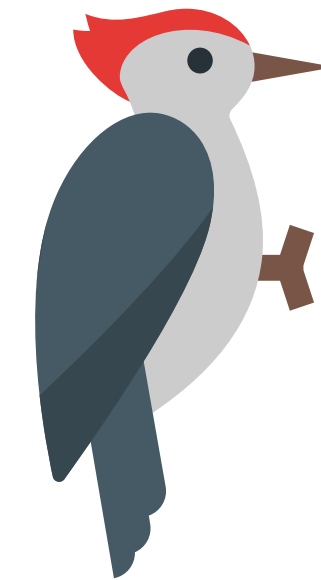
Technique

WOODPECKER

- Needle only
- Poke - Poke - Poke

ASPIRATION

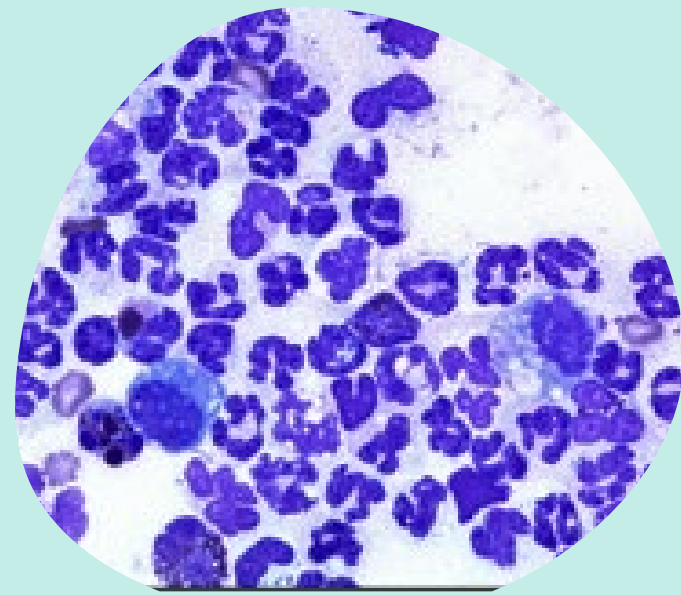
- Needle attached to a syringe
- Use suction for poorly exfoliating masses
 - Bone tumors



LOOK FOR A "FLASH" IN THE NEEDLE HUB
STOP IF YOU SEE BLOOD



Always look at your sample



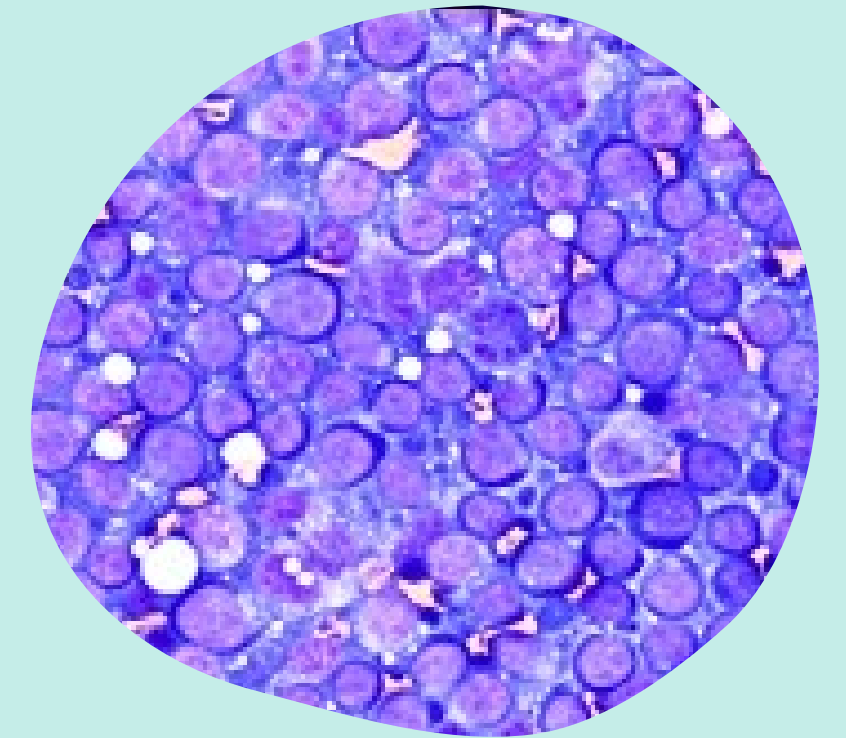
Inflammatory

(neutrophils, macrophages, eosinophils)



Look for organisms

Is it
cellular?

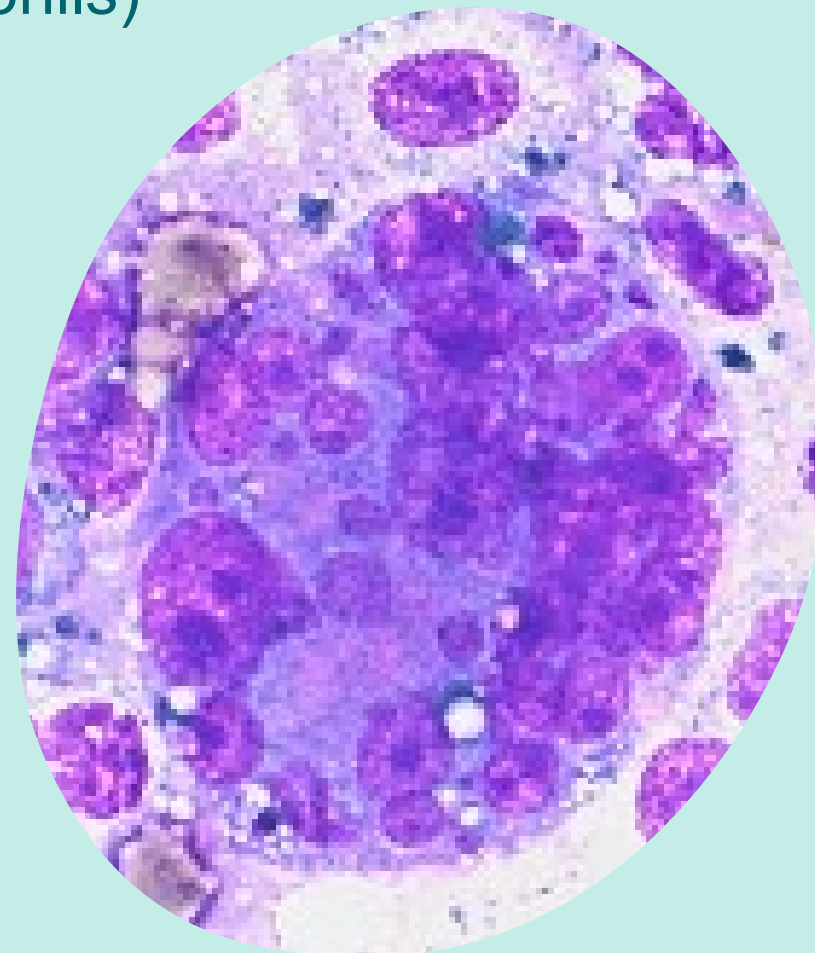


Non-inflammatory

Round, mesenchymal, or epithelial

Criteria of malignancy

Anisocytosis/karyosis, multinucleation,
multiple nucleoli, mitotic figures, etc



New(er) Diagnostics

CADET BRAF & CADET BRAF PLUS

- CAncer DETection of BRAF
 - BRAF is a oncogene
- Diagnose 95% of K9 TCC/UC
- 5% false -, 0% false +
- Easy
- Non-invasive
- Free catch urine sample
- Antech



FYI

- Requires a special container
- Minimum 40 ml urine
- Put in container w/in 15 min
- Can batch samples



New(er) Diagnostics

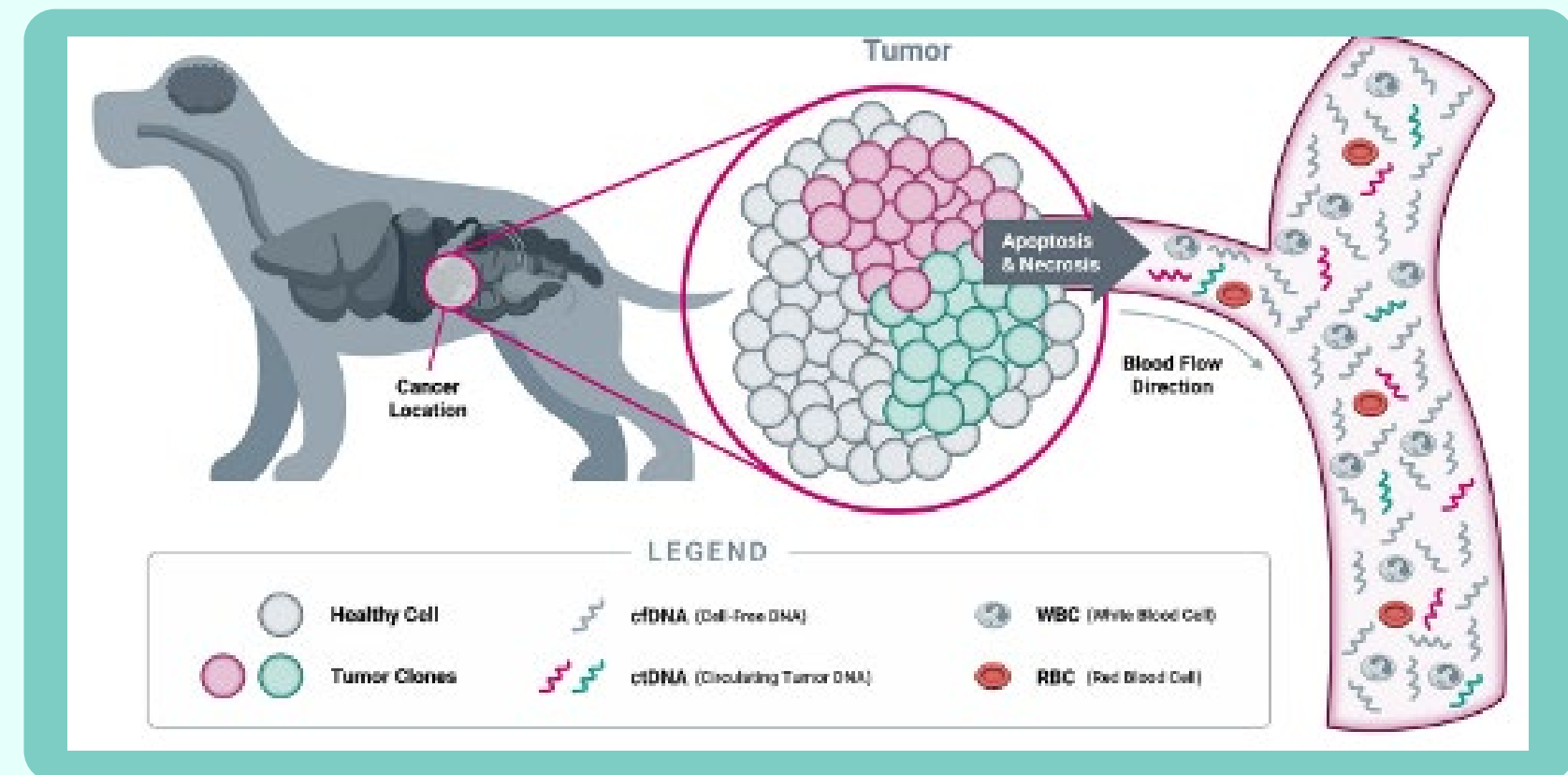


Nu .Q and OncoK 9

- Blood based (liquid) cancer diagnosis
- Identify circulating fragments of tumor DNA
- Screening & monitoring cancer in dogs
 - Lym phom a, hem angiosarcom a

FYI

- Handing instructions
- Special tubes (OncoK9)
- Fasted (Nu.Q)
- Contraindications
 - Trauma, inflammation, recent surgery
- Does not give a diagnosis!



New(er) Diagnostics

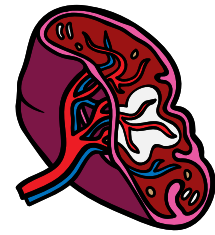
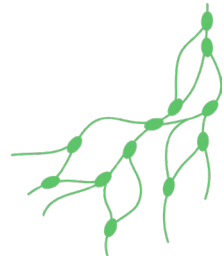
Flow cytometry & PARR

- Characterizing lymphoid neoplasia

- Lymphoma, leukemia

→ Phenotyping (B vs. T)

- Blood, lymph nodes, organs, fluids



- Which question am I trying to answer?
 - Is this lymphoma
 - What type of lymphoma
- What kind of sample do I have?
 - Blood vs. tissue
 - Fresh
 - Low cellularity

Species	Clinical signs	Sample	Cytology	Best test
Dog/Cat	Lymphocytosis	Blood	Small mature or large lymphocytes	Flow
Dog/Cat	Lymphadenopathy	Lymph node	Lymphoma (small or large)	Flow (B v. T)
Dog/Cat	Lymphadenopathy	Lymph node	Mixed or reactive, rare suspicious cells	PARR
Dog/Cat	Cavitary effusion	Thoracic/abdominal fluid	Abnormal large or small lymphoid cells	Flow
Dog/Cat	Mediastinal mass	Mass	Lymphoma or thymoma	Flow
Dog/Cat	Cavitary effusion	Thoracic/abdominal Fluid	Rare lymphoid cell	PARR
Dog/Cat	Leukopenia	Bone marrow	No neoplastic cells	PARR

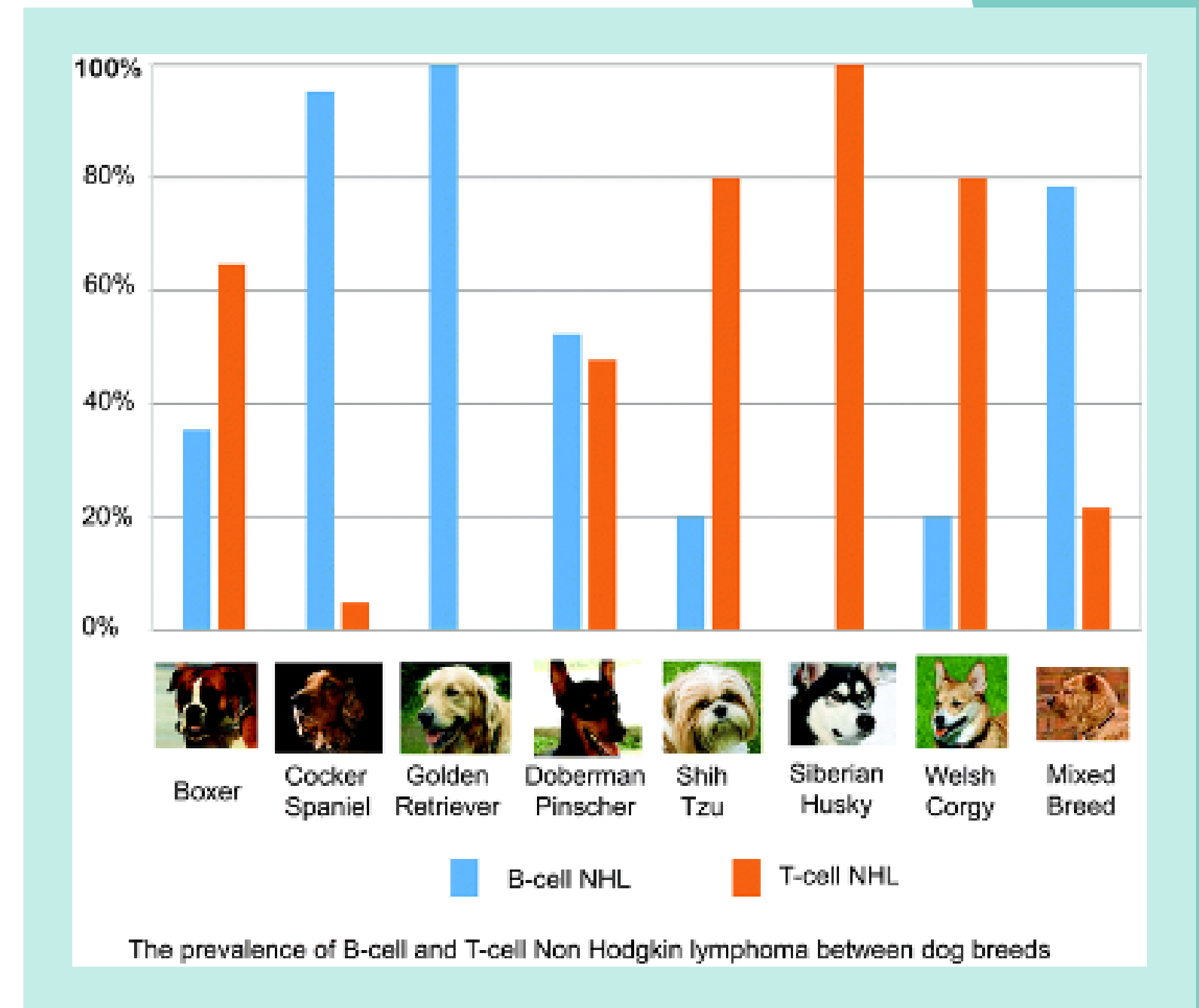
New(er) Diagnostics

Flow cytometry & PARR

- Flow cytometry preferred
 - More cell surface markers used
 - Better for less typical lymphoma
 - Chronic lymphomas
- PARR more versatile
 - Stained slides & histopath samples

FYI

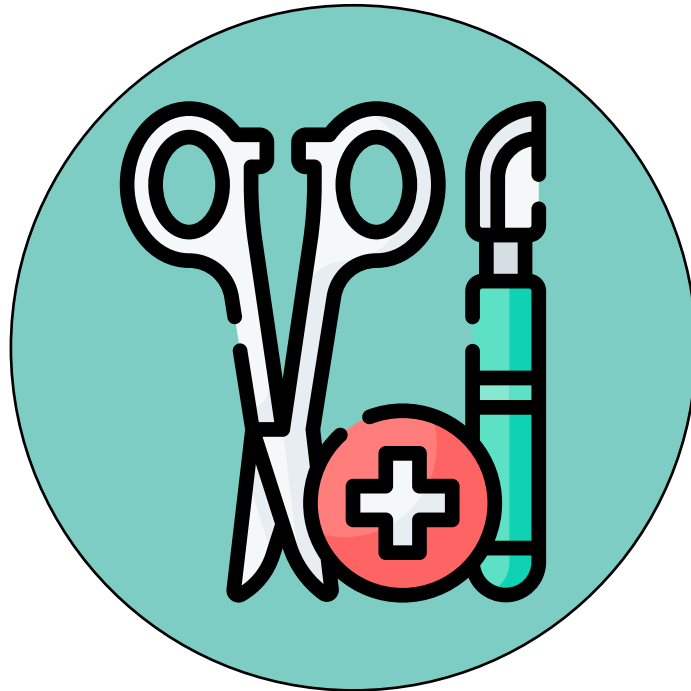
- Not as accurate in cats
- Flow Cytometry is fussier
 - Fresh sample
 - Special collection instructions
 - Overnight shipping
- False + due to tick borne disease



Treatment options for pets with cancer

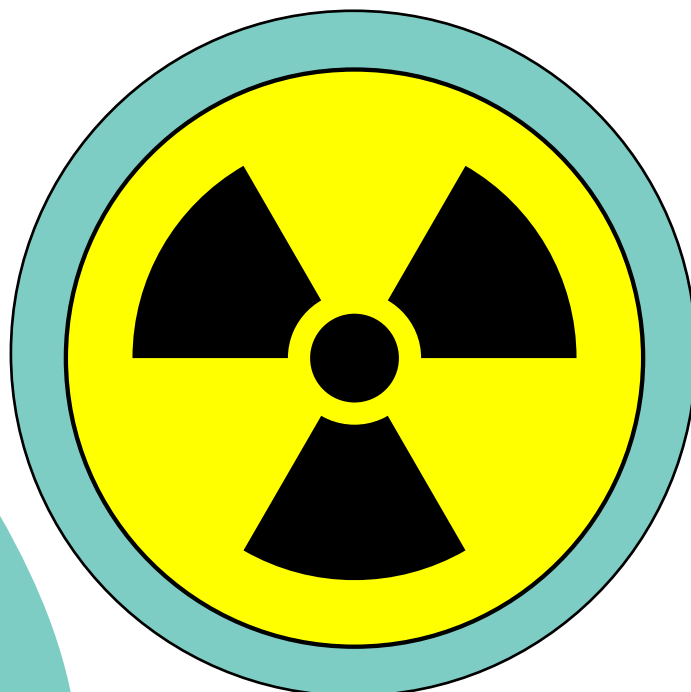


General Treatment Options



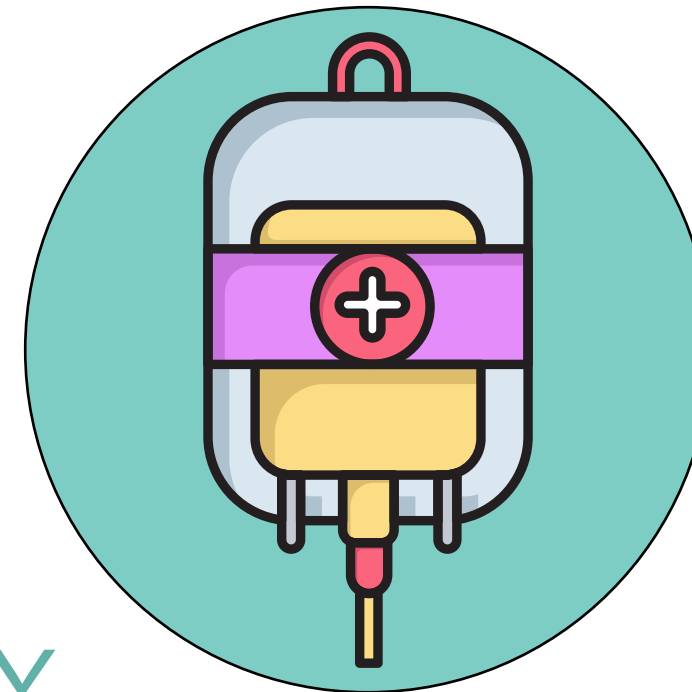
SURGERY

- Solid tumors
- Local tumor control
- STS, MCT, carcinoma



RADIATION THERAPY

- Local tumor control
- Definitive vs. palliative



CHEMOTHERAPY

- Hematologic cancers
 - Lymphoma
- Metastasis
 - OSA
- Local tumor control
 - MCT, TCC

Surgery

- Diagnosis - Biopsy
 - Non-diagnostic cytology
 - Cystic masses
 - Small mass
 - Grade is not always reliable
 - Tumors are heterogenous
 - Tru-Cut, punch, incisional
- Treatment
 - TX of choice for solid tumors
 - Sarcomas, carcinomas
 - Curative in some cases
- Grade - MCT, mammary gland tumors, STS

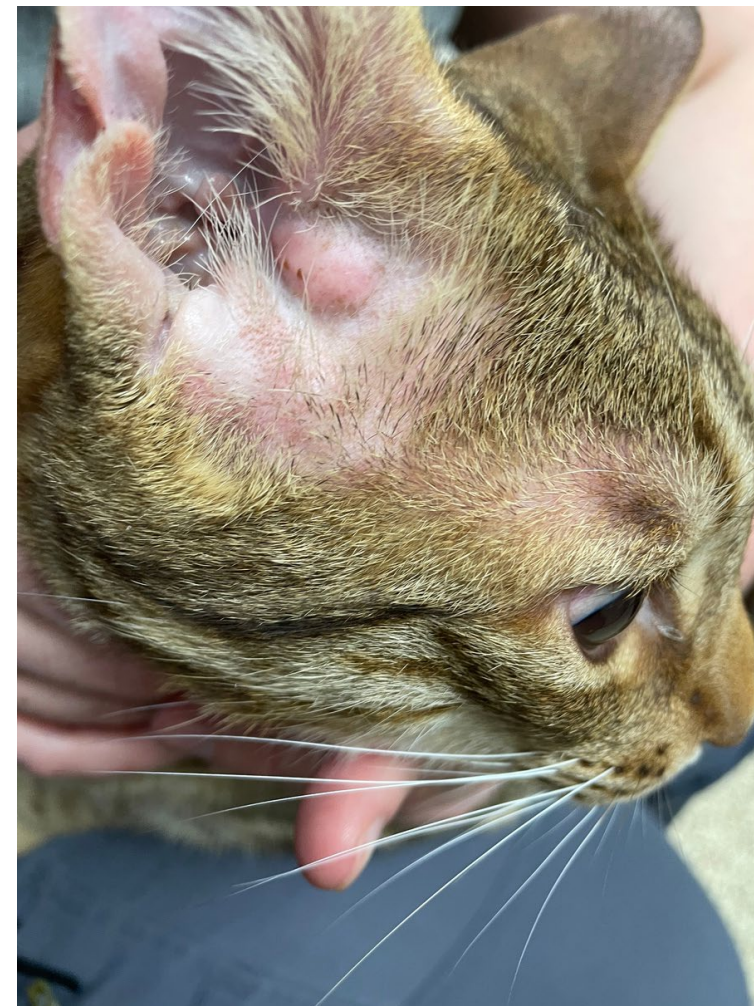
A CHANCE TO CUT IS A CHANCE TO CURE





Surgery

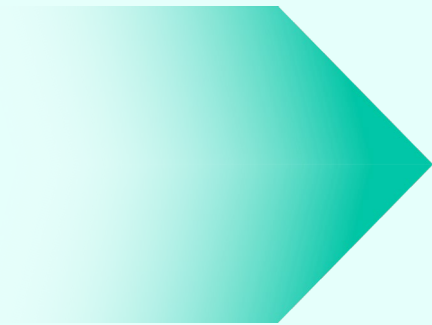
- Procedure & outcome depends on . . .
 - Site
 - Stage
 - Size
 - Skill level of surgeon
- Is there an alternative option?
 - Stelfonta for MCT
 - Radiation therapy for OSA
 - Electrochemotherapy



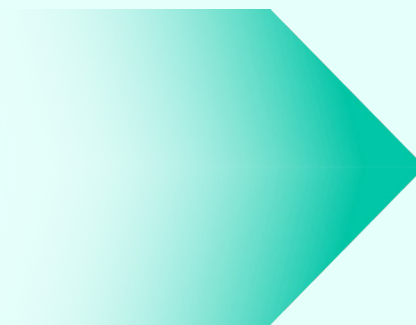
Radiation therapy (XRT)



- Local form of treatment
 - Follow up or alternative to surgery
- Curative-intent treatment
 - More treatments
 - Longer disease control
 - \$\$
- Palliative-intent treatment
 - Fewer treatments
 - Alleviation of symptoms
 - Shorter duration of control
 - Less side effects in short term



Nasal tumors
Soft tissue sarcomas
Brain tumors
MCT
Others



Osteosarcoma
Melanoma
Others

Radiation therapy

- So many options
- How do you decide what to recommend?
 - Number of treatments
 - Side effects
 - Cost
 - Location
 - Expected outcome
 - Owners goals
 - Alternative options



PetCure
ONCOLOGY

CHEMOTHERAPY

Conventional chemotherapy

- Involves giving the highest dose possible that does not cause side effects
- Kills cancer cells directly
- Given at set intervals of time
- IV or oral
- LSA, OSA, HSA, TCC, MGT



Palladia (TKI)

- Blocks cell signaling pathways via c-kit inhibition
 - Anti-angiogenic by blocking VEGF and PDGF receptors
- Oral - given at home MWF
MCT, Endocrine/neuroendocrine cancers, SCC, GIST, TCC, Histiocytic sarcoma, liver cancer



Metronomic chemotherapy

- Low dose, daily or EOD dosing
- Oral chemotherapy drug + NSAID
- Alters tumor microenvironment: anti-angiogenic, immunomodulatory
- TCC, STS, lung tumors, HSA



How to choose an option

- Lotus Pet Oncology can help you figure out what's best
- Not all pets need IV chemotherapy
- Schedule a consult & make a plan



How to formulate a plan

- Clients must understand the diagnosis
 - That means you do, too!
- What's the extent of disease
 - Grade, stage
- Treatment options
 - Surgery, radiation, chemotherapy
 - Risks
 - What's involved
- Goals
 - Definitive or palliative treatment
- \$, life experiences, location, family life, personal reasons
- Our role is to educate, offer options, & establish realistic expectations



Defining your role

EDUCATE

- Know what you're dealing with
- Use your resources
 - Lotus Pet Oncology, IDEXX/Zoetis consulting services, local specialists, VIN, VetHive

OPTIONS

- Surgery
 - Is it possible? Can you do it? Do you need to refer it?
- Radiation
 - Location, cost
- Chemotherapy
 - Are you willing to do it? Do you need to refer it?

EXPECTATIONS

- Be fair & realistic!



Expectation



Oncology care in GP





Oncology care in GP

- Safety considerations
- USP 800
 - Not federally regulated
 - Check with your state
 - PPE
 - Closed system transfer device
 - Chem o hood
 - Spill kits
 - Monitoring
 - Separate areas for handling chem o
 - Who enforces this?



Oncology care in GP

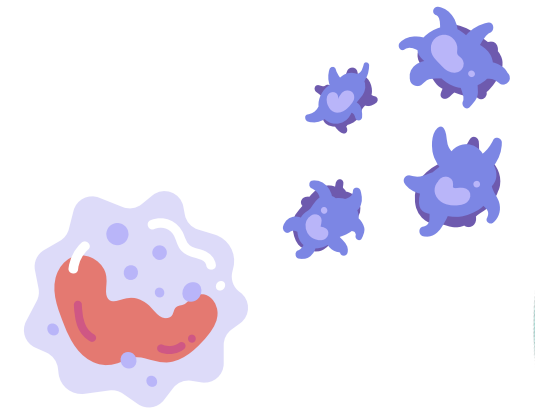
EQ UASHIELD
Closed System for Hazardous Drug Transfer

- Consider oral chemotherapy protocols
- If you're going to give IV chemotherapy
 - Have a plan
 - Contact an oncologist
 - Lotus Pet Oncology 😊
 - Be organized
 - Chem o flow sheet or protocol
 - Systematic approach for every visit
 - Use a closed system transfer device & PPE



Treating pets with chemo

- History
 - How did they do w/ the last tx?
- Body weight
 - Convert to m²
- Physical exam & vitals
 - Measure mass
 - Temperature
- Lab work
 - Obtain from a jugular
 - CBC always
 - Neutrophils >1500
 - PLT >50k
 - Chem depending on drug
 - Lomustine liver values (ALT)
- Calculate drug dosage --> treat patient



BE SYSTEMATIC
BE ORGANIZED
BE CONFIDENT

Things to know

SPECIFIC DRUG CONCERNS

Doxorubicin

- IV infusion
- Cardiotoxic
 - DCM
- Severe vesicant
- Allergic reactions
- Hair loss



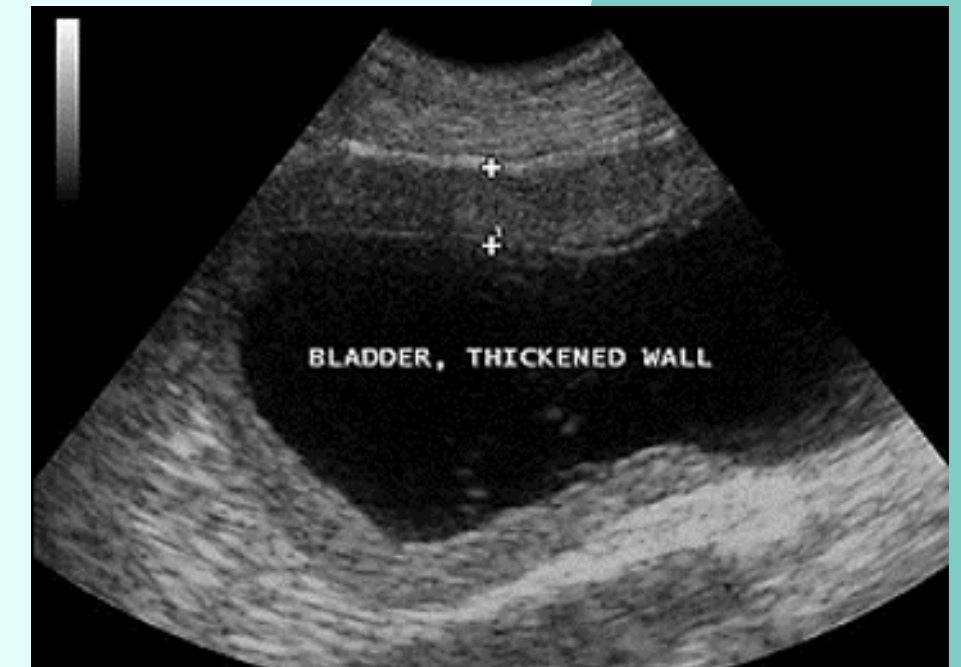
Lomustine

- Easy, oral
- Myelosuppressive
- Hepatotoxic
 - Monitor ALT
 - Denamarin



Cyclophosphamide

- Easy, oral
- Sterile hemorrhagic cystitis
 - Acrolein metabolite
 - DX
 - Recent tx
 - Hematuria, no bacteria WBC
 - Thickened bladder on AUS
- Furosemide reduces risk
- No consistently effective treatment
 - NSAIDs, gabapentin, GAGs
 - Can be prolonged



Things to know

SPECIFIC DRUG CONCERNS

Vincristine

- IV bolus
- Vesicant
- Ileus
 - Prolonged in dogs
 - Constipation in cats

Melphalan

- Oral
- Myeloma
- Bone marrow suppression
 - PLTs

Carboplatin

- IV bolus
- Vomiting
- Delayed nadir
 - Day 10-21
 - Neutrophils & PLTs

Prednisone

- Prednisone LONE in cats
- Diabetes
- Heart failure (cats)
- Glucers
- Not just for lymphoma



MCT
INSULINOMA
BRAIN TUMORS
LUNG MASSES
HYPERCALCEMIA

Things to know

BREED CONCERNS

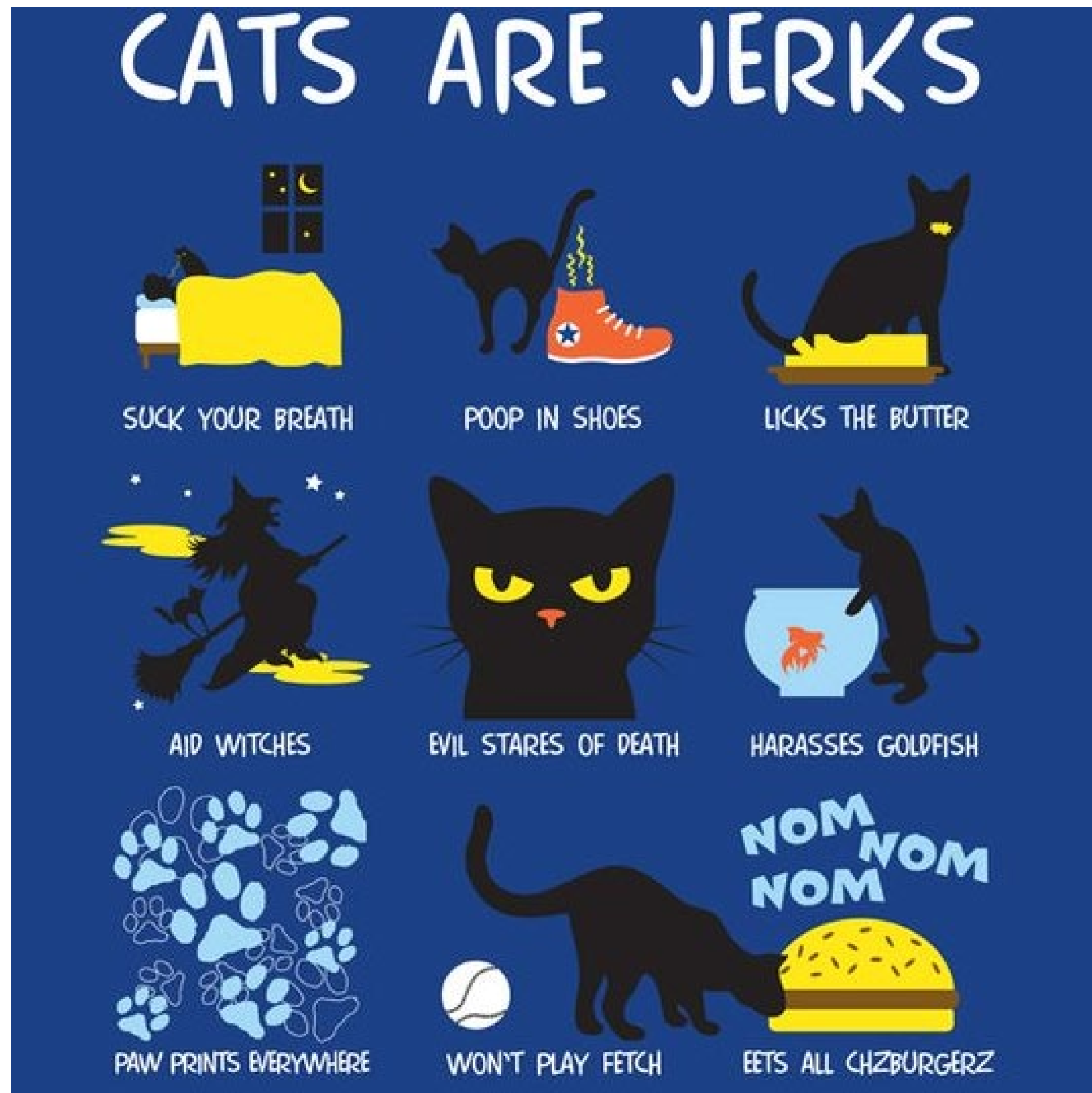
MDR

- Mutated drug efflux pump
- At risk breeds
 - Australian Shepherds
 - Collies
 - Shelties
- Drugs of concern
 - Doxorubicin, vincristine, vinblastine
- Must test these dogs!
 - Blood or saliva





- Different than dogs
- Less predictable responses
- Chemo tolerance
- Immune response
- Administering chemo





**EXPLORE
YOUR
OPTIONS**

Oncology care
in
General practice

Oncology care in GP

ZOLEDRONATE

- Bone tumors
 - OSA, metastatic tumors
 - Improve pain & strength
 - Hypercalcaemia
 - Inhibits bone resorption
 - Impedes osteoclast activity
 - Cytotoxic to OSA?
- Watch outs**
- GI upset
 - Kidney injury
 - Hypocalcaemia
- Not chemotherapy
 - Cheap
 - Easy
 - 0.1-0.2 mg/kg
 - 4 mg/dog max(?)
 - IV infusion
 - 15 minutes
 - Dilute w/ 150-250 ml saline
 - q 4 weeks
 - May vary for hypercalcaemia tx



Oncology care in GP

STELFONTA

- Canine mast cell tumors
- Extract from bluishwood seed
- Intratumoral injection
 - Oncolysis, inflammation, necrosis, healing
 - Not MCT specific
 - Human SCC & melanoma, sarcoids
- Good option for some MCT
 - Small, distal on limb
- Case requirements
 - Tumor size
 - **STAGING- no mets!**
 - Regional LN cytology
- Owner education is critical



Subcutaneous—
located at, or
distal to, the
elbow or the hock



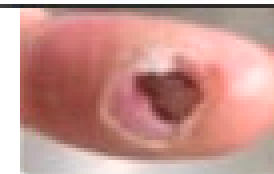
Cutaneous—
located all
over the body



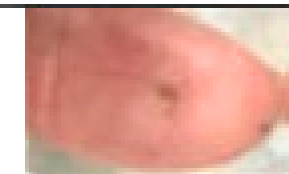
STELFONTA

Watch outs

- Must pre -treat
- Cost
- Anesthesia
- Unpredictable wound
- Risk to staff & yourself
- Is it as good as they say?



Picture 1. Thirteen days after self-injection

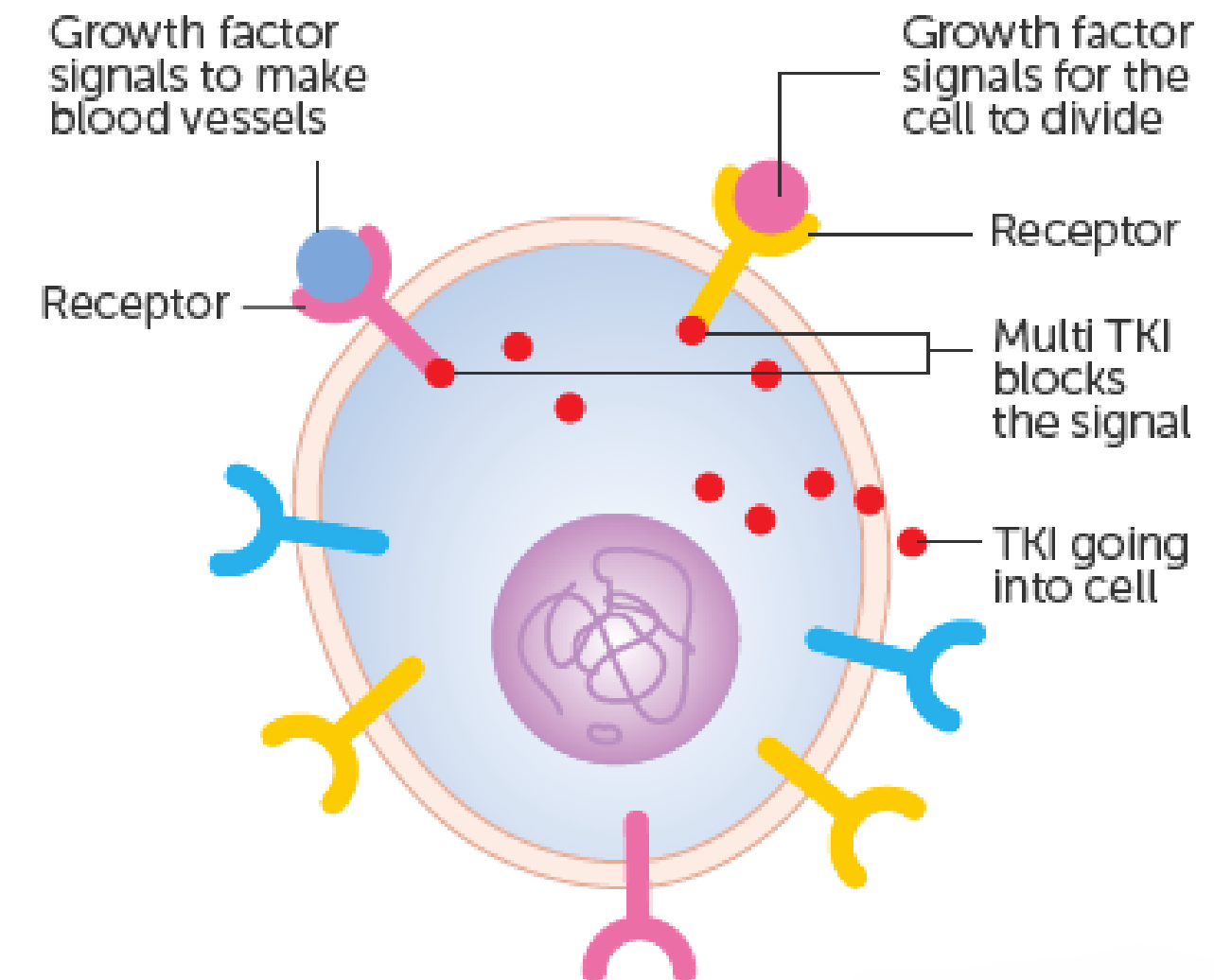


Picture 2. Seventy-four days after self-injection

Oncology care in GP

PALLADIA

- Small molecule tyrosine kinase inhibitor
 - Targeted therapy
 - TKs are messengers that carry a signal to the nucleus
 - Inhibits several receptor tyrosine kinases
 - KIT
 - VEGF-2
 - PDGFR
- Blocks angiogenesis
- Direct and indirect MOA



PALLADIA

- Canine MCT
- So much more. . .
 - Feline MCT
 - AGASACA
 - GIST
 - Carcinomas
 - SCC (cats)
 - Nasal
 - TCC
 - Neuroendocrine
 - Thyroid
 - Adrenal
 - Chemodectoma

- Easy
- Oral dosing - M/W /F
 - 2.5-2.75 mg/kg
 - Don't use the labeled dose!
- Cost
 - Depends where you get it
 - Compounded
 - Stokes
 - Wedgewood

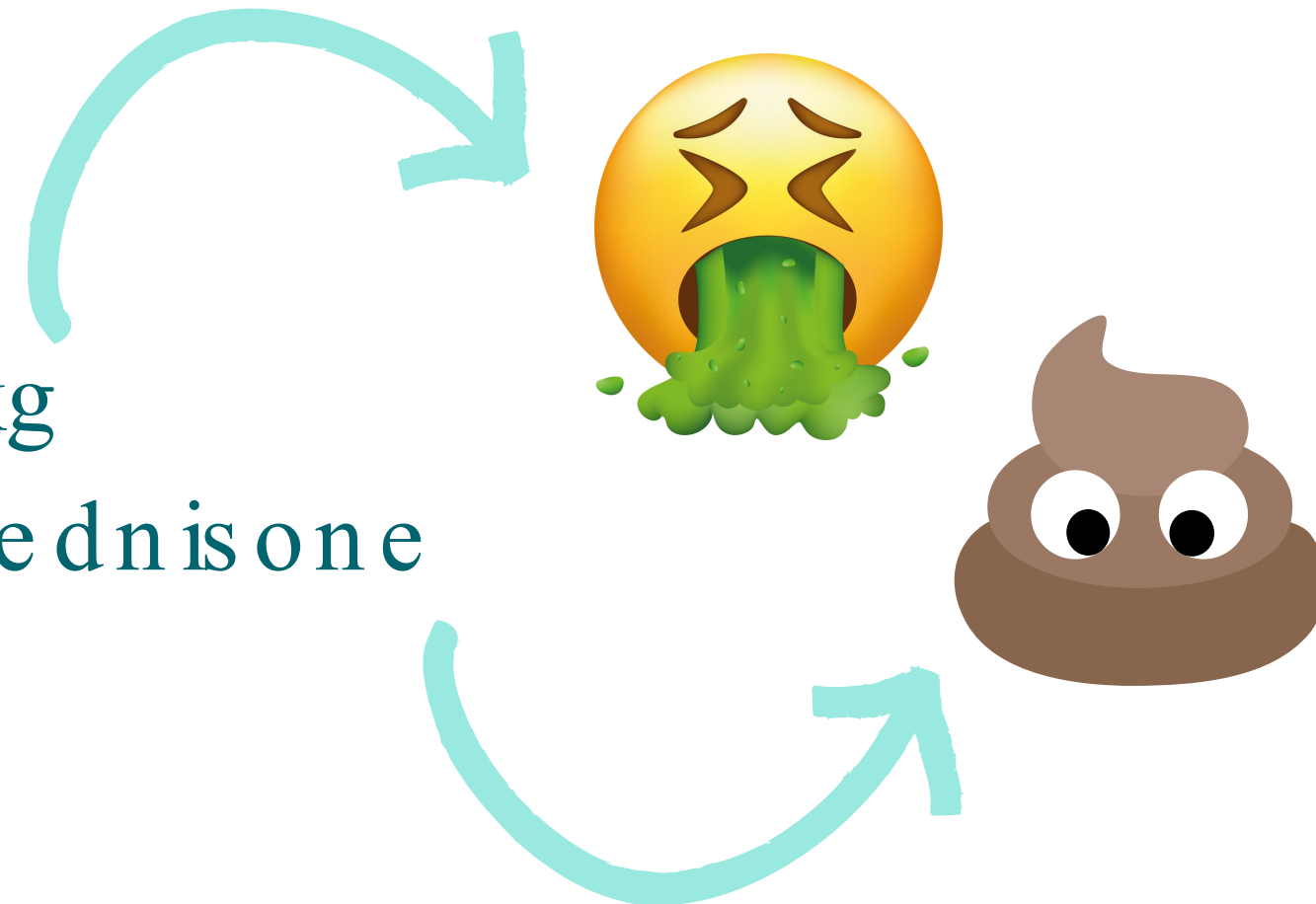
FRANK'S
SINCE 1920
RedHot
I put that  on everything



PALLADIA

Watch outs

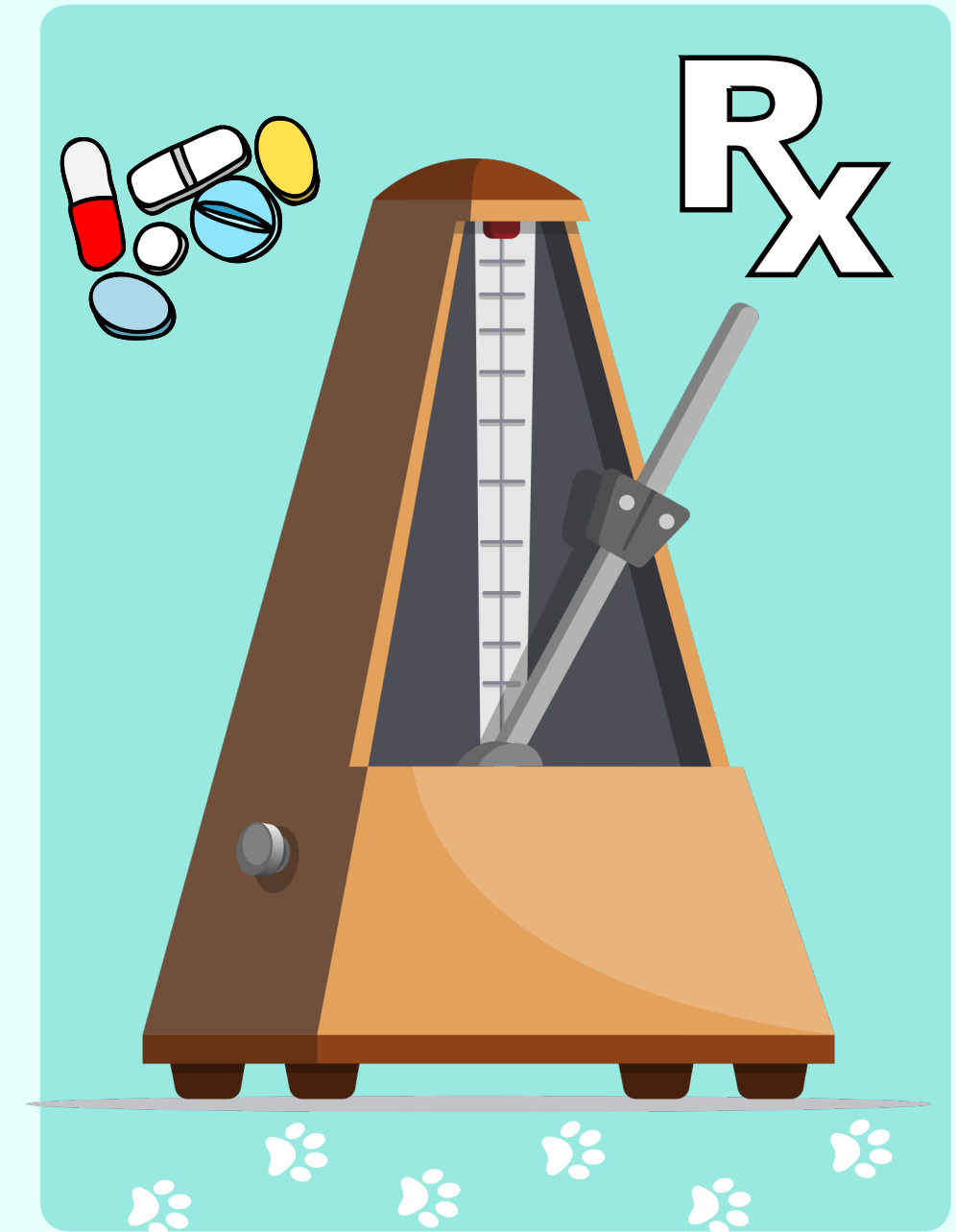
- Monitoring - every 4-8 weeks
 - Lab work: CBC, chem, UA, UPC
 - Blood pressure
- Tumour may not reduce in size
- Do not use label dose of 3.25 mg/kg
- Careful with concurrent NSAIDs, prednisone
 - Alternating days
- Side effects resolve if d/c
- May need to tweak dose & provide supportive care



Oncology care in GP

METRONOMIC CHEMOTHERAPY

- Low dose, daily medications given orally
 - Chem o drug + NSAID
 - Cyclophosphamide or chlorambucil
- Affect tumor endothelium
- Alters immune system
- Reduce Treg
 - Increased during cancer
 - Tregs help tumors survive
 - Contribute to immune suppression

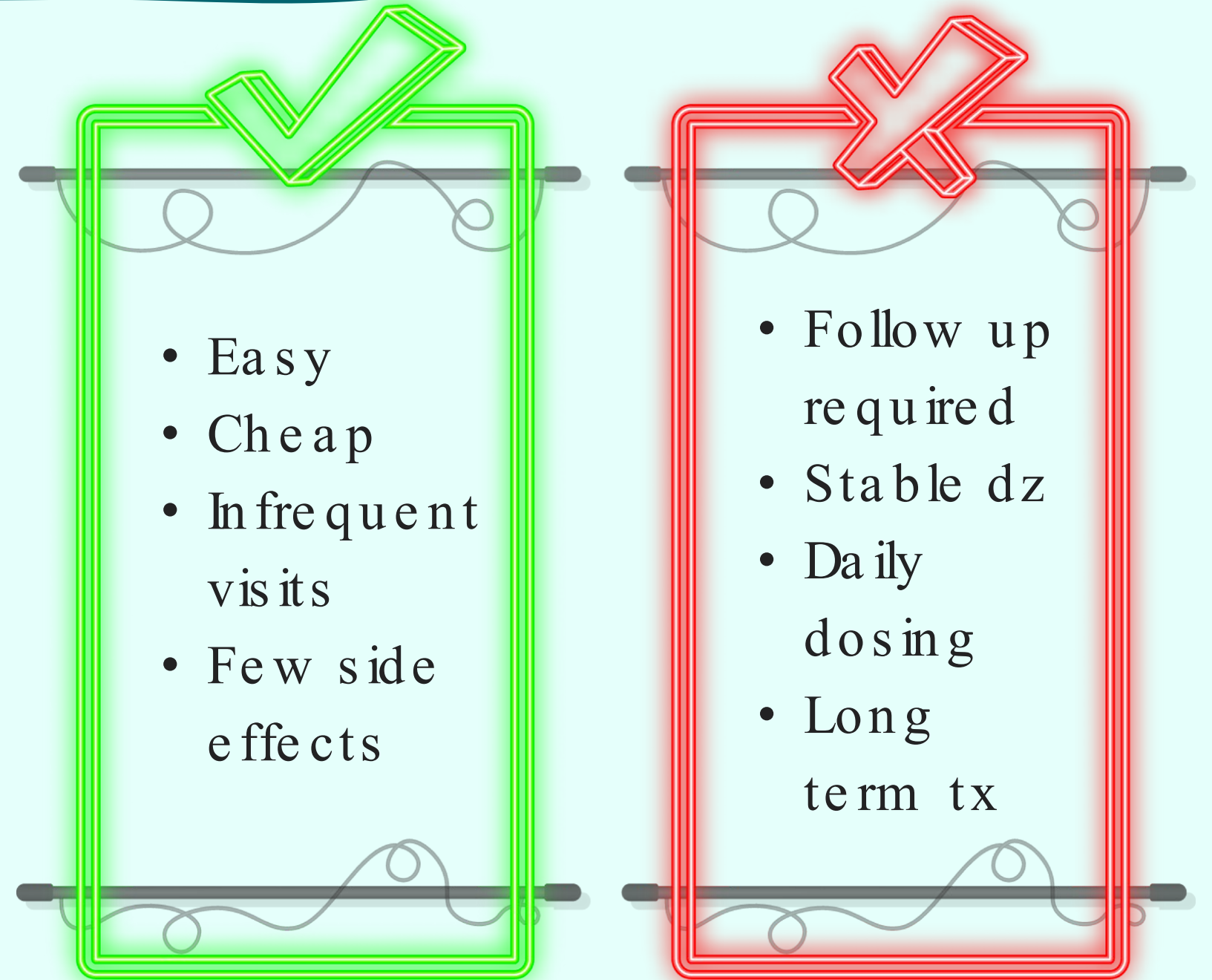


METRONOMIC CHEMOTHERAPY

- Many indications
 - TCC
 - Primary lung tumors
 - Narrowly excised STS
 - Oral tumors
 - Hemangiosarcoma

Watch outs

- Caution with bodily fluids
- Bone marrow suppression
 - Platelets
- Sterile cystitis from cyclophosphamide
 - Use chlorambucil
- Tumor not likely to shrink



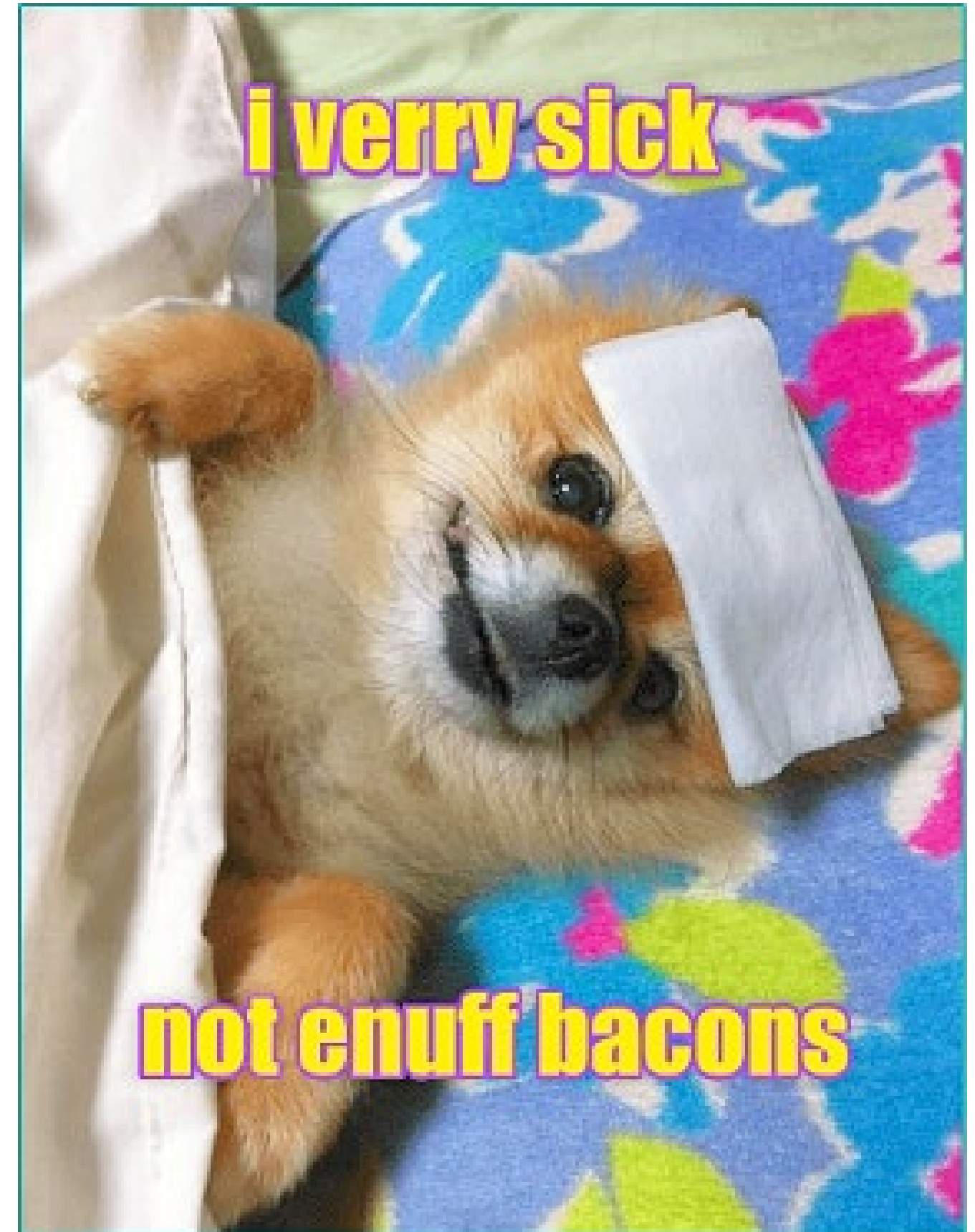
Monitoring cancer patients in GP

POST-CHEMOTHERAPY CBC

- Checking for WBC nadir
- Typically occurs 7 -10 days after tx
 - Exception is carboplatin
 - 14-21 days
- Body weight, temperature, CBC

Watch outs

- Review CBC results!
- Neutrophils <750-1000
 - **NEED ANTIBIOTICS**
 - Fluoroquinolone
 - 5 days



How can we make oncology care better?



Advanced primary level care

WORK WITH AN ONCOLOGIST VIRTUALLY

- No local oncologist
- Booked too far out
- You don't work well together
- Your clients trust YOU
- Oral therapies
- Options for almost everything
- Friendly, supportive collaboration

“you are:”
NOT ALONE
• in this.



lotuspetoncology.com

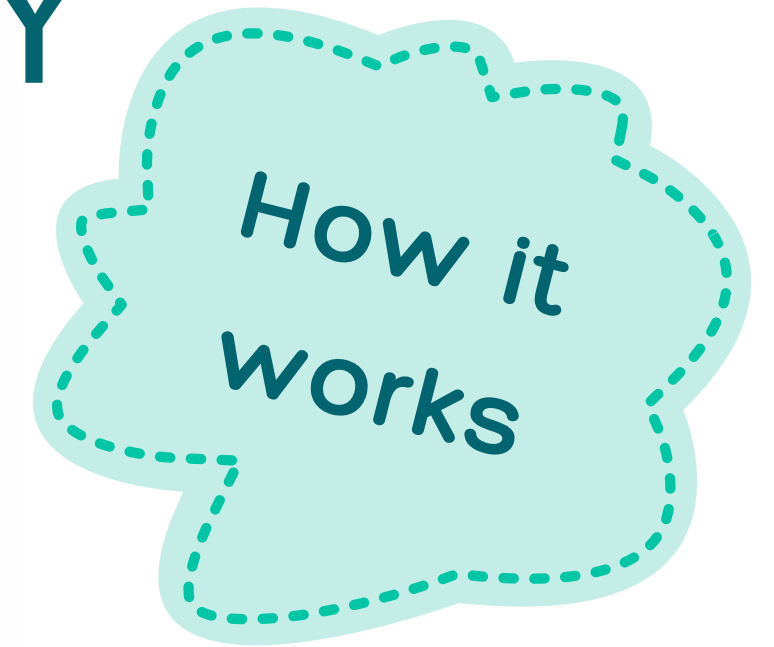


Working together

- Client education
 - Expectations
 - Set clients up for referral
 - Cost
 - Commitment
 - Side effects of tx
- Client goals
 - Go down swinging
 - Palliative care
- Comorbidities
- Mythbusting
- Patient personality



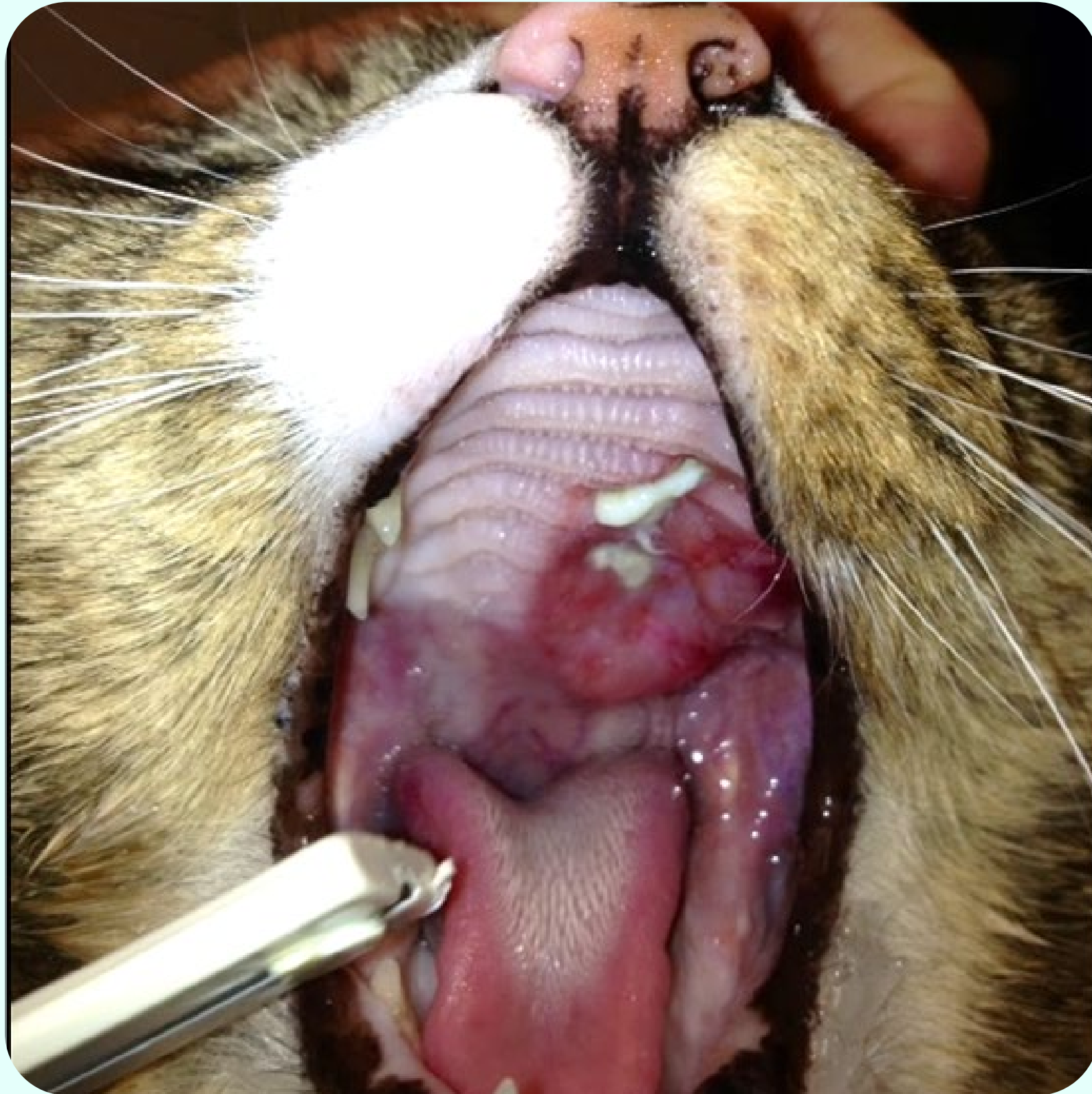
LOTUS PET ONCOLOGY



- Schedule online at lotuspetoncology.com
- Payment at time of scheduling (\$300)
- Zoom link provided
- Records requested and reviewed prior to consult
- Meet at scheduled time
 - Myself, pet owner, +/- primary care vet
- Discuss options available
- Written report within 24 hours
- Detailed personalized care plan provided at an additional cost
 - Includes: chemotherapy protocols, drug dosages, watch outs, follow up appointments, etc
- Recheck, weekend, & emergency appointments available

CASE EXAMPLES



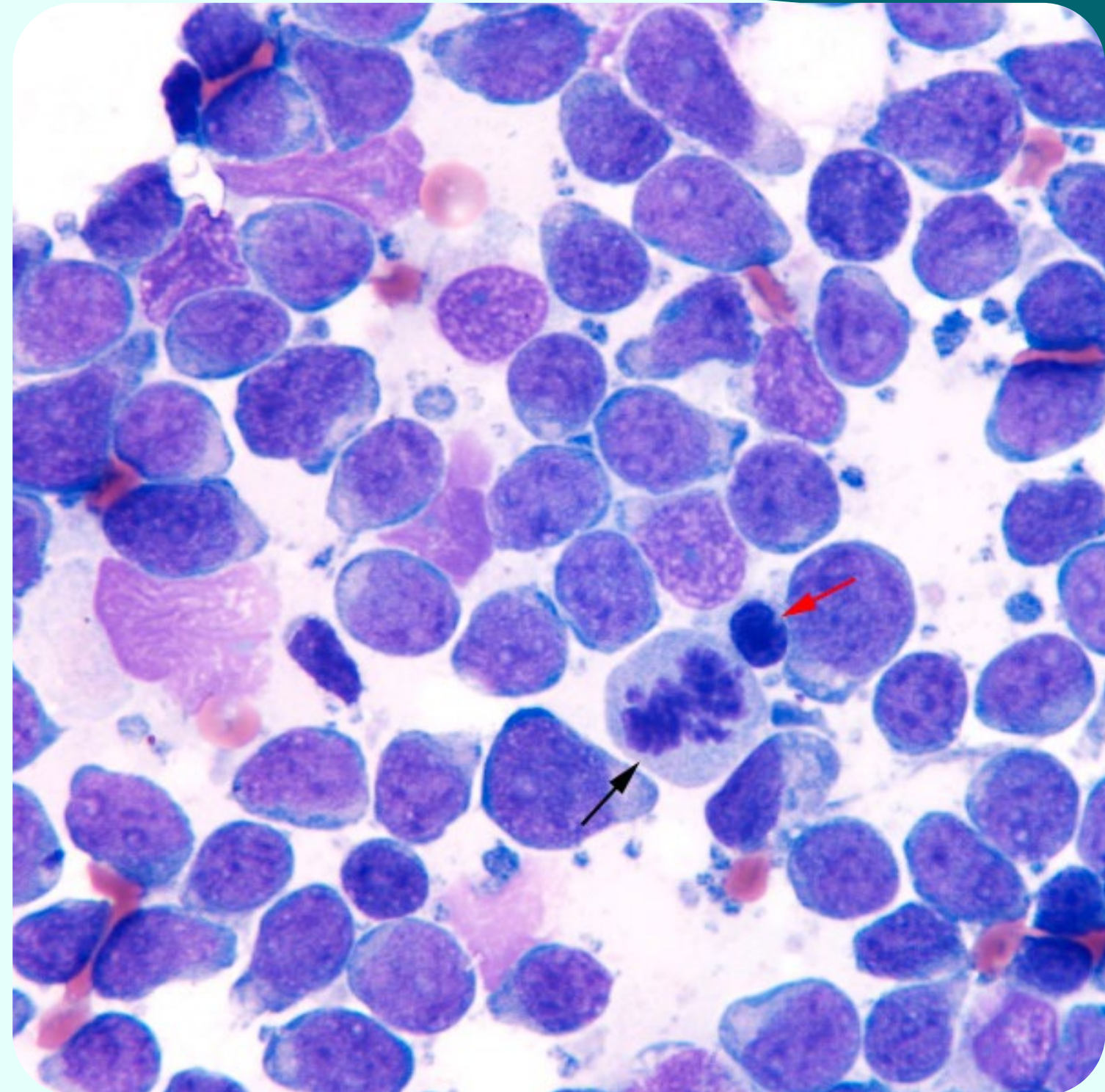


LILA

- 12 year FS DSH
- Clinical signs
 - Decreased appetite
 - Weight loss
 - Drooling
- PE
 - Ulcerated, necrotic mass on hard palate/maxilla
- DDX
 - Infection
 - Tumor: SCC, FSA, other

LILA

- Diagnostics
 - Establish a diagnosis
 - FNA or biopsy
- LYMPHOMA
- Now what?
 - Clients won't refer
 - Cat's miserable
- Options
 - Prednisolone
 - Chem o
 - CHOP, lomustine
 - Radiation
 - Need to stage first



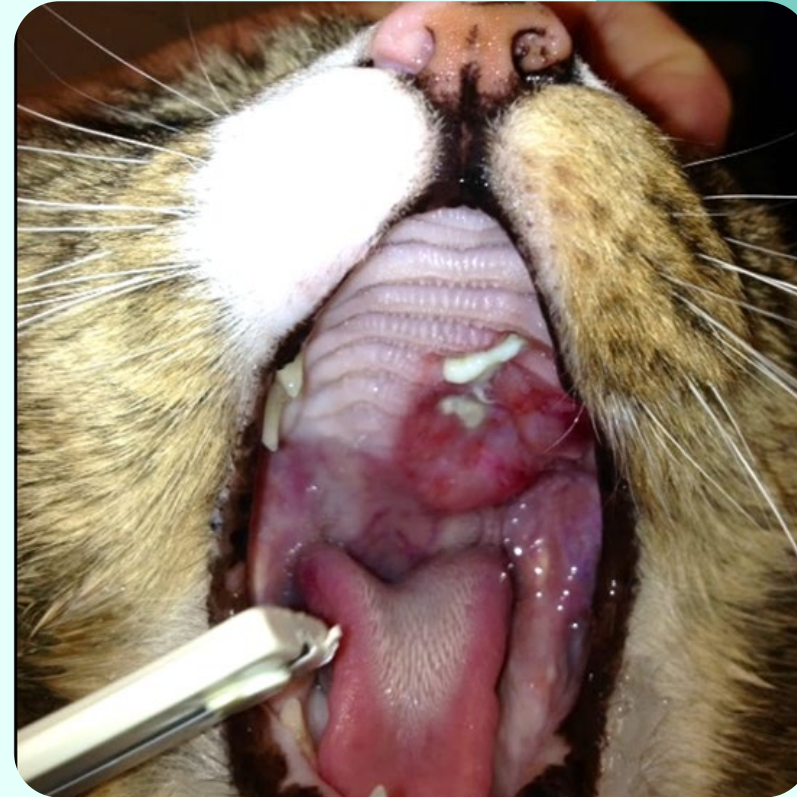
LILA

- Easiest option
- Lowest risk



LOMUSTINE

- Oral
- Cheap
- Standard dosing in cats
- Q3 weeks

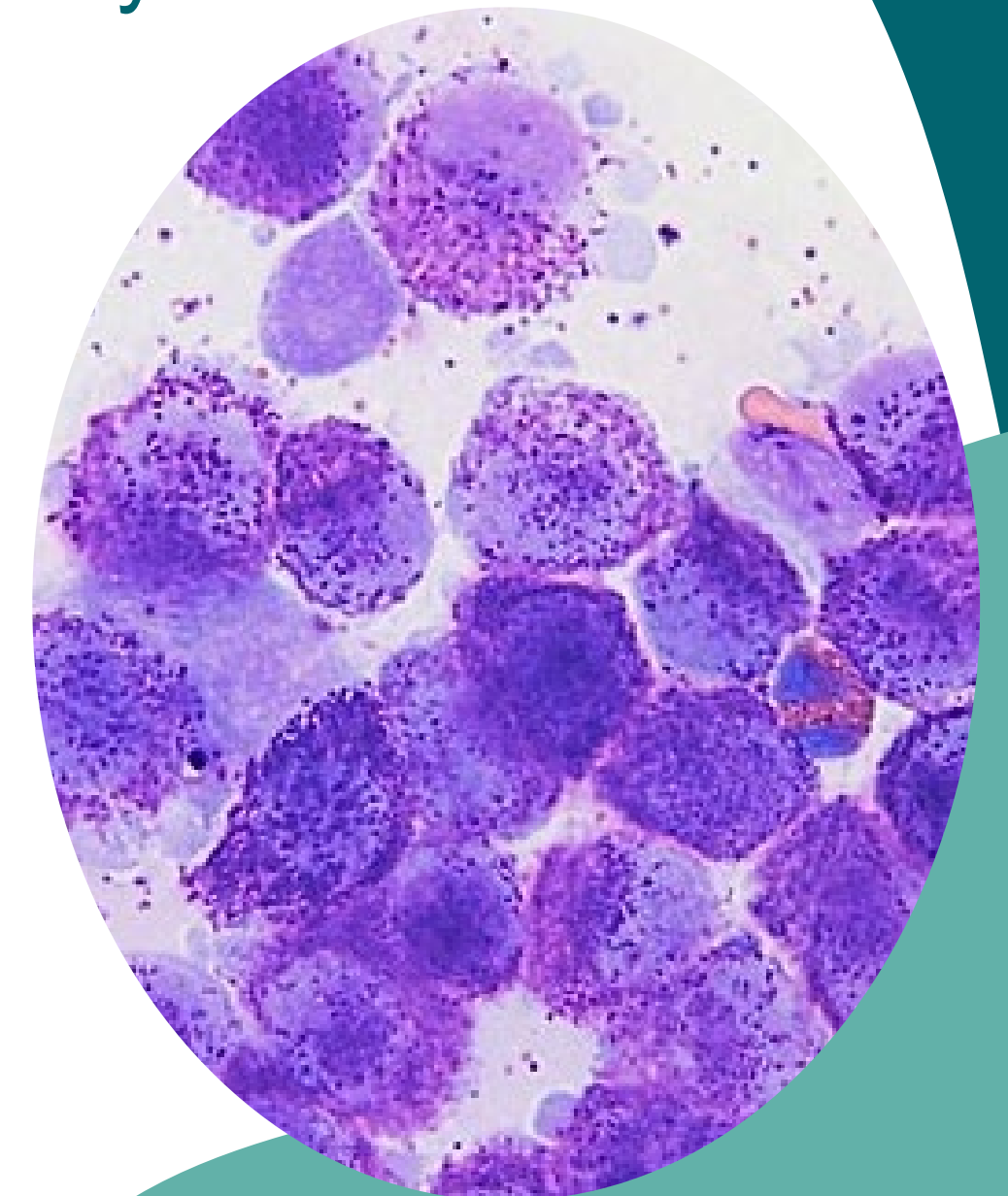


YOU Can
Do THIS



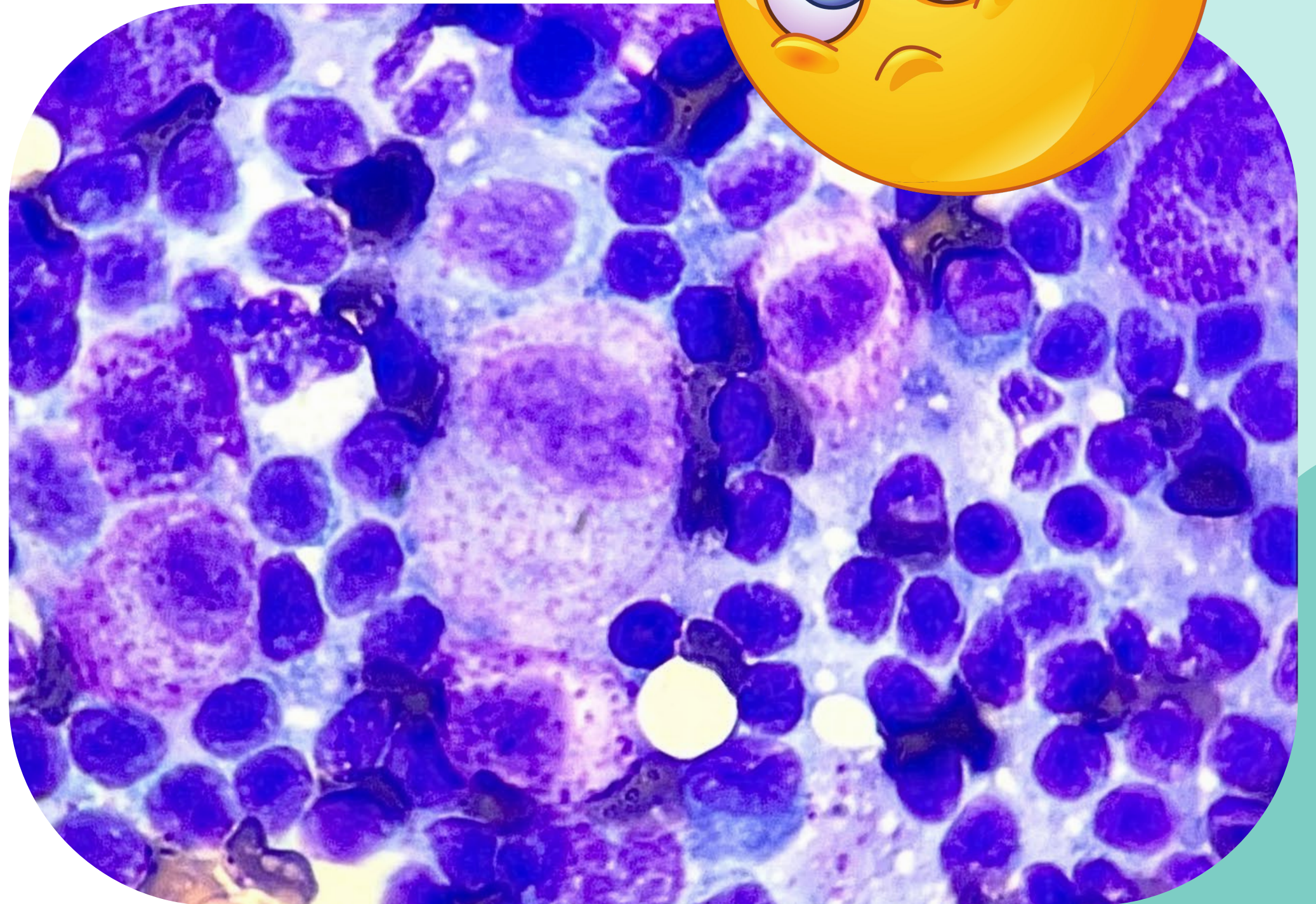
CHLOE

- 10 yr FS Golden Retriever
- Recently adopted
- Mass on LH paw for 1 year
- No symptoms
- DDX
 - MCT, STS
- Initial diagnostics
 - FNA mass



CHLOE

- Potential treatment options
 - Surgery
 - Radiation therapy
 - Stelfonta
 - Chem o
- Additional diagnostics
 - FNA polite a l l y m p h n o d e
 - AUS



CHLOE

- Now things are complicated
 - No easy fix
- Aggressive option
 - Remove mass and LN
 - Downstage
 - Prednisone
 - Intralesional triamcinolone (1mg/cm of tumor)
 - Poor healing, no margin
 - Radiation therapy afterwards
 - Chemo
- "Conservative"
 - Prednisone
 - Chemo
 - Radiation





LOTUS
PET ONCOLOGY

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