

GI-ONCOLOGY

“NO GUTS, NO GLORY”

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GASTROINTESTINAL ONCOLOGY

- Oral
- Salivary glands
- Esophagus
- Stomach
- Intestine (small & large)
- Rectum
- Liver
- Bile ducts/Gall bladder
- Pancreas
- Perianal
- Anal sac

No specific cancer-signs!!

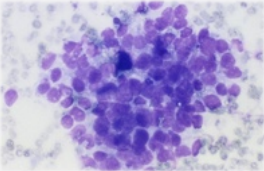
Signs are determined by their (anatomical) location and the cancer's distribution pattern (solid vs diffuse)

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WHAT ARE THE OPTIONS?

3

SAM

JRT FN 9Y
Non-painful mass near the left ear

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SALIVARY GLAND NEOPLASIA

- Rare neoplasia
- Older dogs (11 Y)
- No breed or sex predilection

- (adeno)carcinoma
- Most common:
 - mandibular/sublingual (monostomatic)
 - parotid

- Locally invasive, moderately metastatic
- Regional: D: 17/29%, C: 39%
- Distant: D: ± 8%, C: 16%



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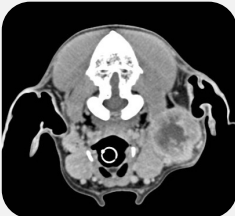
SALIVARY GLAND NEOPLASIA

Signs

- firm, non-painful salivary gland mass (80%)
- less common (<5%)
 - salivary mucocele/ranula
 - halitosis
 - dysphagia
 - exophthalmos

Diagnosis

- Cytology
- Imaging (CT-scan > radiographs/US)



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SALIVARY GLAND NEOPLASIA

Therapy

- Sialoadenectomy $\pm$ lymphadenectomy
- $\pm$ adjuvant radiotherapy
- No effective chemotherapy
- NSAID's? Palladia?

Prognosis

- MST 550d (Hammer 2001, 24 dogs, 30 cats)
- Stage I/II > III/IV (dogs, not cats)
- MST 1,186d (Bush 2023, 72 dogs)
- N+ (248 vs 2340d)



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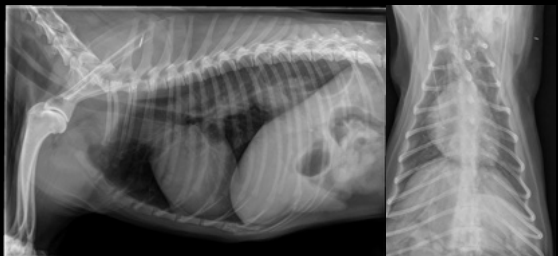
JACK

- Miniature Poodle M 7Y
- Eats differently
- Mild, but progressive weight loss
- Intermittent vomiting / regurgitation

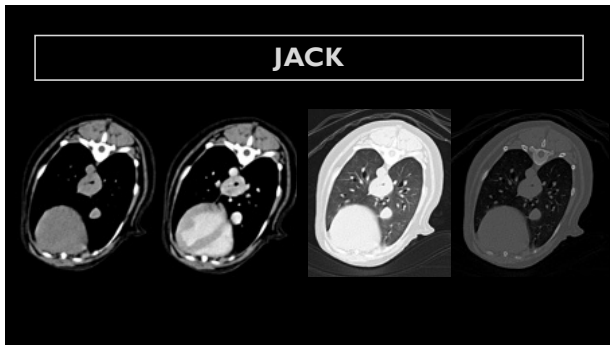


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JACK



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ESOPHAGEAL NEOPLASIA

- Rare $\pm 0.5\%$ of all canine neoplasia
- Most commonly malignant tumors
 - carcinomas (incl. SCC), sarcomas
- benign: polyps, plasmacytoma, leiomyoma, fibroma
- Usually distal esophagus
- Mostly older dogs, no breed- or sex predilection
- Cause?
 - Carcinoma: unknown (gastric acid?)
 - Sarcoma: *Spirocerca lupi*

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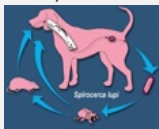
ESOPHAGEAL NEOPLASIA

<p>General signs esophageal diseases</p> <ul style="list-style-type: none"> • Regurgitation (vomiting) • Dysphagia • Pain on swallowing • Weight loss • Salivation • Dyspnea/Coughing 	<p>In case of <i>Spirocerca lupi</i> also</p> <ul style="list-style-type: none"> • Seizures (aberrant migration parasites) • Spondylitis thoracic vertebrae ($\frac{1}{3}$ of patients) • Hypertrophic osteoarthropathy • Sudden death (aortic aneurysm)
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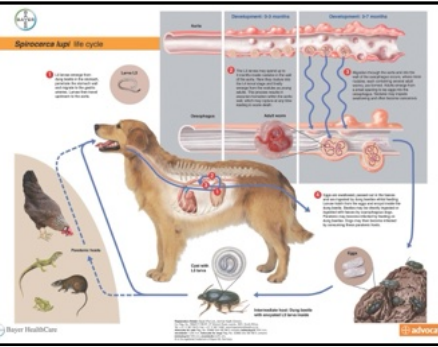
SPIROCERCA LUPI

- Nematode
- Mediterranean sea, Africa, south-eastern USA
- Vector: dung beetle, paratenic hosts: lizards, small rodents
- Invade gastric wall, via distal aorta into esophagus
- Cycle: 6M-2Y
- Mostly sarcomas



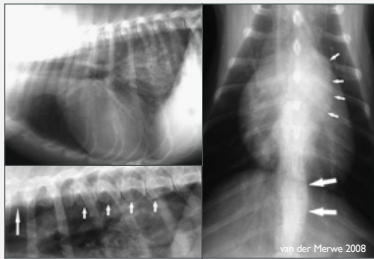
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Spirocerca lupi life cycle



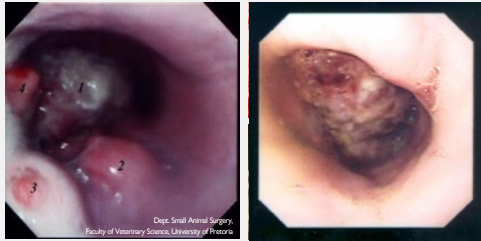
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DIAGNOSIS SPIROCERCA LUPI



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DIAGNOSIS SPIROCERCA LUPI



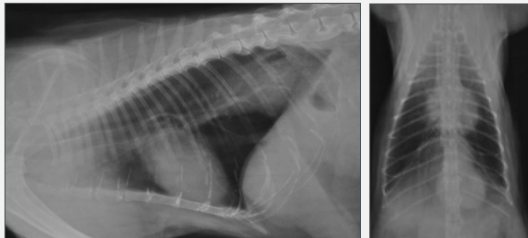
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ESOPHAGEAL NEOPLASIA

- Surgery is treatment of choice
 - Intrathoracic difficult, benign tumors in distal esophagus/cardia may be approached via stomach
 - Chemotherapy and radiotherapy are unsuccessful
- In case of *S. lupi*:
 - Adults: ivermectin / doramectin (off-label, registered for cattle)
 - Non-neoplastic lesions will regress spontaneously, sarcomas require surgery
 - Prevention: ingestion vector/paratenic host, monthly milbemycin (Milbemax®) or moxidectin/imidacloprid (Advocate®)
- Prognosis
 - Generally poor, benign better than malignant

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DSH FN 13Y ANOREXIA, REGURGITATION



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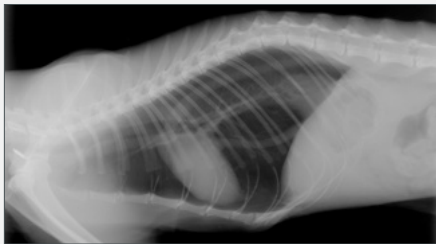
FELINE ESOPHAGAL NEOPLASIA



- Rare, mostly SCC (sarcoma, plasmacytoma)
- Progressive, vague $\pm$ esophageal signs
- Diagnosis
 - Radiography (ddx pulmonary tumor)
 - CT-scan
 - Endoscopy
- Often metastasize
- Therapy
 - Surgery if feasible
 - Superficial SCC photodynamic therapy?

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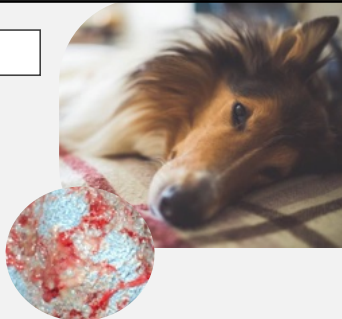
BE CAREFUL!!



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MAY

- Scottish collie FN 12Y
- Progressive weight loss
- Gradual reduction in appetite
- Progressive vomiting, mostly slime
 - Initially response to omeprazole
- Recently fresh blood noted



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MAY

- Physical exam unremarkable, except BCS 3/9
- Laboratory analysis:
 - Milde anemia (Ht 37%)
 - Low-normal total protein and albumin (54/26 g/L)
 - Low folate and normal cobalamin (12 nmol/L / 460 pmol/L)

Chronic gastritis vs gastric carcinoma?

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GASTRIC NEOPLASIA

- Rare, 1-2% of all malignant canine neoplasms
- Older dogs (mean 10 years)
- M > F
- All breeds, but more frequently
 - Belgian shepherds (Malinois), Scottish collie, Chow chow, Staffordshire bull terrier

Pathology

- adenocarcinoma (47-72%), leiomyoma, lymphoma
- Location: pyloric region (50%), greater curvature, incisura angularis
- Metastasis: ±75%
 - gastric lymph nodes, omentum, liver, duodenum, pancreas, spleen, esophagus, adrenal glands, lungs

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GASTRIC NEOPLASIA

Signs

- decreased appetite, vomiting, drooling, melena, weight loss

Physical exam

- Poor BCS (<4/9)
- Abdominal pain/tenderness, **never** mass

Clinical pathology

- GI blood loss (low PCV, low TP/alb)
- Carcinoma vs chronic gastritis
 - Lower folate, normal cobalamin, higher CRP

Diagnostic imaging

Endoscopy

Seim-Wikse 2019

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GASTRIC CARCINOMA



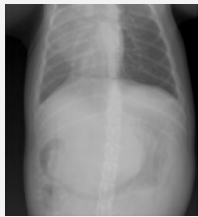
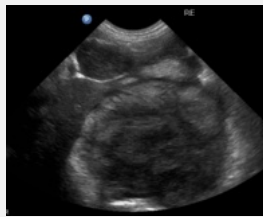
Antrum polyp



Apple core sign
(carcinoma)

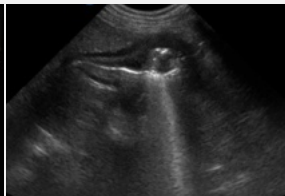
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GASTRIC LYMPHOMA



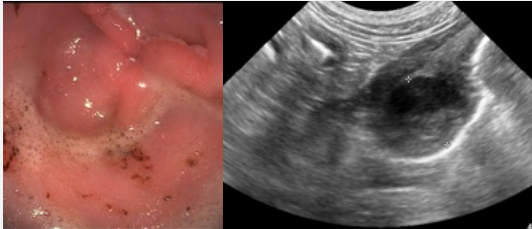
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GASTRIC ULCERATION (GASTRIC CARCINOMA)



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GASTRIC MASS (GASTRIC PLASMACYTOMA)



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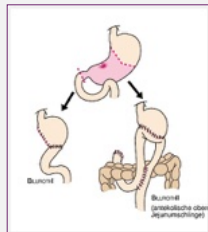
GASTRIC NEOPLASIA

Therapy

- Surgery (Billroth-type procedures)
 - adenocarcinoma: difficult
 - leiomyoma/benign masses: potentially curative
- Chemotherapy: lymphoma

Prognosis

- Adenocarcinoma: poor; 76% have metastases
- Leiomyo(sarco)ma, benign masses: good
- Lymphoma (often B-cell): better than SI



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MOOS

- Boxer dog MN 8Y
- For 2-3 weeks
 - Lethargy
 - Reduced appetite
 - Mild weight loss

Physical examination

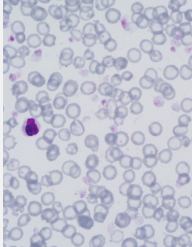
- Pale mucous membranes, mild tachycardia
- Melena?
- Abdominal palpation: no abnormalities



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MOOS

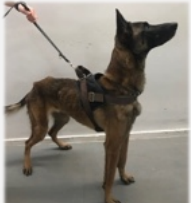
Hematocrit	32	0.42 – 0.61%
Reticulocytes	0.7	<1.5%
CHr	0.93	1.43 – 1.71 fol
Leukocytes	21.3	4.5 - 14.6 G/L
Thrombocytes	687	144 – 60 G/L
Urea	18.3	3.0 – 12.5 mmol/L
Creatinine	83	50 - 129 µmol/L
Total Protein	54	
Albumin	23	26 – 37 g/L
ALP	102	<89 IU/L
ALAT	78	<70 IU/L
Glucose	2.4	4.2 – 5.8 mmol/L



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ROY

- Belgian shepherd (Malinois) MN 7Y
- Poor appetite, severe weight loss



Physical examination

- BCS 2/9, no other abnormalities

Diagnostic workup

- Normal fecal exam, regular blood work and urinalysis

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INTESTINAL NEOPLASIA

Signs	Small intestine	Large intestine
Aspecific – reduced appetite, lethargy	+	+
Obstruction (focal neoplasia) – vomiting, diarrhea	+	-
Malabsorption/Maldigestion (diffuse neoplasia) – weight loss, diarrhea	+	-
Tenesmus	-	+
Blood	melena	frank blood

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INTESTINAL NEOPLASIA

- Rare tumors (3%), most common non-oral GI-tumor
- Small intestine > caecum > colon
- Mostly malignant ($\pm 90\%$)
 - (adeno)carcinoma, leiomyosarcoma/GIST, lymphoma
 - Rare: benign tumors (adenoma/leiomyoma), MCT, plasmacytoma

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SI NEOPLASIA - CLINICAL PATHOLOGY

Blood analysis

- Usually non-specific, variable degrees of anemia, leukocytosis, hypoproteinemia
- More "specific"
 - (Leukemia) lymphoma
 - Hypoglycemia mesenchymal
 - Hypocobalaminemia lymphoma

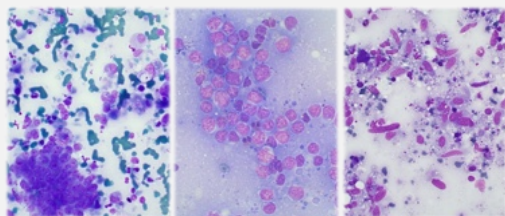
Cytology

- Diffuse lesion (thickened bowel): often unrewarding
- Discrete lesion: often diagnostic
- Impression smears better than FNAB
- Lymphoma > carcinoma > leiomyo(sarco)ma

Bonfanti et al., 2006

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INTESTINAL NEOPLASIA - CYTOLOGY



Cytology: 70% agreement with histology

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SI NEOPLASIA - RADIOGRAPHY

Routine abdominal radiographs

Abdominal mass, obstruction, or persistent irregularity of bowel appearance in:

- 25% of carcinomas
- 60% of mesenchymal tumors

Contrast radiography

- Intestinal mass identified in 57% of dogs with non-lymphoid intestinal tumors

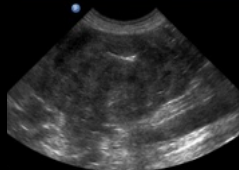
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SI NEOPLASIA - ULTRASONOGRAPHY

- Non-lymphoid: mass in 87% (13/15)
- Intestinal lymphoma: often nonspecific
- Can be normal in up to 1/4 cases

Intestinal neoplasia (vs enteritis)

- loss of intestinal wall layering (99% vs 11%)
- increased intestinal wall thickness (15 mm vs 6 mm)
- focal intestinal involvement (98% vs 28%)
- thickened lymph node (median 1.9cm vs 1.0cm)



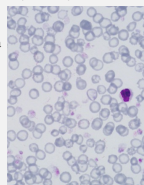
Pennick et al., 2003

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REMMEL

Hematocrit	32	0.42 – 0.61%
Reticulocytes	0.7	<1.5%
CHr	0.93	1.43 – 1.71 fol
Leukocytes	21.3	4.5 – 14.6 G/L
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Urea	18.3	3.0 – 12.5 mmol/L
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Total Protein	54	
Albumin	23	26 – 37 g/L
ALP	102	<89 IU/L
ALAT	78	<70 IU/L
Glucose	2.4	4.2 – 5.8 mmol/L

- Moderate, non-regenerative anemia
- Hypochromasia
- Thrombocytosis (reactive)
- PLE
- Uremia
- Hypoglycemia



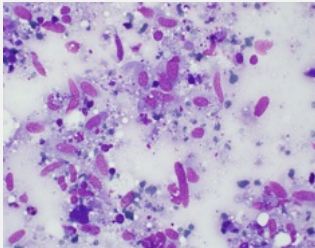
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HYPOGLYCEMIA (FASTING GLUCOSE LEVELS <4.0 MMOL/L)

- Prolonged storage, laboratory error
- **Hepatic insufficiency** (PSS, cirrhosis)
- Endocrine
 - (partial) hypoadrenocorticism
 - Hypopituitarism
- **Idiopathic:** neonatal, juvenile (toy breeds), hunting dog (exercise related)
- Sepsis
- **Drugs:** insulin, sulfonylurea, salicylates, β -blockers, ethanol, xylitol
- Renal failure
- Glycogen storage diseases
- Prolonged starvation
- Neoplastic
 - Insulinoma
- **Paraneoplastic**
 - hepatocellular tumor, leiomyoma (uterine, intestinal) (IGF-II)
 - Hemangiosarcoma, polycythemia, leukemia (increased use)
 - Exocrine pancreatic neoplasia

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LEIMYO(SARCO)MA/GIST



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INTESTINAL TUMOR - THERAPY

Surgery = treatment of choice

- Recommended margin 4-8 cm on all sides
- All sides = oral, aboral and mesenteric



Medical therapy

- Adenocarcinoma:
 - no benefit of adjuvant chemotherapy
 - Adjuvant toceranib?
- GISTs: humans TKIs, dogs?
- Lymphoma: chemotherapy
- MCT: TKIs?

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INTESTINAL TUMOR - MARGINS

Is 4-8 cm margin really necessary?

DOG (n = 27)	3 cm	2 cm	1 cm	Ln+
Adenocarcinoma (n=10)	10/10	9/10	6/10	2/4
Leiomyosarcoma (n=11)	11/11	11/11	10/11	0/1
Lymphoma (n=6)	1/6	1/6	1/6	2/3

CAT (n = 10)	Local control	Ln+	Cured
Lymphoma (n = 17)	None	8/10	0/17
Adenocarcinoma (n=9)	7/9 @ 4cm	4/6	7/9
Sarcoma (n = 2)	100% @ 4cm	0/2	2/2
Mast cell tumor (n = 2)	100% @ 5cm	2/2	0/2

Complete excision
 • Carc/Sarc: 100%
 • 3 cm
 • 2 cm 95%
 • ML: never

Complete excision
 • Carc/Sarc 4 cm
 • MCT: 5 cm
 • ML: never

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REMMEL - SURGERY



Cecal Leiomyoma

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REMMEL - SURGERY



Cecal Leiomyoma

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JEJUNAL LEIOMYOMA



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MESENCHYMAL TUMOR

- Leiomyo(sarco)ma, most common mesenchymal tumor
 - mature smooth muscle cells
 - LI > cecum > SI
- Gastrointestinal Stromal Tumors (GIST)
 - subset mesenchymal tumors
 - c-kit+ (CD117)
 - cecum > SI
- Older dogs
 - SI: 9Y (4-13)
 - Cecum: 10Y (6-14)
 - M > F (60 : 40)
 - Breeds: Boxer, JRT, Golden retriever
 - Metastatic rate: 38%-54%
 - liver, spleen, lungs, kidneys, diaphragm

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LEIOMYO(SARCO)MA

- | | |
|---|---|
| <p><u>SI and Cecum</u></p> <ul style="list-style-type: none"> • Common (≥50%):
lethargy, anorexia, vomiting • Less common (≤ 20%):
diarrhea, melena, abdominal pain • Palpable abdominal mass: ± 70% | <p><u>SI vs Cecum</u></p> <ul style="list-style-type: none"> • SI > Cecum <ul style="list-style-type: none"> • weight loss (25 vs 4%) • anemia (40 vs 20%) • Cecum > SI: <ul style="list-style-type: none"> • perforation/peritonitis (30 vs 4%) • hypoglycemia (8 vs 0%) |
|---|---|
- Paraneoplastic syndromes
- Hypoglycemia (cecum/GIST)
 - Erythrocytosis (ectopic EPO)
 - Nephrogenic diabetes insipidus

Mass et al, 2007

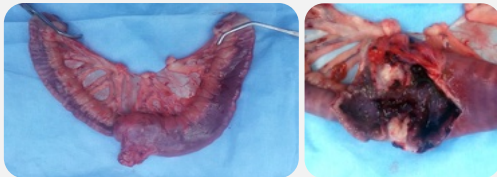
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SURGERY – SI ADENOCARCINOMA



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SURGERY – SI CARCINOMA



Median OST 544 days
I- and 2-year survival rates: 60% and 36%

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SI CARCINOMA

- Older dogs, 9-10Y (1-14)
- All breeds, commonly reported in German shepherds, collies,
- Small intestine > large intestine
- $\pm 50\%$ palpable
- Metastatic rate 40-70%
 - regional lymph nodes, mesentery, liver, lungs rare
- Different histologic forms:
 - acinic, papillary, solid and mucinous
- 2 growth patterns:
 - intraluminal vs circular (scirrhous)
- Often APC-gene mutations incl. loss of β -catenin and E-cadherin
- $\pm 50\%$ show COX-2 expression

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ROY

- Belgian shepherd (Malinois) MN 7Y
- Poor appetite, severe weight loss

Physical examination

- BCS 2/9, no other abnormalities

Diagnostic workup

- Normal fecal exam, regular blood work and urinalysis




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ROY

- Clinical suspicion of MA/MD
- Additional tests
 - Low cobalamin and folate levels
 - Normal cPLI

MA/MD, no EPI, normal abdominal US ⇒ upper GI-endoscopy




MA/MD = malabsorption/maldigestion

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INTESTINAL LYMPHOMA




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SMALL INTESTINAL HIGH-GRADE LYMPHOMA

- Uncommon presentation of canine lymphoma: $\pm 7\%$ of cases
- Affects all breeds
 - Shar-Pei, Boxer, Labrador retriever overrepresented
- Mostly transmural, diffuse disease
- Mostly high-grade T-cell (63-78%)

Signs

- Nonspecific GI-signs, but often rapidly progressive

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SMALL INTESTINAL HIGH-GRADE LYMPHOMA

Diagnosis

- Laboratory analysis: nonspecific
 - Monocytosis (73%), neutrophilia (63%), leukocytosis (43%), anemia (33%)
 - PLE (80%), hypoalbuminemia, hypocalcemia
 - Paraneoplastic eosinophilia in GI T-cell lymphoma

Abdominal US

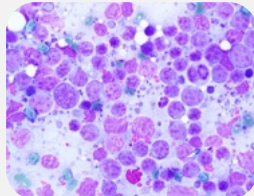
- Focal, segmental, or diffuse intestinal abnormalities
- Mesenteric lymphadenopathy, hepatosplenomegaly
- May be nonspecific, even normal in $\pm 1/4$ of cases

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SMALL INTESTINAL HIGH-GRADE LYMPHOMA

Additional diagnostics

- Cytology
- Histology
 - Biopsies: endoscopy vs laparotomy
 - IHC and/or PARR may be indicated



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INTESTINAL LYMPHOMA

Treatment

- Surgery only indicated for preventing complications, incl. septic (pre)perforation, obstruction
- Chemotherapy (L-CHOP, CCNU)

Prognosis

- Poor

Location	Survival (days)
stomach	17
small intestine	13
large intestine	61
>1 site	4,5

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FELINE INTESTINAL TUMORS

Tumor type	S.I.	L.I.	P
Polyp/papilloma	0	16	< 0.001
Adenocarcinoma	45	98	< 0.001
Carcinoma	15	11	0.862
SCC	3	3	N/A
Lymphoma	119	31	< 0.001
Sarcoma	15	2	0.008
Other sarcomas	5	11	N/A

Risotto et al., 2011

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FELINE INTESTINAL PSEUDOTUMORS

Feline non-neoplastic abdominal masses

- Granuloma
- FIP
- (atypical) Mycobacteria
- Fungal
- Feline gastrointestinal eosinophilic sclerosing fibroplasia (FGESF)

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GERONIMO - DSH MC 7½Y

- Since 3 weeks less active and loss of appetite
- Weight loss (3.7 → 3.4 kg / ±10%)
- Vomited 2x, no diarrhea
- BCS 4/9
- Abdominal mass



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MR. GREY – DSH MC 11½Y

- History: years of intermittent SI-diarrhea
- Now:
 - Reduced appetite
 - Weight loss (3.6 → 2.8 kg / ±20%)
 - Vomits 1x/week for last 4 months
- Diagnostics: blood, fecal, urinalysis
 - mild anemia, low TP/Alb, low cobalamin
- Tx: antibiotics, hypoallergenic diet
- BCS 2/9 - MCS 4/4
- No thyroid or abdominal mass



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GERONIMO - DSH MC 7½Y



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FELINE INTESTINAL LYMPHOMA

1

2

3

4

1. Reactive

2. LG

3. HG

4. LGL

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HIGH GRADE ALIMENTARY LYMPHOMA

Surgery - limited role

→ Lymphoma is diffuse intestinal disease

- Surgery only: media ST 96 days

When is surgery indicated?

- (pre-)Perforative intestinal wall
- Septic peritonitis
- Mechanical obstruction?
- Diagnostics?

Chemotherapy - treatment of choice

Protocol	COP	L-CHOP	CCNU
Cases	27	21	32
CR (%)	19 (70)	NR	7 (22)
mDFP (d)	440	140	302
mOST (d)	486	280	108
References	Versaegh 2024	Zwaanen 1998	Rau 2017

- Prognostic: obtaining CR not B/T or anatomical location

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WHAT IF CHEMO DOESN'T WORK?

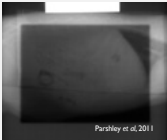
Whole abdomen radiation

- 2x 4 Gy on 2 consecutive days
- Toxicity: very mild

median OST

- 214d after RT
- 355d overall

Prognostic:: weight



Parsley et al. 2011



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WHAT IS IT? IBD OR LOW GRADE LYMPHOMA?



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COBALAMINE

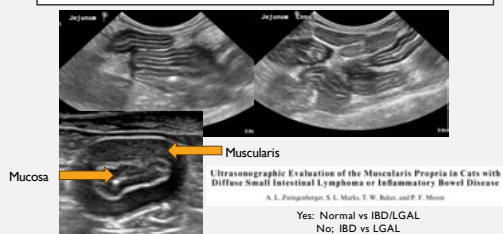
Diagnosis	Severe* (<150)	Mild-Moderate (150-304)	Normal (>305)
Lymphoma (n=39)	21 (54%)	6 (15%)	12 (31%)
Enteritis (n=28)	10 (36%)	2 (7%)	16 (57%)

Kook et al, 2012

* values below level of detection

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ULTRASONOGRAPHY



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WHY BOTHER?

Percent survival

Time (days)

Enteritis

LGAL

Sabatini et al. 2016

Warning
Dangerous substance

Chlorambucil = alkylating agent (IARC class I)
Risks involved for both animal and owner
Costs (medication, additional check-ups)

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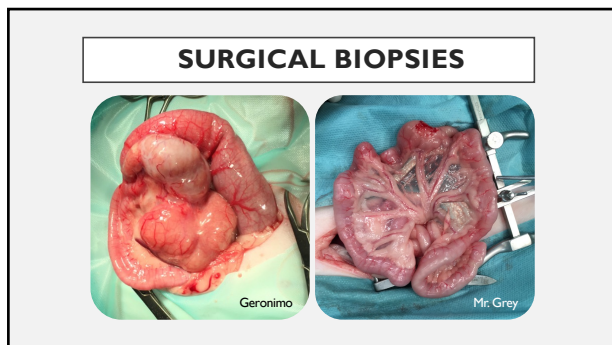
CYTOLOGY

Two microscopic images of cytology smears showing numerous purple-stained cells, likely lymphocytes, on a light background.

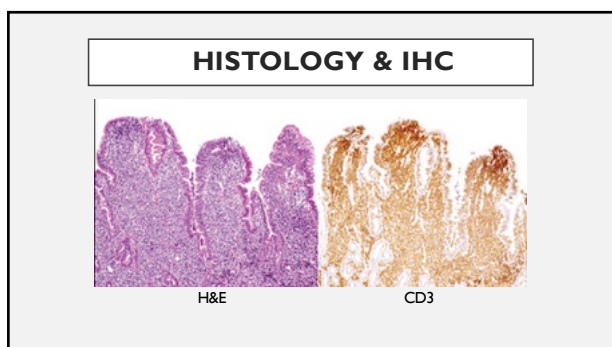
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Biopsy procedure	 Endoscopy	 Laparoscopy	 Laparotomy
Invasive	-	±	+
Access to GI-tract	Stomach, duodenum, colon ± ileum, not jejunum	entire GI-tract (biopsy mesenteric jejunum)	entire GI-tract
Other abdominal organs	-	+	+
Type of biopsy	partial thickness ((sub)mucosa)	full-thickness	full-thickness
Biopsy quality	variable	high, limited number	High, multiple samples
Delay in start therapy	-	±	+

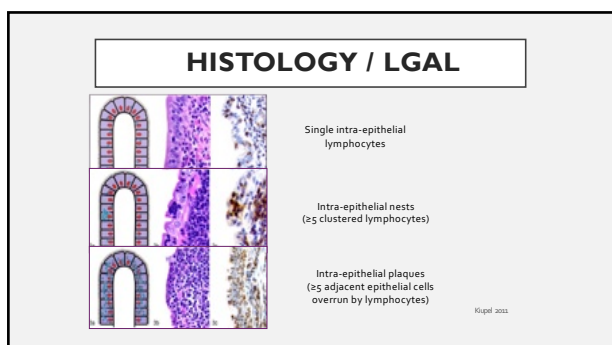
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THE CAT PARR

Overall

- Sensitivity ±70%,
- Specificity 90%

B cell lymphoma

- ±50% with only IGH-VDJ
- ±85% with multiple primer sets

T cell lymphoma

- 87-95%, butmaar
- cross-lineage re-arrangements and
- false-positives

Conclusion: PARR in the cat is more difficult than in the dog and sensitivity varies between laboratories

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PARR - LYMPHOMA

Diagnosis	Monoclonal	Oligoclonal	Polyclonal
Mucosal T-cell (EATCL-II)	66/84 (78%)	11/84 (13%)	7/84 (8%)
Transmural T-cell (EATCL-I)	15/19 (78%)	2/19 (11%)	2/19 (11%)
B-cell lymphoma*	9/18 (50%)	-	2/18 (11%)

* 7/18 (39%) pseudoclonal IgH

PARR not suitable for immunophenotyping
➢ ±9% EATCL-II show Cross Lineage Rearrangement
=> T-cell lymphoma with clonal IgH peak

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PARR – LYMPHOMA VS ENTERITIS

	Low-grade AL	LP-Enteritis
Monoclonal	19/22 (86%)	8/20 (40%)
Monoclonal peak on polyclonal background	0/22 (0%)	6/20 (30%)
Oligoclonal	0/22 (0%)	2/20 (10%)
Polyclonal with minor clones	1/22 (5%)	0/20 (0%)
Polyclonal	2/22 (9%)	4/20 (20%)

Freiche 2021

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LYMPHOMA TESTING - PARR

1. Histology, IHC and PARR can be false-positive in both IBD and healthy cats
2. PARR is moderately sensitive (60-70%) and highly specific (>90%)
 - Feline lymphoma has a relatively low prevalence in the healthy population
 - ↳ not suitable as a screening test due to high chance of false-positive
 - Doing only a PARR will not give the answer!
 - ↳ PARR should be interpreted in conjunction with clinical signs, histology and IHC ⇒ increases the prevalence, and the PPV

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CHEMOTHERAPIE - LGAL

- Chlorambucil + Prednisolon (1 mg/kg)
 - Leukeran: 2mg tablets, do **NOT** break tablets!!
- Different dosages Chlorambucil
 - A. C: 2 mg q24-72h
 - B. C: 15 mg/m² q24h 4 days every 3 weeks
 - C. C: 20 mg/m² q14d
- For a 3.5 kg cat (= 0.231 m²)
 - A. 2.0 mg/dose = 3.0 Tab/week = 18 Tab/6 weeks
 - B. 3.5 mg/dose = 7.0 Tab/round = 14 Tab/6 weeks
 - C. 4.6 mg/dose = 2.3 Tab/round = 7 Tab/6 weeks

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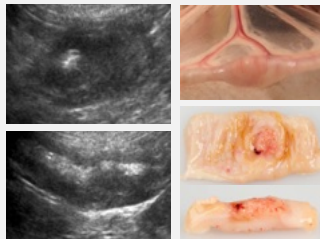
FELINE INTESTINAL ADENOCARCINOMA

- Vomiting, anorexia, weight loss/low BCS
- 50-85% have palpable mass

- High metastatic rate
- ±50% regional lymph nodes,
 - ±80% carcinomatosis (peritoneum)
 - Liver, lungs

- Therapy**
- Surgery ± adjuvant doxorubicin?

- Prognosis**
- Perioperative mortality 30-50%
 - No surgery: median ST 2-3W
 - Surgery: median ST: 9 / 12 / 15M



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JACK

- JRT, MN, 5Y
- Progressively (months) problems with defecation
- Recently a trace of fresh blood noted
- Yesterday owner noted a mass protruding from the anus following defecation
- No other (medical) problems



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COLORECTAL NEOPLASIA

- <10% of canine neoplasia
- Dog: mostly malignant
 - Malignant: adenocarcinoma (*in situ*), leiomyo(sarco)ma, lymphoma
- Benign: adenomatous polyps, plasmacytoma
- Pseudotumors: (eosinophilic) granuloma
- Low metastatic rate
- Cat: rarely benign

Signs

- *Mass effect*
 - tenesmus (intrapelvic mass)
 - tumor prolapse (rectal mass)
 - diarrhea (partial obstruction)
- *Invasion* $\Rightarrow$ hematochezia
 - rectal bleeding independent of defecation
 - uncommon in mesenchymal tumors
- **Less common signs**
 - weight loss (mostly with concurrent SI-disease)
 - vomiting (cat > dog)

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COLORECTAL NEOPLASIA

Physical examination

- mass (abdominal or rectal palpation)
- abdominal pain

Laboratory tests

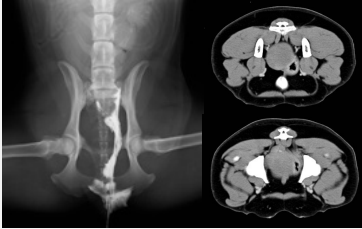
- non-specific; anemia, leukocytosis
- less common than in SI neoplasia

Diagnostic imaging

- *Radiography*
 - Plain: abdominal mass in $\pm$ 40% LI tumors
 - Contrast study
- *Ultrasonography*
 - Modality of choice for colon, not ideal for rectal masses

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DIAGNOSTIC IMAGING



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COLORECTAL NEOPLASIA

Endoscopy

- Recommended prior to treatment
- Size, location and distribution pattern (multifocal disease!!)
- Always biopsy!

Biopsy

- Cytology and histology can be false-negative
 - submucosal location of malignancy
 - ulceration and necrosis
- Can be difficult to assess malignancy on endoscopic biopsies



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COLORECTAL NEOPLASIA

Surgery

- Rectum: various approaches described; submucosal resection via transanal approach appears effective
- Resection >4 cm risk for fecal incontinence and incisional dehiscence
- Resection of distal 1.5 cm increases risk for fecal incontinence
- Prognosis: 75-80% 5Y-survival
- Colon: abdominal approach



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COLORECTAL NEOPLASIA

Chemotherapy

- Lymphoma (plasmacytoma?)
- No benefit for (adeno)carcinoma, leiomyosarcoma

Radiotherapy

Stenting

- Malignant non-resectable neoplasia



Cvlin 2011

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COLORECTAL ADENOCARCINOMA

- Most common large intestinal neoplasm
- Older dogs 8.5Y (2 - 14)
- Mostly male (60%-70%)
- Mid-to-distal rectum > large intestine
- Gross appearance
 - nodular, single or multiple ("cobble stone")
 - pedunculated (mid-to-distal rectum)
 - annular constriction (mid-rectum)
- Metastatic rate
 - variable (0-80%)
 - mesenteric lymph nodes, liver



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LUCKY

- Shih Tzu, MN, 10Y
- Routine geriatric work-up
 - Elevated liver enzymes
- Possible Pu/Pd
- Abdominal mass...
- US abdomen:
 - big liver mass, bilateral mildly enlarged adrenal glands



<https://es.123rf.com/>

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HEPATIC NEOPLASIA

Rare tumors:

- Dog: 0.6 - 1.5% of all tumors
- Cat: 1.5 - 2.9% of all tumors

Primary hepatic neoplasia ($\pm 25\%$)

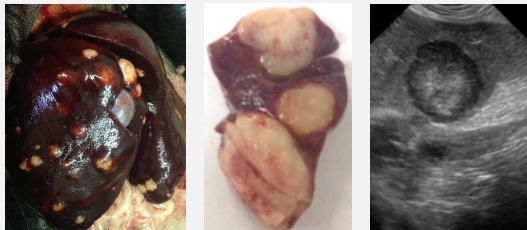
- Hepatocellular (D: 76%, C: 86% adenoma)
- Cholangiocellular (D+C 100% malignant)
- Neuroendocrine (carcinoid)
- Mesenchymal

Secondary hepatic neoplasia ($\pm 75\%$)

- Metastases (46%): hemangiosarcoma, "abdominal" carcinomas, mast cell tumors, melanomas, etc
- Hematopoietic tumors (28%): lymphoma, histiocytic sarcoma, etc

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METASTATIC HEPATIC NEOPLASIA



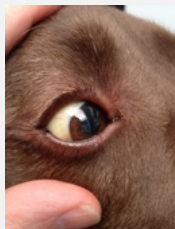
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PRIMARY HEPATIC NEOPLASIA

Older dogs (10-11Y), no sex or breed predisposition

Clinical signs

- No signs ($\pm 30\%$)
- Poor appetite, weight loss, polyuria, vomiting, fever
- Secondary tumors signs related to primary tumor
- Rare signs
 - Icterus ($< 15\%$ of liver diseases)
 - Neurologic signs: hepatoencephalopathy, hypoglycemia



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DIAGNOSIS

Physical examination

- Unremarkable
- Hepatomegaly / Abdominal mass ($\pm 50\%$)
- Icterus

Laboratory analysis

- Anemia
- Leukocytosis (neutrophilia)
- Elevated liver enzymes
 - ALAT/AST >> ALP
- Hypoglycemia (HCC)
- α -fetoprotein (HCC)

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RADIOGRAPHY

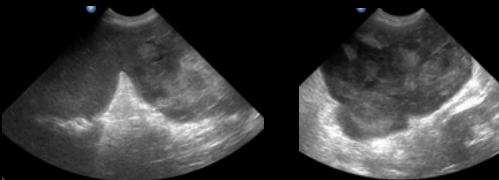


>85% non-specific findings:

- hepatomegaly
- loss of detail

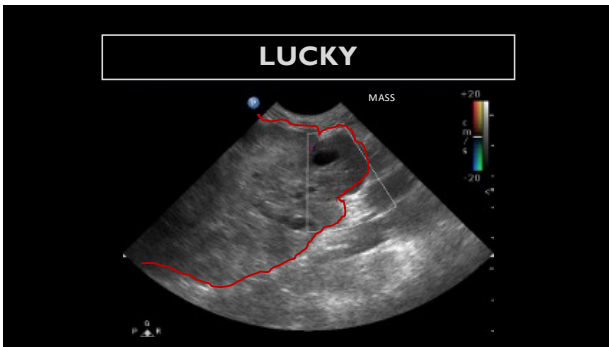
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ULTRASONOGRAPHY



Sensitivity $\pm 75\%$, Specificity $\pm 80\%$
 What to look for? Solitary vs Multifocal/Diffuse neoplasia;
 Relation to biliary structures and vasculature

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HOW GOOD IS ULTRASONOGRAPHY?

Hepatic ultrasonographic abnormalities have substantial limitations in predicting both disease (neoplasia) as well as type of neoplasia

Diagnostic differentials for diffuse alterations in hepatic parenchymal echogenicity			
Diffuse Hyperechogenicity	Diffuse Hypoechoic	Mixed Echogenicity	
Steatid hepatopathy Lipidosis Other vascular hepatopathies Chronic hepatitis Cirrhosis	Passive congestion Focal hepatitis Lymphoma Leishmaniasis Eosinophilic gastroenteritis	Steatid hepatopathy associated with benign hypertrophy, or other combinations of processes Alcoholic Cholangitis Cholangiocarcinoma	

Diagnostic differentials for focal hepatic lesions by color ultrasonography			
Anechoic	Hypoechoic	Hyperechoic	Mixed Echogenicity
Cyst Cystic tumor Necrosis Abscess Hemorrhage	Nodular hyperplasia Metastases Lymphoma Primary hepatic neoplasia Abscess Necrosis Hemorrhage Complex cyst	Nodular hyperplasia Primary neoplasia Metastases Mineralization or chondroid matrix Albenia Fat or myxoid degeneration Granuloma Gas Metallic clip	Nodular hyperplasia Primary neoplasia Metastases Abscess Hemorrhage

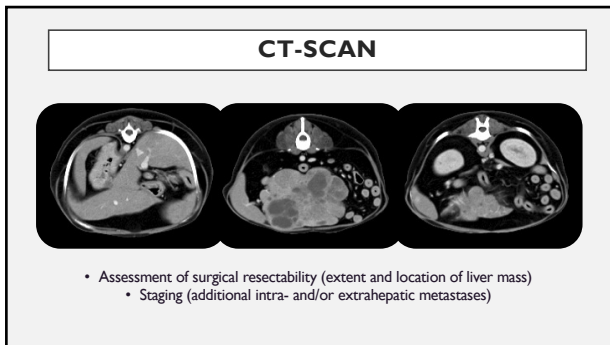
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DOES EVERY HEPATIC MASS REPRESENT NEOPLASIA?

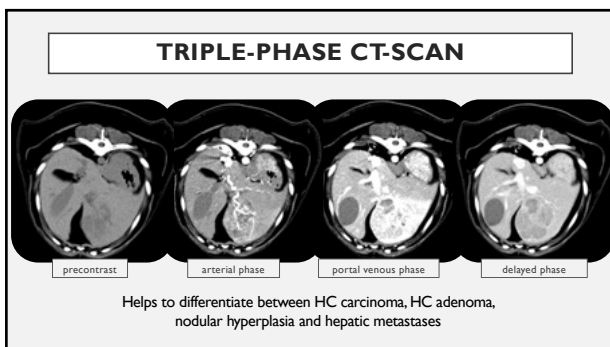
< 3cm → nodular hyperplasia or SIH
≥ 3cm ± ascites, abnormal hepatic lymph node, abnormal spleen → neoplasia

67 - 75% of target lesions represent malignancy

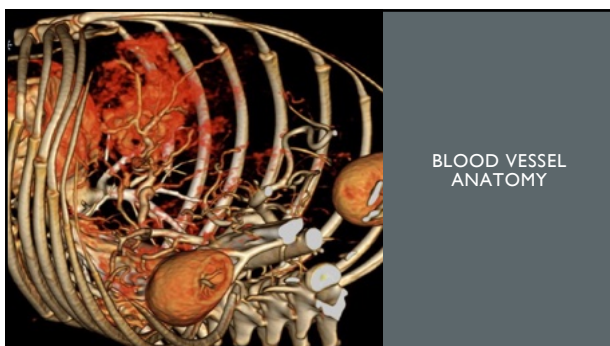
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DIAGNOSIS

Cytology

- Useful for diagnosing diffuse hepatic disorders
- Lymphoma, SIH, lipidosis
- Metastatic tumors, exception (hemangio)sarcoma
- Cytology may suggest a hepatocellular tumor

Histology

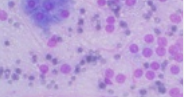
- Often unrewarding in primary liver neoplasia
- Useful in most secondary liver tumors
- Risks: collapse/ shock (vagal?), bleeding
 - High-risk patients: suspicion of hemangiosarcoma
- Ki-67 prognostic??

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CYTOLOGY

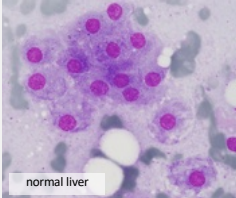
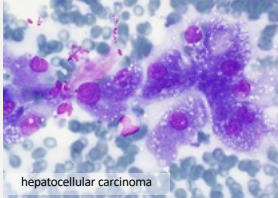


Diagnosis	Sensitivity	PPV
Neoplasia	52	87
Round cell	60	75
Carcinoma (non-HCC)	55	86
Carcinoma (HCC)	35	100
Sarcoma	17	33



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CYTOLOGY - HCC



normal liver

hepatocellular carcinoma

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HEPATOCELLULAR CARCINOMA

- Most common ($\pm 50\%$) primary hepatic neoplasia in the dog
- Predisposed
 - M > F
 - Welsh Corgi, beagle, Miniature Schnauzers Shih Tzus?
 - Scottish terrier with vacuolar hepatopathy
 - Hypercortisolism
- Presentation:
 - Massive (50-80%) vs Nodular vs Diffuse type
 - Slow growing tumor
 - Left > Right
 - Metastasis 0-37%

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HEPATIC NEOPLASIA - SURGERY

Median OST for massive HCC following surgery

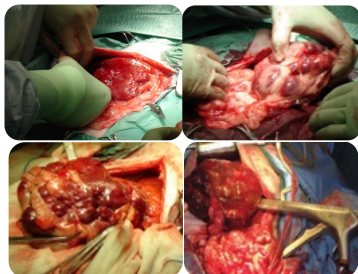
- >1.460 days (vs 270d for non-surgical management)

Prognostic

- Solitary ($\pm 60\%$) >> multifocal/diffuse ($\pm 40\%$)
- Left > central / right liver lobe mass (vasculature, bile ducts)
- Incomplete excision, pulmonary metastasis, or recurrent local disease, no effect on OST
- Repeat surgery following recurrence possible

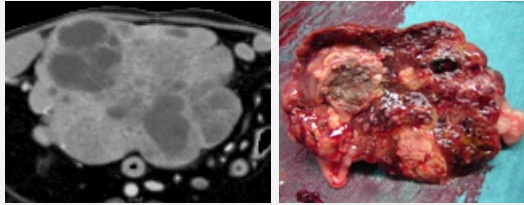
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SURGERY



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SURGERY



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OTHER THERAPIES?

Chemotherapy

- Primary liver tumors often drug resistant (ABC-transporters)
- Secondary tumors: hemangiosarcoma, lymphoma
- Toleranib?

Other

- US-guided microwave or radiofrequency ablation
- Interventional radiology - transarterial chemoembolization (TACE)
- Radiotherapy (SBRT)

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DSH MN 14Y ANOREXIA, JAUNDICE



Extrahepatic cholestasis



Cholangiocarcinoma

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FELINE HEPATIC TUMORS

- Uncommon (1.5 - 2.9% of feline neoplasms)
- More often secondary, than primary
 - Primary: **bile duct carc**, hepatocellular carc, neuroendocrine, sarcoma
 - Secondary: **ML**, metastasis
- More likely multifocal (nodular/diffuse)
- Most common
 1. Biliary: carcinoma > adenoma
 - ± 67% metastatic rate
 2. Hepatocellular: adenoma > adenocarcinoma
 - ± 25% metastatic rate

Signs

- Anorexia, lethargy, vomiting
- Icterus, ascites and abdominal pain: rare

Diagnostic methods

- Palpation (50% of cats have hepatomegaly)
- Elevated ALAT/ASAT, bilirubin
- US / (CT-scan)

Therapy: surgery if feasible

- Prognosis**, poor unless, benign tumor
- malignant <1M
 - benign 12- 44M (5 cats!)

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QUESTIONS??

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