

The Laboratory Dog

C L Davis/NCALAM
May 2010
Lab Animal Medicine Workshop
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Acknowledgements

- Thanks to the following sources for the images used in this presentation:
 - Diane Forsythe and Mary Grant – National Institute for Environmental Health Sciences
 - US Army
 - Sue Spray and Tim Barker – Scripps Institute

Disclaimer

- This is not an ACLAM sanctioned presentation
- All information is deemed reliable and correct
 - No warranty for accuracy
- No information presented is known to be specifically included in the ACLAM Board Certification Exam

Genus and species?



<http://www.petinsurance.com/healthzone/pet-articles/pet-owner-topics/~//media/All%20PHZ%20Images/Article%20images/159groupofdogs.aspx>

Genus & Species

- *Canis familiaris*

Research Uses

- Pharmacology
- Toxicology
- Surgical models
- Dental studies
- Many others



<http://1995.photobucket.com/albums/af76/la-kern26/beagle.jpg>

source classifications

- Class A?
- Class B?

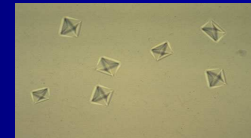
source classifications

- Class A - Purpose bred
- Class B- Random source

Dog space

- Floor space?
 - $(\text{Length} + 6 \text{ in.})^2 / 144$
 - Length: nose tip to tail base
- Height?
 - 6 in. taller than head of tallest standing dog
- Exercise if what conditions not met?
 - Single: < 2X floor space
 - Group: < 100% required space each
- Exercise Exemption?
 - By vet for health reasons. 30 day review unless permanent.

Diseases



<http://www.dcss.cs.amedd.army.mil/field/FLIP%20Disk%204.2/Chemistry/SCUrinalysis/SCUA-Microscopy/SCSingle%20Slides/SCC9Ox3.jpg>

Diagnosis?

Calcium oxalate crystals

- "Maltese cross"
- Can be normal
- With renal failure- suggests ethylene glycol toxicosis

Repro stuff

- Cycle?
 - Monoestrus
- Fertilization can occur how late?
 - 8 days after coitus
- How long oocytes viable?
 - 12-24 hours after ovulation
- Placentation?
 - Endotheliochorial
- Gestation length?
 - 59- 63 days

Diseases



<http://www.civir.com/temp/cache/9c83597a512548d1e553cc7d1c71bd99.png>



<http://www.vetsurgerycentral.com/images/urogenital/pyometra/pyometra.jpg>

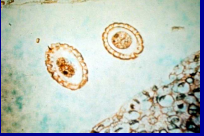


Diagnosis?

Diseases




<http://www.ccapvet.org/images/Nematodes/dioctophyme-adult.jpg>



Diagnosis?

Giant Kidney Worm

- *Dioctophyme renale*
- Renal pelvis



<http://www.ccapvet.org/images/Nematodes/dioctophyme-adult.jpg>

Diseases



http://www.marvistavet.com/assets/images/animated_megaesophagus_xray.gif



<http://content.answers.com/main/content/img/elsevier/vet/g261.jpg>

Diagnosis?

Diseases




Diseases

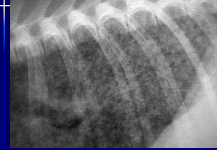



Diagnosis?

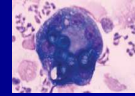
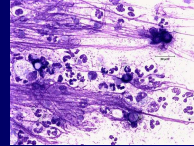
JPS

- Juvenile Polyarteritis Syndrome (JPS)
- Beagles, other breeds occasionally
- Fever, painful neck
- Systemic necrotizing vasculitis
- Hereditary? Autoimmune mediated
- Remissions and relapses
- Steroid responsive

Diseases



<http://www.vet.uga.edu/vpp/clerk/mordcau/figure1.jpg>



<http://veterinarymedicine.dvm360.com/vetmed/data/articlestandard/vetmed/192099/896803/Figure4-Blasto-LN-FNA3.jpg>

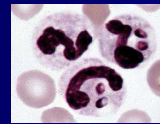
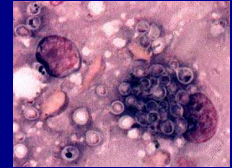
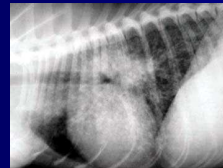
Diagnosis?

<http://www.cvm.tamu.edu/acvp/FungiPics/blasto-dog60x.jpg>

Blastomycosis

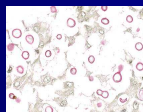
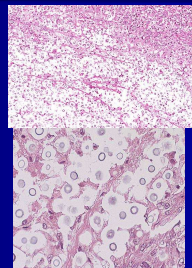
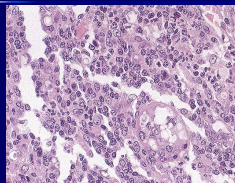
- *Blastomyces dermatitidis*
- Inhaled from environment
- Other systemic fungal diseases?

Histoplasma capsulatum



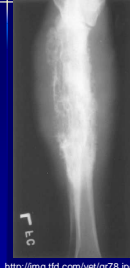
<http://www.vet.uga.edu/vpp/clerk/edison/Fig4ADJ.jpg>

Cryptococcus neoformans



<http://vp4.afip.org/wsc/wsc96/images/c4c4e.jpg>

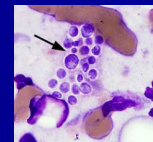
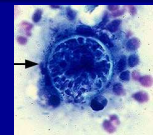
Coccidioides immitis



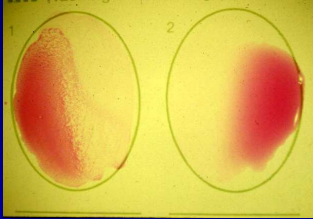
<http://img.ftd.com/vet/gr78.jpg>



<http://www.vet.uga.edu/VPP/clerk/ntterf/ig05.jpg>



Diseases



http://www.strawstnpaw.s.com/img/services_brucella_test_kit.jpg

Test for?

Brucellosis

- *Brucella canis*
- Epididymitis, orchitis, endometritis, placentitis, abortions, infertility
- Zoonotic
- *B. abortus*, *B. melitensis*, *B. suis*
- Reportable disease

Diseases



Diagnosis?

Interdigital cyst

- Chronic inflammatory lesion (not cyst)
- "sterile pyogranuloma complex"
- German shepherds, beagles
- Usually 3rd & 4th interdigital spaces
- Sterile- steroids, surgery
- JAALAS 44(4): 2005 p17-21



JAALAS 44(4): 2005 p17-21

Diseases

- Kennel Cough Complex
- Caused by?

Kennel Cough

- **Bordatella bronchiseptica*
- Canine parainfluenza virus
- Canine adenovirus 1 & 2
- Canine herpesvirus, reovirus, mycoplasma

Diseases



Diagnosis?



<http://atlas.arabslab.com/data/5/PLATYFIG23.jpg>

Tapeworm

- *Dipylidium caninum*



<http://www.stanford.edu/group/parasites/ParaSites/2006/Dipylidiasis/Adult%20form.JPG>

Diseases



http://adventuredoc.files.wordpress.com/2009/11/taenia_egg1.jpg

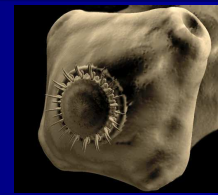


Tapeworm

- *Taenia*



<http://cal.vet.upenn.edu/projects/paraav/images/ta7-13.jpg>



<http://www.phsource.us/images/Helminths/taenia.jpg>

Diseases

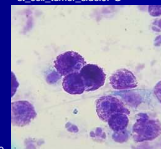


<http://www.theveterinarian.com.au/clinicalcare/view/3hilton.jpg>

Diagnosis?



http://en.wikipedia.org/wiki/File:Ma_st_cell_tumor_side.JPG



<http://en.wikipedia.org/wiki/Mastocytoma>

Mast cell tumor

- Most common skin tumor
- Grades I- III
- Gastric ulcers b/c of histamine
- Potentially malignant
- Toluidine blue- stains cytoplasmic granules
- Surgical excision

Breed and Model?

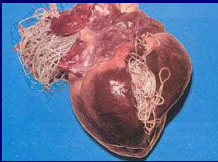


<http://www.whinny4me.com/Kelsey/Kelsey%20-%2007062006%20-%20047.jpg>

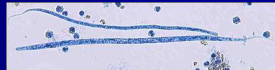
Breed and Model

- Grey collie
- Cyclic neutropenia/hematopoiesis
- Grey collie syndrome

Diseases



<http://www.treasurevalleyvet.com/sitebuildercontent/sitebuilderpictures/HEARTWORM.jpg>



<http://www.capvet.org/images/heartworm-microfilariae.jpg>

Diagnosis?

Heartworms

- *Dirofilaria immitis* vs. *Dipetalonema reconditum*
- *Wolbachia*
 - obligate, intracellular, gram-negative bacteria found in most filarial nematodes
 - order Rickettsiales
 - ?contribute to pulmonary and renal inflammation through the *Wolbachia* surface protein (WSP)
 - suppressing *Wolbachia* with doxycycline prior to adulticide therapy may reduce the gross pulmonary pathology b/c of thromboembolic shower of dead worm fragments.

Diseases



Diagnosis?

Papillomatosis

- Canine oral papillomatosis
- Papillomavirus
- Mouth, nostrils, eyelids
- Rarely, can progress to squamous cell carcinoma
- Immature immune system, usually
 - Puppies or young dogs primarily

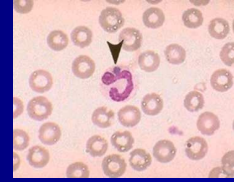
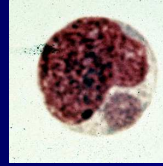
Diseases



http://farm1.static.flickr.com/185/416836684_178ae63595_m.jpg



Diseases



http://www.marvistavet.com/html/body_ehrlichia_infection_in_dogs.html

Diagnosis?

Ehrlichiosis

- *Ehrlichia canis*
- Vector?

Vector

- Brown dog tick
- *Rhipicephalus sanguineus*



http://www.marvistavet.com/html/body_ehrlichia_infection_in_dogs.html

Diseases



<http://journals.tubitak.gov.tr/veterinary/issues/vet-07-31-4/vet-31-4-12-0510-17.pdf>



Diagnosis?

? platys

- Previously *Ehrlichia platys*
- Changed to *Anaplasma platys*
- Same vector as *E. canis*

Diseases



<http://www.eyevet.ca/images/information/cherry-pup.jpg>



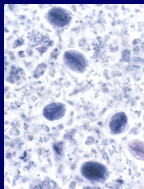
http://www.tribledanes.com/Health/cherry_eye.jpg

Diagnosis?

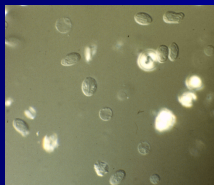
"Cherry Eye"

- Hyperplasia or prolapse of nictitating membrane (3rd eyelid) gland
- Not congenital, but breed disposition (beagles)
- Steroid treatment?
- Usually surgical excision

Diseases



<http://www.k-state.edu/parasitology/625tutorals/FIGiardia05.jpg>



<http://www.cyto.purdue.edu/flowcyt/educate/photos/cells/giardia.gif>



<http://www.firvetclinic.com/Canine/giardia.jpg>

Diagnosis?

Giardia

- *Giardia duodenalis* (*lamblia*)
- Direct life cycle
- pH change from stomach to duodenum- excyst
- Direct fecal- trophozoites
- Zinc sulfate float- cysts

Bleeding Disorders

- Hemophilia A- deficiency in ?
 - Factor VIII deficiency
- Hemophilia B- deficiency in ?
 - Factor IX deficiency
- Von Willebrand disease (vWD)- deficiency in?
 - vWD- Von Willebrand factor deficiency
- Breed association?
 - Doberman Pinschers

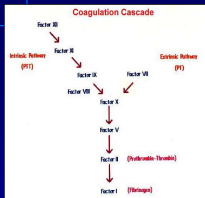
Bleeding Disorders

- Alexander's disease/ proconvertin disease- deficiency in ?
 - Factor VII deficiency
- Breed association?
 - Beagles*, Alaskan Klee Kai, Alaskan Malamutes, other and mixed breeds
 - Comp Med 59(4): 2009, p378- 382

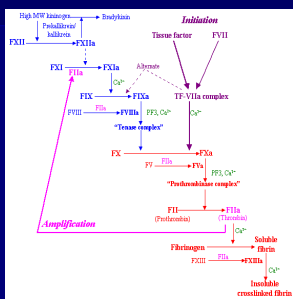


http://en.wikipedia.org/wiki/Alaskan_Klee_Kai

Coagulation

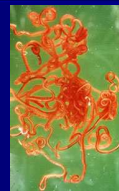


<http://path.upmc.edu/cases/case119/images/gross1.jpg>



<http://diagnolab.vet.com/ell.edu/clinpath/modules/coags/images/coagcascade.gif>

Diseases



<http://cal.vet.upenn.edu/projects/parasit06/website/images/Lab%205/S.lupinsitu.jpg>

Diagnosis?

Spirocerca lupi

- Nodules in esophagus, stomach, aorta
- Hypertrophic osteopathy
- Esophageal sarcoma
- Aortic aneurysm
- Spondylitis of posterior thoracic vertebrae

Breed and Model?



<http://media-2.web.britannica.com/eb-media/84/6384-004-47960FCF.jpg>

Breed and Model

- Bedlington terrier
- Copper storage disease/ copper toxicosis- Wilson's Disease

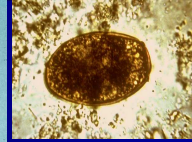
Breed and Model?

- Rat strain model?
- Fish model?

Copper storage disease

- Long Evans Cinnamon Rat
- White perch (*Morone americana*)

Diseases



<http://instruction.cvhs.okstate.edu/jcfow/htdocs/Disk1/Imag0028a.jpg>

Diagnosis?

Fluke

- *Paragonimus kellicoti*



<http://instruction.cvhs.okstate.edu/jcfow/htdocs/Disk1/Imag0028a.jpg>

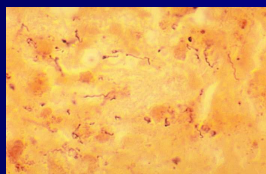
Diseases

- Lameness (shifting)
- Fever
- Weight loss
- lymphadenopathy



http://farm2.static.flickr.com/1279/847636307_74d47b9309.jpg

Diseases



<http://pathmicro.med.sc.edu/borrelia.jpg>



<http://www.bafda-uk.org/images/Borrelia.jpg>

Diagnosis?

Lyme Disease

- *Borrelia burgdorferi*
- Zoonotic
- Test- IFA or ELISA (vaccine- positive)
- Treatment- doxycycline

- Vector?
- Reservoir?

Lyme Disease

- deer tick (*Ixodes*)
- White-footed deer mouse
– *Peromyscus leucopus*
- Other tick-borne diseases?



http://www.ticktoxins.org/ticks/images/af_blackleggedtick.jpg



http://wildnatureimages.org/sitebuildercontent/sitebuilderpictures/white-footed_mouse_21702.jpg

Tick-borne diseases

- RMSF (*Rickettsia rickettsii*)
- *Babesia canis*
- *Mycoplasma haemocanis*
– formerly *Hemobartonella canis*
– Comp Med 54 (4): 2004 p404-409
- *Hepatozoon canis*
- *Ehrlichia*, Lyme disease
- Retrospective of lab dog serologic reactions: JAALAS 47(5): 2008, p23- 8

Diseases



<http://www.capvet.org/images/Whipworms/whipworm-adultsindog.jpg>



<http://www.capvet.org/images/Whipworms/177/whipworm-eggs.jpg>

Diagnosis?

Whipworms

- *Trichuris vulpis*
- Direct life cycle
- Intermittent release of eggs
- Eggs survive in environment (years)
- Resistant to disinfection
- Dessication or incineration

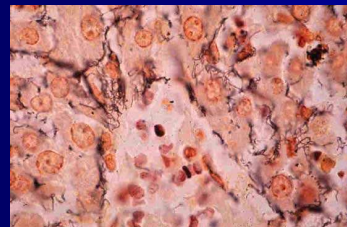
Diseases



Leptospirosis in Dogs- Current Status. P. L. McDonough. In Recent Advances in Canine Infectious Diseases, ed L. Carmichael, International Veterinary Information Service, Ithaca, NY.



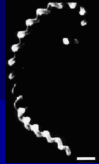
Diseases



Diagnosis?

Leptospirosis in Dogs- Current Status. P. L. McDonough. In Recent Advances in Canine Infectious Diseases, ed L. Carmichael, International Veterinary Information Service, Ithaca, NY.

Leptospirosis



- *Leptospira interrogans*
- Serovars: canicola, icterohemorrhagiae, grippityphosa, pomona, bratislava
- Zoonotic
- Vaccines now available for all serovars but bratislava

Diseases

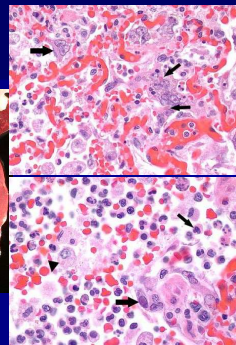
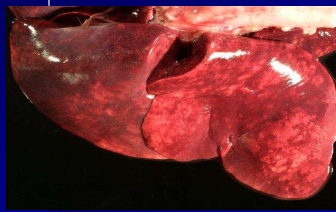


<http://www.campbowwow.com/us/nc/charlottesville/Portals/83/Dogs/20Health/20Wetpages/Dogs/20Health/20Wetpages/Distemper.jpg>

<http://angela.orgae.net/wp-content/uploads/2009/12/hyperkeratosis-of-footpads.jpg>

http://daarmypuppy.com/board/data/Image_Link/puppy_with_distemper.gif

Diseases



<http://www.cvm.tamu.edu/acvp/CanineDistemper/1-lung%20gross.jpg>

Diagnosis?

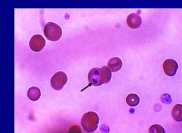
Canine Distemper Virus

- Paramyxovirus
- Genus *Morbivirus*
- INIB & ICIB
 - Tongue, brain, trachea, bladder, conjunctiva
- Neurologic signs- demyelination
- Fluorescent Ab- mm or conjunctiva
- Other Morbilliviruses?

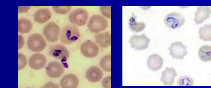
Canine Distemper Virus

- Measles
- Rinderpest

Diseases



<http://www.capecvet.org/images/Babesia/babesia.jpg>



<http://www.testapet.com/images/babesiaincis.jpg>

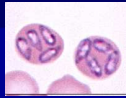
[http://veterinarynews.dvm360.com/dvm360/3/60100/Image1.jpg](http://veterinarynews.dvm360.com/dvm360/dvm360/3/60100/Image1.jpg)

Diagnosis?

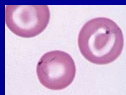
Babesia

- *Babesia canis*
- Protozoan
- Hemolytic anemia
- Vector- brown dog tick

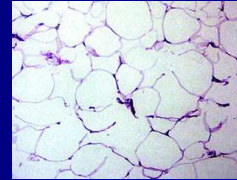
- Other Babesia- *B. gibsoni*



http://diaglab.vet.comell.edu/clinpath/modules/r_boncrph/images/bab-cmp.jpg



Diseases



<http://www.vet.uga.edu/vpp/clerk/berger/fig5.jpg>

Diagnosis?

Lipoma

- Subcutaneous
- Encapsulated
- older, overweight females
- Don't recur after excision
- Surgical removal if affecting ambulation



<http://www.allpetsmacomb.com/lipoma1.jpg>



Diseases



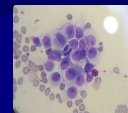
<http://210.36.18.53/gxujingoin/syjsckpko/OSU/Img0051d.jpg>



Diagnosis?

Lungworm

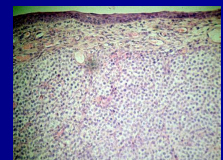
- *Oslerus osleri*
- previously *Filaroides osleri*
- Metastrongyle
- Tracheal irritation, persistent coughing
- Bronchoscopy, tracheal wash



http://en.wikipedia.org/wiki/File:Canine_transmissible_venerial_tumor_cytology.JPG

[http://medical-dictionary.thefreedictionary.com/canine+transmissible+venerial+tumor+\(TVT\)](http://medical-dictionary.thefreedictionary.com/canine+transmissible+venerial+tumor+(TVT))

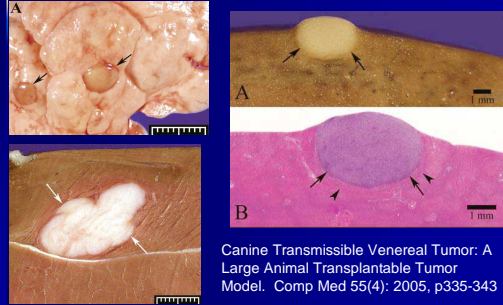
Diagnosis?



Transmissible Venereal Tumor (TVT)

- Transmitted by coitus
- Genital nodules- also skin, lips, nasal mucosa
- Can affect males or females
- Metastasis rare
- Remove from breeding program
- Vincristine- remission and cure 90%

TVT

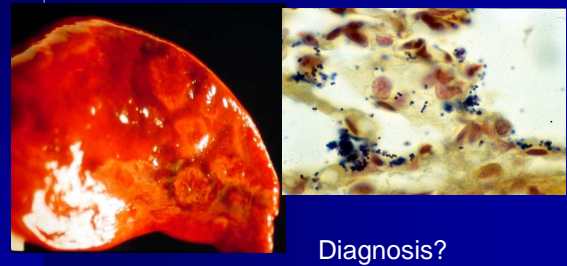


Canine Transmissible Venereal Tumor: A Large Animal Transplantable Tumor Model. Comp Med 55(4): 2005, p335-343

Diseases



Diseases



Diagnosis?

Strep

- Streptococcus
- *S. zooepidemicus*
- Bull's eye lesion
- Strep Lancefield group C

Diseases

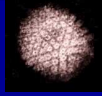
- Young puppy- hemorrhage
- Older puppy- neuro signs
- Adult- reproductive dz
- Diagnosis?



<http://www.addl.purdue.edu/newsletters/2008/Spring/Images/image001HP.jpg>

Canine Herpesvirus

- Latent infection- recrudescence
- Venereal transmission
 - Or birth canal- puppies
- "Turkey egg" kidneys
- Basophilic INIB



<http://www.facebook.com/profile/pic.php?id=AAAAAQIAQnVGA0GTN3NulT1GyU8vQAAANIGDrzyQrQVIBhw2uDwR3>

Diseases



Diagnosis?

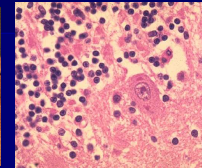
Dermatosporaxis

- Stretchy skin
- Ehlers Danlos
- Collagen disease
- Dogs, cats, mink

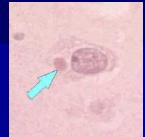
Diseases



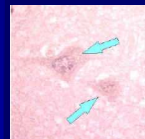
<http://smardogs.files.wordpress.com/2009/02/rabid-dog.jpg>



<http://pathmicro.med.sc.edu/viro/negri-perk.jpg>

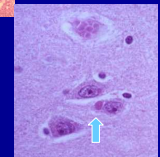


<http://pathmicro.med.sc.edu/viro/negri2.jpg>



<http://pathmicro.med.sc.edu/viro/negri1.jpg>

Diagnosis?

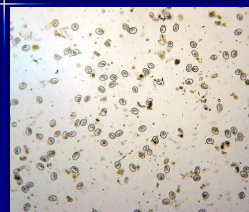


<http://www.pathguy.com/~lulo/lu00033.htm>

Rabies virus

- 3 stages
 - Prodromal
 - Furious
 - Paralytic
- Incubation 1 week- 1 year
- Definitive Dx: Fl. Ab - virus in Negri bodies of hippocampal cells

Diseases



http://img.photobucket.com/albums/v661/dave_weldon/Parasites/Coccidia100x.jpg



<http://cpah.biz/images/194.jpg>

Diagnosis?

Coccidia

- *Cytoisospora canis*
 - *C. ohioensis*
 - *C. burrowsi*
 - *C. neurivolta*
- Direct or indirect transmission
- Sporulates in environment to infective stage

Diseases

- puppy
- Fever
- Lethargy
- Vomiting
- Hemorrhagic diarrhea

- CBC- low WBC

Diseases

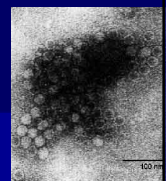


<http://cal.vet.upenn.edu/projects/pathterm2/images/igovoid.jpg>

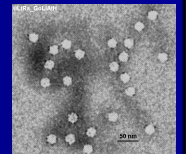
Diagnosis?

Canine Parvovirus

- $\leq 500-2000$ WBC/ul
- Hypothermia, icterus, DIC
- 6-20 weeks old
- Affinity for \div cells
 - Villus atrophy
 - Crypt necrosis
 - Bone marrow, lymphoid cells
- Fecal ELISA from CITE
- Rottweilers and Dobermans



<http://www.b19virus.com/canine-parvovirus-pictures.html>



http://upload.wikimedia.org/wikipedia/commons/8/85/Canines_Parvovirus.jpg

Diseases



Diagnosis?

Ascarids

- *Toxocara canis*
- *Toxascaris leonina*
- Visceral larval migrans- pneumonia
- Potbellied puppy, intussusception
- Transplacental and transmammary migration
- Infective stage- L3

Breed and Model?



<http://www.justdogbreeds.com/images/breeds/golden-retriever.jpg>



Breed and Model

- Golden retriever
- Muscular Dystrophy (Duchenne)
- X linked recessive
- Absence of dystrophin muscle protein

Diseases



<http://www.cityofboston.gov/animalcontrol/images/mange.jpg>



http://www.morgananimahospital.com/resources/assets/images_large/354.jpg

Diagnosis?

Mange

- *Sarcoptes scabiei* var. *canis*
- Intensely pruritic
- Survive 1-3 weeks off host
- Zoonotic- infects cats and humans
- Can get negative scrapes- therapeutic trial
- Other mite?

Demodicosis

- *Demodex canis*
- Hair follicles
- Commensal/normal fauna
- Localized or generalized
 - Localized usually < 18 months and resolves w/o treatment
 - Generalized usually secondary- endocrine disorder or immunosuppression



<http://img.fid.com/vet/humbs/gr105.jpg>

Disorders



<http://www.lbah.com/canine/ald.htm>



<http://www.dogleggs.com/files/granuloma.cfm>

Diagnosis?

Lick Granuloma

- Acral lick granuloma
- Release of endorphins
- Behavior modification, exercise, toys
- Anti-anxiety, topicals, opioid antagonists

Disorders



<http://www.dogleggs.com/files/granuloma.cfm>

Diagnosis?

Pressure Sore

- Pressure sore (decubital ulcer)
- Extended recumbency
- Pressure from a cast
- Often second-intention healing by granulation tissue

Disorders



http://www.dog-cheap-sleeps.com/images/GLUNNER_HY_GROMA_11-18-08_006.jpg



<http://www.loveofbreeds.com/health/elbowcallus.jpg>

Diagnosis?

Elbow Hygroma

- Most often over olecranon
- Tuber calcis, greater trochanter, stifle
- Usually giant and large breeds
- Unilateral or bilateral
- Fluid filled, painless
- Relieve point pressure (bandage), pad cage, drain/aspirate

Diseases



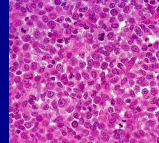
<http://www.vet.uga.edu/vpp/clerk/woods/fig2a.jpg>



<http://img.skitch.com/20080923-ja3fa2wtdtfaea9bdf1y19pey.jpg>



<http://z.about.com/d/vetmedicine/1/0/F/S/asv006a.JPG>



Diagnosis?

<http://www.vet.uga.edu/VP/P/CLERK/woods/fig3.jpg>

Histiocytoma

- Benign
- Monocyte-macrophage cells
- "button tumors"
- High mitotic index
- Usually spontaneously regress in < 3 months

Diseases



http://www.cbu.edu/~seisen/Parasites/OnParade_files/image010.gif



http://farm4.static.flickr.com/3050/2772968150_f4d2db9011.jpg

Diagnosis?

Hookworms

- *Ancylostoma caninum*
 - *A. braziliense*
 - *Uncinara stenocephala*
- Anemia, melena
- Transmammary migration, some transplacental
- Infective stage- L3
- Adult hookworm- 0.02- 0.2ml blood

Breed and Model?



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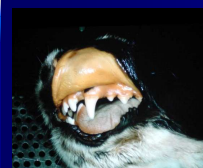
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Breed and Model

- Malteagle
- Glycogen Storage Disease
- Kishnani PS, Vet Pathology. 2001 38(1):83-91

Diseases



<http://davidbaesler.files.wordpress.com/2009/07/22138346.jpg>

Inherited disease?
Breed association?

PFK

- Phosphofructokinase deficiency
 - Glycogen storage disease type VII
- Cocker spaniel
- English Springer spaniel
- Whippet?
- Other disease possibility?



http://upload.wikimedia.org/wikipedia/en/7/77/EnglishSpringerSpaniel_web.jpg

PK

- Pyruvate kinase deficiency
- RBC's into echinocytes
- Enzyme-deficient hemolytic anemia
- Beagles, Basenji, Cairn Terrier, West Highland White Terrier

Diseases



<http://www.dogchatforum.com/ringworm-in-dogs.htm>

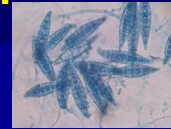


http://www.marvistavet.com/html/body_ringworm.html

Diagnosis?

Ringworm

- *Microsporum canis*
- *M. gypseum*
- *Trichophyton mentagrophytes**
- Sabourand's medium or dermatophyte test medium (DTM)
- *M. canis* may fluoresce- Wood's lamp



http://upload.wikimedia.org/wikipedia/commons/0/03/Macroconidia_Microsporum_canis.JPG

Diseases



Diagnosis?

Polydactyly



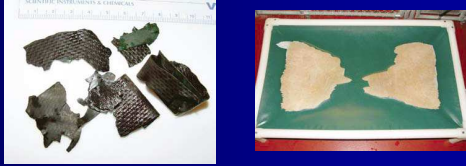
<http://amihylwiczek.com/blog/images/bombadistmail.jpg>



http://en.wikipedia.org/wiki/File:Male_polydactyl_grey_house_cat_-_right_front_paw_circles.jpg

<http://www.smh.com.au/ffimage/2007/02/22/cattoes.0.jpg>

Article



JAALAS 48(1): 76-78

Article

- Injury Related to Environmental Enrichment in a Dog: Gastric Foreign Body
- JAALAS 48(1): 2009, p76-78

Articles

- Dog BCS: JAALAS 43(3): 2004 p34- 7
- Intussusception: Comp Med 57(3): 2007, p287-291
- Lipids levels: Comp Med 58(5): 2008, p485- 489
- Pancreatitis model: Comp Med 59(1): 2009 p78- 82
- ECG in Beagles: JAALAS 49(1): 2010 p31- 35

Questions?



<http://superfunnypets.com/wp-content/uploads/2008/10/daisy.jpg>