Abomasal disorders

· LDA and RDA – Most common in dairy cattle within one month of parturition or prepartum. Due to hypocalcemia resulting in abomosal atony. Leads to metabolic alkalosis, hypochloremia, hypokalemia due to sequestration of acid, chlorine and potassium in abomasum. Left 5-10x more common than right. Left-sided ping between ribs 9-13.
Normal TPR. Anorexia, decreased production, ketosis. Diarrhea is poor px sign. Treatment - roll cow, but recurrence likely. Surgical correction with omentopexy or abomasopexy. RDA can become AV.

· Abomasal volvulus – Dairy cows near parturition w/ sudden drop in milk production. Usually counterclockwise from rear. Very sick, clinical signs more severe dt vascular compromise. Right sided ping, palpable. Treatment is surgery.
Poor prognosis.

· Abomasal ulcers - Most common in high-producing dairy cows in first 6 weeks of production. Stress decreases protective prostaglandins. Ulceration at the ventral portion of the fundic region of the greater curvature. See melena, anorexia, occult blood, abdominal pain. LSA is significant cause of bleeding ulcers in older cattle. Bleeding ulcers don't perforate and perforating ulcers (seen in calves) don't bleed.

· Abomasal impaction - Pregnant beef cattle in winter with poor quality feed.

· Left Ping = LDA, pneumoperitoneum, atonic rumen.

· Right Ping = Spiral colon, rectum/colon, RDA, RAV (palpable).

Abortion

· **Cattle** - Herd problem: IBR, BVD, brucellosis, leptospirosis, campylobacteriosis, trichomoniasis, anaplasmosis, ureaplasmas, mycoplasmas. Sporadic: Mycotic (Aspergillus, Mucor spp). Reach uterus hematogenously, cause late term abortion. Fetus not affected or may have ringworm lesions; placenta severely affected with necrosis of cotyledons. Dx via culture of fetal tissue. Also Listeria, Haemophilus, Corynebacterium pyogenes, Staphylococcus, bluetonque. Nitrates, lupine, locoweed, mycotoxins.

· **Mares** - Most common infectious cause of abortion in horses is Equine Herpes 1, last trimester. Equine viral arteritis less frequent. Vax available for both diseases. Sporadic abortion from *Streptococcus zooepidemicus*, *Escherichic coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, Staphylococcus aureus, *Rhodococcus equi*, *Actinobacillus equuli*.
These infections occur through ascending infection via the cervix. Twin pregnancies often result in abortion. Crush the smallest embryo at day 22-25 after confirmation of pregnancy.

· **Sheep** - Most common cause of abortion is campylobacteriosis. Campylobacteriosis - Infection via ingestion of organisms. Late-term abortion of edematous fetus; liver with gray necrotic foci. Carrier sheep shed organisms in feces, uterine discharges, aborted fetuses. Culture and ID organism in fetal abomasal fluid and liver. Vaccinate ewes at breeding; booster at second month gestation. Toxoplasma gondii – protozoan; life cycle is completed in the cat. Abortion and still births in sheep, pigs, and goats. White foci in cotyledons, leukoencephalomalacia. Chlamydia psittaci – late-term abortion. Exposure via ingestion, inhalation or venereal. Fetus well-preserved or mummified. Placentitis most consistent finding. Leptospirosis - late-term abortions. Listeriosis - late-term abortion, birth of weak lambs. Slight to marked autolysis of fetus, fluid in serous cavities, necrotic foci in liver, lung and spleen. Erosions in abomasal mucosa. CNS deficits. Man can be affected. Akabane virus disease – arthrogryposis, hydrancephaly.

· **Pigs** – Vaccinations: parvovirus, pseudorabies, enterovirus, brucellosis, leptospirosis can affect reproductive performance. Vaccinate sows and gilts against leptospirosis, parvovirus and erysipelas. Also permit >21 day exposure to herd before breeding to allow natural exposure to endemic herd pathogens including parvovirus and enteroviruses that can cause reproductive failure. Parvovirus - Early fetal resorption, reduced litter size, mummies. Due to persistence of maternal immunity in gilts until sexual maturity, exposure at breeding time. Pseudorabies - Abortion, stillbirths, mummies, weak pigs. Also fever, respiratory signs, nervous signs. Brucellosis - Venereal. Leptospirosis – *L. interrogans* one of most common causes of reproductive failure. *L. pomona* is late term abortion. *L. Bratislava* commonly id in serologic surveys in midwest US but NOT affected w/ abortion or repro problems.

Abortion/Parturition, Induced

· Cow – $PGF_{2\alpha}$ up to 4th month. Months 5-8 $PGF_{2\alpha}$ & Dexamethasone combination. 75% have retained placentas. 0-14 days pre-term, calves born with normal viability and normal blood IgG.

· Mare - PG for abortion only. May need double dose or repeated treatment at 48 hour intervals after 4th month. Douching of uterus also works at any stage of pregnancy. Oxytocin for live foal only after cervix has begun to relax

and colostrum is in udder.

· Small animal - Not safe. $PGF_{2\alpha}$ can be used after day 40. Dexamethasone 10 days produces fetal death and resorption.

Acepromazine - Phenothiazine tranquilizer. Block release and uptake of dopamine in the CNS. Also has anticholinergic, antihistaminic, antispasmodic and alpha-adrenergic blocking effects. Depresses RAS. Administer atropine to counteract bradycardic effects.

· Adverse effects - Precipitates seizures. ↓ RR, ↓ arterial BP, ↑ CVP, bradycardia, sinoatrial arrest. Bradycardia negated by physiological response to decreased BP. Causes extrusion of penis in male large animals. No analgesic effects.

· Positive effects - Antidysrhythmic effects. Inhibit arrhythmias induced by ultra-short barbiturates, halothane, epinephrine. Reduces halothane-induced malignant hyperthermia in pigs.

· Contraindications - Decrease dose in animals with hepatic dysfunction, cardiac disease. Contraindicated in patients with hypovolemia, shock, tetanus, strychnine.

Acetabular fractures – If there is no displacement, fractures treated conservatively with Ehmer sling and restricted activity. Bone plates and screws used for internal fixation.

Acetaminophen poisoning - Tylenol♀.

· Clinical signs - Hemolytic anemia, methemoglobinemia. Dark-colored urine. Icterus, facial edema, lethargy. The liver is the primary site of toxicity.

· Clin path - Heinz body anemia, hemolysis, hemoglobinuria.

· Therapy - N-acetylcysteine (Mucomist).

Acrodermatitis – Lethal familial zinc deficiency in white bull terriers. Retarded growth, progressive, acral, hyperkeratotic dermatitis, pustular dermatits at mucocutaneous jxns. Death by 2 yrs of age.

Acute Abdomen – Syndrome. Acute presentation, showing systemic signs, abdomen painful, distended, V/D, weakness. Major categories are bacterial sepsis, obstruction/perforation, ischemia/thrombosis. Fundamental question is surgical or medical tx reqd. W/ septic peritonitis, the solution to polution is dilution – exploratory and lavage. See GDV and pancreatitis for others.

Addison's Disease – Hypoadrenocorticism. Immune-mediated or iatrogenic adrenocortical insufficiency leads to deficiency of glucocorticoids and mineralocorticoids. Seen in young to middle-aged dogs, occasionally horses. Familial in standard poodles (?). Lack of aldosterone secretion results in impaired ability to conserve Na^+ and excrete K^+. Leads to hyponatremia and hyperkalemia (Na:K < 25:1).

· Clinical signs - Hyponatremia leads to hypotension, ↓ CO, hypovolemia. Results in prerenal azotemia. Lack of cortisol secretion can lead to GI signs, lethargy, and impaired stress response. Normocytic, normochromic anemia. Absolute eosinophilia. Hypoglycemia due to ↓ glucose production (glucocorticoid deficiency). Occasional hypercalcemia.

· Ddx – Whipworm infection, renal failure, acute pancreatitis, toxin.

· Diagnosis - ACTH stimulation test.

· Treatment – Fluid replacement, electrolyte assessment. Florinef (Fludrocortisone acetate) or DOCP (Desoxycorticosterone pivalate). Prednisone if necessary.

ADH – Antidiuretic Hormone. Suppresses excretion of urine. Has specific effect on the epithelial cells of the renal tubules. Stimulates the resorption of water, resulting in concentration of urine.

Adrenal Glands – Endocrine gland. Adrenal cortex - Three zones. Zona glomerulosa (outer) secretes mineralocorticoids. Zona fasciculata (middle) layer secretes glucocorticoids. Zona reticularis (inner) secretes sex steroids. Accessory cortical tissue seen as small nodules in aged dogs is common and nonfunctional. Adrenal Medulla – Modified sympathetic nervous system ganglion. Secretes epinephrine and norepinephrine. Important role in response to stress or hypoglycemia. Tumor of adrenal medulla is pheochromocytoma, which may secrete either hormone.

· Mineralocorticoids - Aldosterone regulates ion transport of epithelial cells, resulting in excretion of K^+ and conservation of Na^+.
· Glucocorticoids - Regulate carbohydrate, protein and lipid metabolism resulting in sparing of glucose and lipolysis.
Glucocorticoids suppress inflammatory and immunologic responses. Can have negative effect on wound healing due to inhibition of fibroblast proliferation and collagen synthesis.
· Sex hormones - Progesterone, estrogens, and androgens.
Aelurostrongylus abstrusus - Cat lungworm. Life cycle includes snail first host; frog, lizard, bird or rodent vector encysted larvae. Cat eats transport host, larvae migrate from stomach to lungs and embed in lung tissues. Eggs form nodules in alveolar ducts, larvae hatch, coughed up, swallowed and passed in feces. Larvae in feces have dorsally spined
tails. Causes coughing, dyspnea. Treatment is levamisole.

African Swine Fever – Iridovirus. Highly contagious viral disease that resembles hog cholera and is therefore

REPORTABLE. Eradicated from western hemisphere. Replicates in RE cells, found in all fluids and tissues. No vaccine. *Ornithodoros* ticks are vectors. Oronasal exposure. Survivors carriers for life. Clinical signs include fever, vomiting, diarrhea, eye discharge, abortion, death. Hemorrhage of lymph nodes, renal cortex, splenomegaly (bigger than in hog cholera). Excessive pleural, pericardial and peritoneal f luids.

Air Sacculitis – *Mycoplasma gallisepticum*. Causes respiratory tract infection in chickens. High rate of carcass condemnation. Caseous exudate.

Aldosterone - The main mineralocorticoid hormone secreted by the adrenal cortex. Regulates electrolyte and water balance by promoting retention of Na^+ and the excretion of K^+. Retention of water induces an increase in plasma volume and an increase in blood pressure. Secretion of aldosterone is stimulated by angiotensin II.

Aleutian Disease - Parvoviral infection of mink resulting in immune complex formation and deposition. No vaccine.

Alimentary Lymphosarcoma – Most have normal or $\downarrow$ peripheral lymphocytes. "Nonresponsive IBD". Can be diffuse or multinodular. Dx w/ full thickness biopsy. Very difficult to treat.

Alkalosis - $\uparrow HCO_3$, $\uparrow TCO_2$, hyperventilation causes alkalosis. Cow saliva rich in HCO_3 (horse saliva rich in Cl^-).

Amyloidosis - Consists of β pleated sheets of amino acids, refractory to enzymatic breakdown. Two major amyloid proteins. AA released from hepatocytes due to chronic infection. AL composed of partially degraded immunoglobulin light chains produced by malignant plasma cells. Disease caused by displacement of normal cells with amyloid deposits, mainly liver, spleen, brain and kidneys.

Anal Sac Disease – Hematochezia. Chronic bright red blood w/ normal stools.

Anaplasmosis – *Anaplasma marginale*. Rickettsia located in the stroma of RBC. Disease of ruminants. Transmission through contamination with infected blood via ticks (*Boophilus*, *Dermacentor*), horse flies, stable flies, mechanical transfer of blood (vax, dehorn, etc). Fomites. Carriers maintain disease in a herd. More severe in adult cattle; lifelong resistance if exposed young.
· Clinical signs - Depression, inappetence, fever, decreased production, marked icterus. Anemia leading to hypoxemia. No hemoglobinuria.
· Diagnosis - Suspect in mature cattle showing anemia without hemoglobinuria. Blood smear, see anisocytosis, presence of agent. Serology.
· Treatment – Tetracycline. LA200. Do not stress patients, may die. Insect control.
· Vax – May cause neonatal isoerythrolysis.

Ancylostoma caninum – Canine hookworm. See hookworms.

Anemia – CRC = % reticulocytes X patient PCV/normal PCV (45 in dog, 37 in cat). Regenerative if > than 1% in dog or 0.5% in cat. Horses have no peripherally circulating reticulocytes.

· Regenerative Anemia – Macrocytic, normochromic, nRBCs. Regenerative response take 2-5 days.

· Hemolysis – Intravascular = RBC destruction w/in blood vessels and loss of Hgb from cells. Often severly ill w/ weakness, fever, icterus, Hgbemia, Hbguria. More aggressive therapy, worse px. Extravascular = RBCs lysed following phagocytosis w/in RE system. Patients ± ill and may only have signs related to anemia, spleno/hepatomegaly, ± icterus. Ddx: IMHA, SLE, Zn tox (pennies<1982), Heinz body anemia (onions, tylenol in cats), Babesia, Hemobartonella, copper tox, Lepto, endotoxemia.

· Blood loss – Acute blood loss see severe signs bc no time to compensate. Chronic internal blood loss will have no Fe deficiency. Chronic external blood loss via skin, UT, GIT will have Fe deficiency. Ddx: coagulopathy, trauma, ruptured hemangiosarcoma, GI ulceration, nasal epistaxis.

· Nonregenerative Anemia – Microcytic, hypochromic. 1) BM aplastic diseases such as myelofibrosis, neoplasia, Ehrlichia, FeLV. Toxins such as anticonvulsants, chloramphenicol, TMPS, estrogen, phenylbutazone, chemo. 2) 2° failure of erythropoeisis – ACD. Mild to mod anemia. 3) Hemoglobin synthesis defects such as Fe deficiency. 4) 1° failure of erythropoeisis. Pure red cell aplasia, immune mediated disease, estrogen therapy (often given for urinary incontinence). See severe anemia, ↑ serum Fe, ↑ EP, normal platelets and WBCs. Tx w/ immunosuppressives.

· Circulating nRBCs – Metarubricytes. Ddx: regenerative response (only if orderly), BM dysfunction, splenic dysfunction, extramedullary hematopoiesis, lead toxicity, hemangiosarcoma, heatstroke/vasculitis.

Anesthesia

Premedications

· Anticholinergics – Parasympatholytics. Protect HRs, decrease secretions, decrease threshold for arrythmias. Do not work in rabbits and goats as they have atropinase (why they can eat nightshade).

- Atropine – Muscarinic antagonist. Competitively inhibits acetycholine at postganglionic parasympathetic sites. Low dose inhibits salivation, bronchial secretions, sweating. Moderate dose dilates and inhibits accommodation of the pupil, ↑ heart rate. High dose ↓ GI and urinary tract motility. Very high dose inhibits gastric secretions. Crosses BBB. May cause ileus in horses. Also, antiemetic, mjydriatic, organophosphate tox tx. Red as a beet, dry as a bone, mad as a wet hen. Tachycardia, dilated pupils.
- Glycopyrrolate vs. atropine – Atropine for emergency, works quicker (but doesn't last as long only 2-3 hrs). Glyco is 2-4x more potent than atropine, duration of action 4X longer (4-6 hours), prevents bradycardia without causing tachycardia. Glyco does not penetrate BBB (poor lipid solubility), atropine does.

· Tranquilizers - Calm the animal, facilitate handling for induction, ↓ amount of induction drugs.

- Phenothiazine tranquilizers (Acepromazine) - α antagonist. Neuroleptic. No analgesia. Sedative, antiarrhythmic, antiemetic. Vasodilation, hypotension, lowers seizure threshold, inhibits platelet aggregation, penile paralysis in stallions, ↑ HR. Do not use in shocky animals. No reversal. Don't use in really young, really old, or sick. Avoid in DP dogs.
- Diazepam – Benzodiazepine sedative. Does not work as tranquilizer when used alone. ↓ amount of other induction drugs necessary. Anxiolytic, anticonvulsant. Centrally acting muscle relaxant (as is Guaifenesin). Appetite stimulant in cats. In healthy cat as premed, may cause excitement or aggression dt suppression of learned behavior. Flumazenil is reversal agent. Do not give IM, carrier is propylene glycol. Can give midozolam IM (H_2O carrier).
- Opiods – Controlled substances. Analgesia, euphoria, antitussive, anti-diarrheal. Hypotension, bradycardia, respiratory depression. Potency of morphine < oxy (10x) < fentanyl (100x). Vagally mediated bradyarrythmias (tx w/ atropine). Naloxone is antagonist. Morphine – pure mu agonist; make vomit; cheap; good for mod to severe visceral pain; epidural gives LT analgesia (up to 24 hrs); give preservative free morphine (normal carrier is formaldehyde). Butorphanol – kappa agonist, mu antagonist; 2-4 hrs duration; very safe; ceiling effect on ventilatory depression, oral form avail. Can ↓ effects of morphine, fentanyl (b/c mu antag); not as much sedation or dysphoria. Buprenorphine – partial mu agonist; behaves like kappa agonist; good for mild to mod pain; lasts 6-8 hrs; ceiling effect on ventilatory depression. Naloxone does not reverse resp depression of buprenorphine. Partial agonist means lots of affinity for receptor but not very active once there. Innovar-Vet = Fentanyl + Droperidol.
- α_2 agonists - Sedative, analgesic, muscle relaxant. Vagally mediated bradycardia, systemic hypertension,

respiratory depression. Sensitizes heart to epi induces arrythmias, arrhythmogenic (1° and 2° heart block),. Can still get kicked/bitten, animals can override. ↑ urine production, vomiting in dogs. Xylazine - cattle extremely sensitive (1/10th dose), also sheep and goats; reverse w/ yohimbine. Paralyzes esophageal musculature allowing it to fill w/ air, can look like megaesophagus on rads. 1° side effect in cats is vomiting or retching. Detomidine – reverse w/ telazolin. Medetomidine – reverse w/ atepamazole.

Induction agents

· Barbiturates – CNS depression by inhibiting synaptic transmission and diminishing neuronal excitation in the cerebral cortex and RAS. ↓ CBF = ↓ cerebral O_2 demand = ↓ ICP. Splenic vasodilation. Poor analgesia. Rapid smooth induction, arrhythmogenic - sensitizes CV to epi induced arrythmias. ↑ sensitivity of laryngeal and bronchial reflexes to ectopic stimulation (laryngeal spasm). CV and respiratory depression. Ultra-short acting - thiopental, thiamylal, methohexital (shortest, best to use in greyhounds). Short acting – Pentobarbital. Pentothal – gold standard; scheduled. ↓ BP, ↑ HR (baroreceptor mediated). Does not potentiate seizures, good for brain patients, not so good for heart (arrhthmias, bigeminy). Redistributes to fat which affects how wake up (once full, have to metabolize). Avoid in sighthounds, longer sleep time. Causes skin sloughing if outside vein (tx w/ lidocaine, fluids, prayers).

· Propofol – Rapid onset, short duration of action, rapid recovery. Noncumulative. Nonscheduled. ↓ CBF = ↓ ICP. CV depression, apneic effects (give slowly), response to CO_2 depressed. Causes a dose-dependent ↓ in arterial blood pressure. Can potentiate arrhythmias. Soybean/egg lecithin based (bacterial medium, care w/ prep and storage), non-irritating. Good for c-sxns and outpatient sx. Do not use in horses, wake up too fast, excitatory. If given daily in cats, can see heinz body anemia.

· Ketamine – Dissociatives are controlled substances. Phencycladine derivative, GABA agonist, glutamate receptor antagonist. Wide therapeutic index. Depresses corticothalamic system, stimulates limbic system. Produces unconsciousness but retain high muscle tone and may move spontaneously, open eyelids, brisk palpebral reflex. Good somatic analgesia, poor visceral analgesia. Bad for cat spays, good for skin grafts, burn patients. Supports CV system by increasing CO, cardiostimulatory – not good if in heart failure. Antiarrhythmic. Seizurogenic. ↑ CBF, ↑ O_2 consumption, ↑ ICP. ↑ IOP. Hepatic metabolism in most spp, renal in cats. Do not give alone to horses. Add valium w/ cats. Telazol is similar.

· Etomidate - Noncumulative. Very little CV effects and respiratory depression. Good for debilitated patients. Rapid, smooth induction. ↓ CBF = ↓ ICP without effecting O_2 delivery to brain. Give drug slowly to prevent apnea. Suppresses adrenals and ↓ cortisol, may need to give a steroid. Expensive. Causes hemolysis of cells in cats.

Inhalation agents – Potent CV and respiratory depressants. The greater the blood solubility coefficient, the longer it takes for anesthesia to occur. Do not mask induce brachycephalic, vomiting patients. Environmental contamination high when mask induce. Semiclosed O_2 flow rate = 15 ml/lb/min. Bain O_2 flow = 300 ml/lb/min. ↑ rates in bain to remove CO_2. Dead space is where 2 way flow – Y piece in circle system.

· Halothane - Most arrhythmogenic. Lowers threshold to catecholamine-induced arrhythmias, then meth, then iso and sevo. Associated with postop liver dysfunction. Cheapest. 25% metabolized. #1 metabolite is bromine, causes lethargy and ataxia. MAC ~ 0.8.

· Isoflurane - Better analgesic than halothane but more respiration depression seen in dogs, cats. Has greatest hypotensive effect. Little or no hepatic metabolism. Minimally metabolized. MAC ~ 1.3.

· Methoxyflurane - Greatest degree of metabolism (50%). ↑ B/G = ↑ solubility = slow induction. Nephrotoxic. MAC ~ 0.23, most potent.

· Sevoflurane – Interacts w/ soda lime to form nephrotoxic compound A. MAC ~ 2.3.

· Desflurane – Combines w/ Barlyme to form carbon monoxide.

· Nitrous Oxide – Largest MAC value.

Local Anesthetics – Prevent cell membrane permeability to Na+, Ca++ ↓, local anesth. SC never sees the noxius stimuli to begin with. Can mix with epinephrine to ↑ duration of effects, but impair perfusion to affected tissue (may
slow healing). Procaine (safe, epidural), Lidocaine (IV antiarrhyth, nn blocks), Proparacaine (ophthal), Bupivacaine (thor sx, potent pain, longer duration, slower onset). Morphine epidural can last up to 24 hrs. Brachial plexus block

for amputation, intercostal and interpleural blocks, ring blocks for declaws, line block for c-sxn, splash for ear ablation.

Neuromuscular Blockers – For ophthalmic sx, exotics restraint, fundoscopy in birds/reptiles.
· Atracurium – Nondepolarizing; prevents Ach from binding, competitive antagonist. Edrophonium antagonizes (also dx myesthenia gravis).
· Succinylcholine – Depolarizing; bind to Ach receptors and elicit effects causing prolonged contraction; not broken down by Achesterase, long effects. Not in birds.
· Dantrolene – Peripherally acting sk mm relaxant, interferes w/ release of Ca++ from sarcoplasmic reticulum. Used for exertional myopathy, UMN bladder, and malignant hyperthermia tx.

Inotropes/Chronotropes – Need blood volume and Ca^{++} for these to work. Chronotropy – iso>dopa>dobuta. Youngsters depend on rate for CO not inotropy.
· Dobutamine - β_1 adrenergic agonist. Inotropic. Poor chronotrope, $\therefore$ not arrythmogenic. Used in horses. Can use for intraop bradycardia.
· Dopamine - β_1, α_1, α_2 adrenergic agonist. Emergency hypotensive treatment post-resusc. At low dose (2μ g/kg),
vasodilation of renal afferent tubules, if hypotensive and oliguric, ↑ urinary output. At medium dose (5μ g/kg), β_1 inotrope, improves cardiac output. At high dose (20μ g/kg), see α affects – vasoconstriction. Use only if post arrest to b ring peripheral pooling back to central compartment.
· Isoproterenol - β_1, β_2 adrenergic agonist. Extremely chronotropic and $\therefore$ arrythmogenic, used for bradyarrythmias,
pacemakers and horses that are very fit. Vasodilation.

Depth of anesthesia
· Stage I: All levels of consciousness when patient responsive, including sleep.
· Stage II: Loss of consciousness. Uncontrolled spontaneous reflex activity.
· Stage III: Cessation of spontaneous motor activity. Stage of surgical anesthesia.

Blood pressure - Systolic below 80 and mean below 60 are worry numbers when anesthetized. Hypotension is mean BP<60 for >20min. Assist by ↓ anesthetic %, ↑ fluid rate, ↑ ventilation. Kidney cannot autoregulate when BP<60mmHg.
· Arterial Pressures = CO x Peripheral resistance. CO = HR x SV.
· Systolic 100-160, Diastolic 60-100, Mean 80-120. CVP 0-10.

Blood gasses – Hypoventilation kills slowly, hypoxemia kills quickly.
· $PaCO_2$ - Measures ventilatory status of the patient. Normal 35 – 45 mmHg. $PaCO_2 < 35$ = hyperventilation, ↑ HR, ↑ CO, ↑ BP, injected mucous membranes. $PaCO_2 > 45$ = hypoventilation. $PaCO_2 > 60$ = severe respiratory acidosis. Hypercapnia may be caused by hypoventilation, upper or lower airway obstruction, pleural filling disorders, pulmonary parenchymal disease, abdominal or thoracic restrictive disorders.
· PaO_2 - Measures oxygenating efficiency of the lungs. Normal 90 -100. Patients on 100% O_2 have PaO_2 400-500. PaO_2 = 5x what breathing. $PaO_2 < 60$mmHg = hypoxemia.
· SpO_2 – predictor of O_2 saturation (PaO_2). % saturation of Hgb. Measure w/ pulse oximeter, want >90%.

Urine output - Indirect measure of major visceral organ perfusion. Intraoperative urine output should be 1-2 ml/kg/hr, 0.5mg/kg/hr in horse. Renal fxn ↓ after general anest and sx in normal, healthy animal for 24-48 hrs.

pH – Acid base status. Normal – 7.4. Primary derangement is always in direction of pH, body won't overcompensate. 0.3 x bas deficity x wt(kg) = HCO_3 mEq (give ½ and reasses).

Temperature – Can spontaneously fibrillate if < 92° F.

Tricaine methanesulfonate (MS-222) – Only anesthetic agent approved by FDA for fish.

E cylinder of O2 – Contains 700L @ 2200 psi

H cylinder of O2 – Contains 7,000L @ 2200 psi

Angiotensin – Vasoconstrictive principle formed in the blood when renin is released from the juxtaglomerular apparatus in the kidney. The enzymatic action of renin cleaves angiotensinogen to angiotensin I. Angiotensin I is activated in the lung to become angiotensin II (by ACE). Angiotensin II stimulates aldosterone secretion and raises blood pressure, thereby decreasing fluid loss.

Antacids and Antisecretory Agents – Gastric ulceration, hypersecretory diz, EPI, NSAID tox.

· AlOH – Cations bind bile acid, stimulate prostaglandin sythesis, cytoprotective. Rapid. Also binds P in renal disease.

· H_2 antagonists – Antisecretory; competitive blockade. Cimetidine – TID, least potent, most bioavailable. Ranitidine – 5-12x more potent, BID, less bioavail, minimal drug interactions.

· Omeprazole - Proton pump inhibitors. Most effective antisecretory.

· Misosprostol – Synthetic prostaglandin, antisecretory. Local effects.

· Sucralfate – Cytoprotective; needs acidic environment to work. Protects and promotes healing; physiologic bandaid. NSAID prophy.

Anterior Uveitis - Inflammation of the anterior uveal tract (iris, ciliary body, choroid).

· Signs - Pain, blepharospasm, tearing, conjunctivitis, constricted pupil, reduced IOP, aqueous flare, keratic precipitates,
hypopyon, miosis. Glaucoma, cataract and corneal opacification may be complication.

· Cause - Trauma, infectious systemic disease, intraocular neoplasm, intraocular helminths, immune-mediated disease. Recurrent uveitis immune-mediated.

· Treatment - Topical atropine, corticosteroids if no ulcer, prostaglandin inhibitors, antibiotics.

· Definitions - Blepharospasm - spasm of the orbicular muscle of the eyelid. Aqueous flare - turbidity of the aqueous humor caused by increased protein levels. Keratic precipitates - fibrous deposits on the posterior surface of the cornea, usually associated with uveitis. Hypopyon - pus in the anterior chamber of the eye.

Anthelmintics

· **Pyrantel pamoate**. Nemex, Strongid-T. Neuromuscular blocker, paralyzes. Used for roundworms and hookworms in dogs and cats, also Physaloptera. Strongyles, ascarids in horses. Not absorbed, safe for puppies, kittens, pregnant and lactating animals. Pamoate salt limits absorption – just passes through.

· **Fenbendazole** – Panacure. Least hepatotoxic benzimidozole. Treats rounds, hooks, whips, *Taenia*, lungworms (cats) and *Giardia*. NOT effective against *D. caninum* tapes. 3 doses over 3 days. Febantel is prodrug metabolized to fenbendazole in dogs, don't use in cats. HPS reactions to dying parasites esp. at high doses. **Benzimidozoles** interfere w/ parasite metabolism via inhibition of glucose transport = starvation. All are hepatically metabolized. Albendazole is hepatoxic to SA, used in LA. Oxibendazole and Thiabendozole are indicated for removal of equine parasites in addition to use in other animals. (Many equine parasites have developed resistance to their drugs).

· **Praziquantel** – Droncit, Drontal Plus (combo w/ pyrantel and febantel). Isoquinolone derivative. Widely distributed to tissues after oral admin. Used in tapeworm (cestode) infections, *Dipylidium*, *Taenia*, *P. Kellicotti*, *Echinococcus granulosis*. Impairs function of sucker, stimulates motility. Puppies >4 wks, kittens >6 wks. May see anorexia, V, D, ataxia. Avoid injectable Droncit – burns.

· **Epsiprantel** – Cestex. Isoquinolone derivative. Membrane destabilization causing disruption in worm's integument, host immune system destroys. Tx tapes in cat, dog. >7 wks of age. Not systemically absorbed, safe. Single dose adequate.

· **Ivermectin** – Macrolide. Enhances the release of GABA. GABA acts as an inhibitory neurotransmitter in nematodes and arthropods. Ivermectin causes paralysis and eventual death of the parasite via increase in Cl^- channel permeability. Ivermectin is ineffective against flukes and tapeworms because they do not use GABA as a peripheral nerve transmitter. Mammals do not use GABA as a peripheral nerve transmitter. Heartworm prophylaxis, microfilaricidal; effective against hooks, whips and rounds at higher dose. Lower bioavailability in cats. Young >6 wks old; safe in pregnant/lactating. Does not cross the blood brain barrier. Contraindications: do not use dose higher

than prophy dose in collie breeds (does cross BBB). Also contraindicated in shelties, australian shepherds, old english sheepdogs.

· **Other Macrolides** – Moxidectin, Proheart, heartworm prophy, ok in collies. Selamectin, Revolution, HW prophy, hooks, rounds, fleas, sarcoptes, otodectes. Milbemycin oxime, Interceptor, Sentinel (w/luferenon), HW prophy – make sure HW(-) 1st, microfilaricidal, can cause anaphylaxis; also hooks, rounds, whips, puppies >8 wks.

· **Piperazine** - Pipa tabs. Only effective against ascarids (roundworms). Paralyzes the worm, allowing it to be passed out with the feces. Blocks acetylcholine at the neuromuscular junction. >3 wks of age. OTC products.

· **Levamisole**. Imidothiazole. Promotes unchecked excitatory neurotransmitter activity = paralysis, death. Indicated for treatment of many nematodes usually with LA. More effective against adult worms than larval forms. Not effective against horse parasites.

· **Arsenicals** – Interfere w/ parasite metabolism (inhibit glycolysis), kill adult heartworms. Melarsomine, Immiticide; give IM only. HW infection in dogs. More effective and less irritating, less hepatotoxicity than Thiacetarsemide sodium, Caparsolate. Injection site reactions common, low therapeutic index and low margin of safety in both. Caparsolate can cause significant hepatic and renal damage.

· **Diethylcarbamazine** – Filaribits. Not used much anymore. Apparent filaricidal activity via paralysis. HW prevention with daily oral dosing, can't skip a dose. Do not give if MF+, else shock like syndrome. Effective against rounds at higher doses.

Anthrax – *Bacillus anthracis*. Gram+, nonmotile, spore forming bacterium. Acute, febrile disease of all warm-blooded animals. **REPORTABLE**. **ZOONOTIC**. Found in soil. Not communicable between animals, acquire from consumption of contaminated meat, grazing contaminated soil, spore inhalation, or open skin wound.

· Clinical findings – Septicemia w/ rapidly fatal course. Abrupt rise in temp, stupor, staggering, dyspnea, trembling, collapse, sudden death. Bloody discharges from natural body openings. Anorexia, GI stasis, colic, hematuria. Chronic infections characterized by local, SQ, edematous swellings usually in ventral neck, thorax, shoulders. After death, *rigor mortis* usually incomplete or absent, dark blood from orifices, bloat, rapid decomposition.

· Diagnosis- ELISA, western blot, culture, PCR, IFA. Ddx – other causes of sudden death.

· Treatment and Control – Penicillin, oxytetracycline. Control w/ live vaccine.

· If suspect – Inform regulatory agency, rigid quarantine, prompt disposal of dead, manure, bedding by cremation or deep burial, isolate sick, disinfection, insect repellants, control scavengers, sanitary procedures.

Antibiotics

· **Penicillins** – β-Lactams. G+, easy G-, anaerobes. Bactericidal. Inhibit cell wall synthesis. Safe. Elimated via kidney, good for UTIs. Natural penicillins – G+, poor G-, spirochetes, destroyed by penicillinase. PenG and PenV. Penicillinase-resistant penicillins – Penicillinase producing G+ cocci, esp. *Staphylococcus*. Cloxacillin, dicloxacillin. Aminopenicillins – Broad spectrum, ↑ G- activity. Ampicillin, amoxicillin. Extended spectrum penicillins – addl Gactivity, *Pseudomonas*. Carbenicillin, ticarcillin, piperacillin. Potentiated penicillins - Developed to inactivate β-lactamases. Clavomox, timentin. Don't use penicillins in rodents and lagomorphs; elimination of G+ gut flora can lead to fatal colibacillosis.

· **Cephalosporins** – β-Lactams. G+, some G- (more with each generation), anaerobes. Bactericidal. β-lactam antibiotics. Inhibit cell wall synthesis. More effective against actively growing bacteria. Classifications – 1st generation cepholosporins include cephalothin, cefazolin, cephapirin, cephadine, cephalexin, cefadroxil. Activity against most G+, poor G- activity. 2nd generation cepholosporins - not very popular, same G+ activity, expanded G-. 3rd generation cepholosporins – same G+ activity, much expanded G- activity; cefotaxime, moxolactom, cefoperazone, ceftiofur (BRD, no withdrawal time).

· **Aminoglycosides** – 1° G- aerobes. Some G+. *Pseudomonas, staphylococcus*, atypical mycobacterium (nocardia/actinomyces). Irreversibly bind to 30S ribosomal unit and inhibits protein synthesis. Bactericidal. Includes amikacin (SID, parvo pups), gentamicin, neomycin, and spectinomycin. Inactive against fungi, viruses and most anaerobic bacteria. Accumulate in inner ear and kidneys. Elimination via glomerular filtration. Adverse Effects – Nephrotoxic. Casts in urine, increased BUN and Cr. Nephrotoxicity reversible when drug discontinued. Ototoxic. 8th cranial nerve toxicity. Auditory and vestibular symptoms may be irreversible.

· **Fluoroquinolones** – Good G- aerobes, facultative anaerobes, atypical mycobacterium, *chlamydia, mycoplasma, ehrilichia,* BRD. Bactericidal. DNA gyrase inhibitor, prevent DNA synthesis. Enrofloxacin (SID, prostate, RMSF, deethylated to cipro), ciprofloxacin. Variable activity against *Streptococci* – not recommended. Contraindicated in young animals due to cartilage defects. Baytril associated with blindness in cats.

· **Sulfonamides** - G+, easy G-, anaerobes; *nocardia* and *actinomyces*. Bacteriostatic. Inhibit folic acid pathway (PABA/pteridine not converted to DHFA). Broad spectrum. Many bacteria have developed resistance. Potentiated sulfonamides – TMPS. Bactericidal, inhibits bacterial thymidine synthesis in folic acid pathway. Excellent tissue distribution. Most drug side effects of all Abs, allergic reactions, hepatotoxic, KCS, hypothroidism, crystalluria, thyrotoxic, anemia, BM toxicity (aplastic anemia, thrombocytopenia hypoprothrombinemia).
· **Tetracyclines** - G+, easy G-, *Mycoplasma,* spirochetes*, chlamydia, Rickettsia, Hemobartonella,* Brucellosis. Bacteriostatic. Inhibits protein synthesis by binding to the 30S ribosomal unit. Safe. Prostate. Includes doxycycline (biliary excretion), oxytetracycline, tetracycline. Resistance ↑. May cause esophagitis. **Chloramphenicol** – G+, G-. Bacteriostatic. Binds to the 50S ribosomal subunit preventing protein synthesis. Penetrates everything. Can cause aplastic anemia in humans.
· **Lincosomides** – G+ aerobes, anaerobes. No G-. Often combo w/ aminoglycosides. Lincomycin, clindamycin. Bacteriostatic or bactericidal. Bind to the 50S ribosomal subunit. Distribute well, biliary elimination. Contraindicated in rabbits, rodents, horses, ruminants due to serious GI effects.
· **Macrolides** – G+, selected G-. Bacteriostatic. Bind 50S ribosomal subunit. [ ] in alveolar macrophages, great for pulmonary infections. Erythromycin, tylosin, tilmicosin. Erythromycin is used in the treatment of *Rhodococcus equi* in combo w/ rifampin. Can cause increase in GI motility. Tilmicosin – used in BRD; CV toxicity in primates, horses, swine.
· **Metronidazole** - Bactericidal and antiprotozoal. Obligate anaerobes. Disrupts DNA and nucleic acid synthesis. Immunolmodulator in IBD.
· **Rifampin** - Bactericidal or bacteriostatic. Inhibits DNA-dependent RNA polymerase. Used for treatment of *Rhodococcus equi* in combo w/ erythromycin.

Antiemetic Agents
· **Apomorphine** – Most consistently effective antiemetic in dogs.
· **Atropine** – Anticholinergic. Central. Too many side effects for antiemetic use.
· **Chlorpromazine** – Phenothiazine. Central, antidopaminergic. Very effective centrally acting antiemetic, esp for blood born stimuli. 2nd drug of choice.
· **Diphenhydramine** – Antihistaminergic. Central. Good for motion sickness, otitis media/interna
· **Metaclopramide** – Antidopaminergic. Peripheral and central. Physiologically antagonizes vomiting reflex. Also prokinetic from esophageal sphincter to upper duodenum, don't give w/ obstruction, perforation, or epilepsy. 1st drug of choice.
· **Bismuth Subsalicylate** – Antiprostaglandin, antibacterial. Peripheral. Antidiarrheal. Care in cats.

Antifungal Agents
· **Amphotericin B** – Polyene macrolide. Binds to fungal sterols, altering permeability of membrane. Fungistatic. Dimorphic fungi (histo, blasto, crypto, coccidio). Because of the risk of severe toxicity reserved for disseminated, progressive, potentially fatal fungal infections. Nephrotoxic, anaphylactoid.
· **Imidazoles** – Fungistatic. Inhibit ergosterol/steroid synthesis (blocks cytochrome p450), ↑ cell membrane permeability, ↓ cell membrane fluidity. Use for dermatophytes, yeast, dimorphic fungi. Impairs steroid sythesis, so sometimes used in hyperadrenocorticism and prostate diz. Ketaconazole – Fairly safe (hepatotoxicity), give w/ food. Short t½. Not got w/ dimorphic fungi, esp. blasto. Itraconazole – more effective spectrum. Fluconazole – Crosses BBB.
· **5-Flucytosine** – Ancoban. Inhibits DNA synthesis (antimetabolite, competes with uracil, interfering with pyrimidine
metabolism and protein synthesis). Limited spectrum - *Cryptococcus*, *Candida*. Rapid absorption, excellent distribution. Synergistic effect with amphotericin B. Adverse effects include BM depression (pancytopenia), GI disturbances, rashes, oral ulceration, increased liver enzymes.
· **Griseofulvin** – Inhibits fungal mitosis by disrupting mitotic spindle, inhibit nucleic acid and fungal wall sythesis. Limited to dermatophytes only. Give w/ fatty food to ↑ absorption. [ ] in keratin. Side effects include GI, teratogenic
and carcinogenic at ↑ doses, bone marrow dyscrasias. Do not give to pregnant animals.

Antiseptic Agents – Agents applied to the body vs. **disinfectants** which are used on inanimate objects.

· Alcohol – Protein denaturation. 70% is effective against G+ and G- bacteria. Good bactericidal, fungicidal, virucidal. Most rapid acting but least residual action. Fast kill, defatting agent. Evaporates quickly. 2 min for max effect. May be drying or irritating. May cause cytotoxicity. Often used in combo w/ povidone iodine.
· Chlorhexidine – Cytoplasmic membrane disruption. 0.05% soln effective against Gram+ and Gram-. Persists on skin to give cumulative antibacterial effect. Less irritating. Not inactivated by organic matter. 0.05% is 1:40 dilution, most bactericidal and least toxic to tissues.
· Hydrogen peroxide – Poor antiseptic. Short-acting germicidal effect through release of nascent O_2, irreversibly alters proteins. Effective sporicide. Effervescent action mechanically removes pus and bacteria.
· Iodine – One of most potent antiseptics. Bactericidal, virucidal, fungicidal. Takes 15 min for sporicidal action.. Organic matter inactivates free I in PI. Iodine Soln USP has little to no stinging on broken skin. Iodine tincture USP (I in alcohol) is even more effective, but stings and irritates skin. Rare HPS rxns. Povidone iodine often used in conjunction w/ alcohol. Use PI in 0.1 to 1% [ ]; more dilure solns have ↑ free I and faster, potent bactericidal activity. Dilute stock solution 1:100 or 1:10. Don't use I scrub on open wounds –damage tissue and ↑ infection.
· Iodophors – Betadine. Aqueous complex of iodine, less bactericidal but also less irritating. Gram-, gram+. Do not require repeated application for optimal antimicrobial effect. Contact time 10 min for max effect.
· Hexachlorophene – Gram+ bacteria. Only effective after days of use once film deposition on skin, long contact time. CNS toxin if absorbed, esp in young. Not used much anymore.
· Quaternary ammonium compounds - Changes in cell membrane permeability. G+. Inactivated by organic debris and soaps. Not recommended.

Arginine – Essential amino acid for cats. Needed to "drive" the urea cylce b/c it transforms ammonia into urea. Arginine deficiency may potentiate hepatic encephalopathy.

Arsenic Poisoning - Sources include rodenticides, wood preservatives, weed killers, baits, insecticides.
· Clinical signs - Acute effects on GIT and CV system. Profuse watery diarrhea, may be blood tinged. Severe colic, dehydration, weakness, depression, weak pulse.
· Diagnosis - Determination of arsenic levels in tissue and ingesta.
· Treatment - Thioctic acid, Dimercaprol (BAL). Phenylarsonic toxicosis - arsenical additives to swine and poultry diets to improve production, treat dysentery. Toxicosis results from excess supplementation. Signs in pigs include reduction in weight gain, incoordination, posterior paralysis, blindness. Neurotoxic effects reversible once feed removed. Paralysis and blindness irreversible.

Arthridites in Lambs - Causes of lameness in lambs include joint-ill, tetanus, white muscle disease, enzootic ataxia (copper deficiency), polyarthritis (chlamydial), rickets, poisonous plant intoxication (sneezeweed), and contagious ecthyma (orf). In any age, also erysipelas (important), laminitis, bluetonque, ulcerative dermatosis, foot-and-mouth disease, dermatophilosis.

Arytenoid Chondropathy or Chondritis – Horse. Bilateral inflammation of the arytenoid cartilage causing exercise intolerance, noise, coughing, dyspnea, syndrome similar to that caused by recurrent laryngeal nerve paralysis. Dx via endoscopy. Tx – partial/total arytenoidectomy (leave muscular process). Bilateral – temporary and permanent tracheotomy.

Ascariasis - *Toxocara canis, felis*. Roundworms found in the SI of dogs and cats. See Roundworms..

Aspergillosis – Inhaled fungus. Most common nasal fungal infection in dogs (*A. fumigatus*), esp dolichocephalics. Urinary aspergillosis in GSD, systemic. 1° a respiratory disease. Causes pulmonary infections in birds and death in penguins, mycotic abortion in cattle, gutteral pouch mycosis in horses, infections of the nasal and paranasal tissues of dogs. Clinical signs and lesions in birds include yellow nodules in respiratory passages, etc. See matts of hyphae. Eats away at turbinates. Tx w/ itraconazole and others. Flush nasal cavity w/ chlortrimazole.

Aspiration pneumonia – Right middle lung lobe most commonly affected (1_{st} major bronchus). 2° complication in many diseases. Can be fatal. Treat aggressively with antibiotics.

Aspirin – NSAID. Irreversibly inhibits cyclooxygenase (prostaglandin synthetase) thereby ↓ synthesis of prostaglandins and thromboxanes. Platelets cannot synthesize new cyclooxygenase causing an irreversible effect reduction of platelet aggregation. Antiinflammatory by local actions, antipyretic and analgesic by effects on CNS.

· Pharmacokinetics - Metabolized in the liver by conjugation with glycine and glucuronic acid via glucuronyl transferase. Cats are deficient in this enzyme, so aspirin has a prolonged half life in cats and may accumulate. Excreted by kidneys.

· Use - Analgesia, antipyretic, antiinflammatory, inhibition of platelet aggregation.

· Adverse eff ects - GI ulcers. Toxicity in cats.

· Comparison of NSAIDs - Phenylbutazone more effective peripherally (antiinflammatory) than centrally (antipyretic). Acetaminophen has weak peripheral actions and does not produce significant GI irritation, nor does it have siqnificant antiinflammatory activity, though it acts centrally as an analgesic.

Atopy - Type I HPS, histamine mediated release from mast cells. IgG mediated. Hives, wheals, urticaria distributed to face, feet, ears, armpits, legs in dogs. Miliary dermatitis in cats. Includes food allergies and atopic dermatitis dt inhaled allergens. Intradermal skin testing and ELISA testing (controversial)). Remove offending allergen, hyposensitization, glucocorticoids.

Atrophic rhinitis - *Bordetella bronchiseptica, Pasteurella multocida*. Pigs.

· Clinical signs - Sneezing, followed by atrophy of turbinate bones. Signs begin in pigs 3-8 wks.

· Diagnosis - Signs, lesions, culture

· Control - Difficult to keep herds free of diz, but usually low level. Control measures taken when reach unacceptable levels. Antibiotic (tet, sulf, tm, tyl) administration to prefarrowing sows, newborn piglets, weaners. Bacterin admin to sows (4 and 2 wks prefarrowing) and piglets (1 and 4 wks).

Atropine – Anticholinergic, antimuscarinic. See Anesthesia section. Used as preanesthetic to ↓ respiratory secretions, prevent sinus bradycardia and AV block. Also an antidote for cholinergic overdose (physostigmine) and organophosphate toxicity. Don't use in patients with glaucoma.

Atypical pneumonia - Includes acute bovine pulmonary emphysema and edema (ABPEE), fog fever, bovine atypical interstitial pneumonia. One of the more common causes of acute respiratory distress in cattle, esp adult beef cattle. Typically occurs in autumn, 5-10 days after change to a lush pasture. Lush pasture high in L-tryptophan, which is degraded in the rumen to indoleacetic acid, which is converted by rumenal microorganisms to 3-methylindole. 3-MI is absorbed into the bloodstream and is the source of pneumotoxicity after it is activated by pulmonary macrophages.

Autonomic Nervous System – Involuntary branch of peripheral efferent nervous system; works in conjunction w/ somatic NS which is voluntary branch of efferent division. Innervates cardiac mm, smooth mm, most exocrine glands, some endocrine glands. Neurotransmitters are acetylcholine and norepinephrine. ANS subdivides into sympathetic and parasympathetic NS. Cell body of 1st neuron in CNS – preganglionic fiber – cell body of 2nd neuron in ganglion outside CNS – postganglionic fiber – effector organ. Most visceral organs dually innervated by SNS and PNS

· Sympathetic NS – Fight or flight. Originate in thoracolumbar SC. Short preganglionic fibers, synapse w/ ganglia in sympathetic trunk. Long postganglionic fibers to effector organs.

· Parasympathetic NS – General housekeeping (SLUDDE). Originate in craniosacral SC. Long preganglionic, short postganglionic.

· Acetylcholine – Neurotransmitter for both sympathetic and parasympathetic preganglionic fibers. Also, parasympathetic postganglionic neurotransmitter. Called cholinergic fibers. Ach also acts at sympathetic postganglionic fibers of sweat glands and efferent skeletal muscle terminals.

- Cholinergic receptors:

• Nicotinic – Found on postganglionic cell bodies in all autonomic ganglia. Respond to Ach released from both sympathetic and parasypathetic preganglionic fibers. Also on motor end plates of skeletal mm.

• Muscarinic – Found on effector cell membranes of smooth mm, cardiac mm and glands. Bind w/ Ach from parasympathetic postganglionic fibers. Atropine blocks muscarinic receptors.

· Norepinephrine – Released by sympathetic postganglionic fibers. Called adrenergic fibers (adrenaline). Also acts at adrenal medulla.
- Adrenergic receptors:
• α – Norepi. Excitatory response in effector organ. In general, smooth mm constiction.
• β - Epi. β_1, 1° in heart, excitatory response. β_2, generally inhibitory, relaxation of smooth mm causing bronchodilation and vasodilation.
α_1 – Postsynaptic, smooth mm and glands
Agonist: epi ≥ norepi >> iso
Antagonist: prazosin
· ↑ constriction and excretion
· Vasoconstriction
· Contract radial mm of iris – mydriasis
· Contraction of 3rd eyelid
· Contraction of splenic capsule
· Hyperpolarization and relaxation of intestinal smooth mm
β_1 – Heart. Cardiostimulant.
Agonist: iso > epi = norepi
Antagonist: propanolol
· Positive inotrope and chronotrope
· ↑ AV nodal conduction velocity
· Inhibits motility and tone of SI
· ↑ blood pressure via ↑ in renin secretion from juxtoglomerular cells, conserve Na^+ and H_2O
α_2 – Presynaptic, feedback inhibitor
Agonist: xylazine, detomidine
Antagonist: yohimbine, atipamezole, tolazoline
· Inhibits gut Ach (↓ motility)
· Postjunctional α_2 acts like α_1 to contract smooth mm
· ↓ insulin secretion from pancreatic islet cells
β_2 – Bronchioles. Inhibitory to smooth mm.
Agonist: iso > epi >> norepi
Antagonist: propanolol
· Bronchodilation
· Relaxation of smooth mm
· Vasodilation to abd viscera, kidneys, lungs, and skeletal mm.
· ↑ secretions
· Glycogenolysis and uptake of K^+ in sk mm
· Gluconeogenesis in liver

Avascular Necrosis of Femoral Head – "Leg Perthy's Disease" in humans. Effects young toy and small breed dogs. Decreased blood supply to femoral head and neck, femoral head collapses, pathologic fracures can occur, osteoarthrosis. Usually unilateral lameness. Can be traumatic or spontaneous. On rads, see ↓ opacity of femoral head and neck, collapse of femoral head, joint laxity. Sx, require FHO. Warn O that may occur in other side later.

Avian Anatomy and Diagnostics –
· Feathers don't grow continuously, molt once a year (some spp twice); new feathers have blood supply.
· Urophygial gland at dorsal base of tail for preening.
· Proximal axial skeletal system is pneumatized. Do not attempt to get BM or put catheters in femur or humerus.
· Eyes have skeletal muscles in the iris, cannot dilate pupil w/ atropine (use NM blocker). Optic chiasm 100%, no

concentual PLR.
· Respiratory system requires filling of air sacs with 1st breath, goes to caudal air sac, lungs, cranial air sac and back out.
· Digestive system is beak-tongue-cervical esophagus-crop-thoracic esophagus-proventriculus (glandular stomach)-ventriculus (grinding)-intestines-cloaca.
· Lobulated kidneys are dorsal in synsacral fossa. Renal portal system in addition to hepatic portal system, why don't give injections in hindlimbs (filtered prior to systemic circulation). Birds can decrease GFR b/c uric acid is secreted not filtered. Assess renal fxn w/ uric acid; severe renal failure leads to gout.
· Liver measured by AST and bile acids (not SAP, ALT), eval CPK concurrently. Icterus is rare, see bright green urates when urates should be white.
· Female has 1 ovary on left, poultry have right remnant (often cystic). Males have 2 testes, some have phallus.
· Heart has 4 chambers, right AV valve is muscular not tendinous. R aortic arch, not L.
· Do not have lymph nodes but lymphoid tissue – if spleen enlgd, serious systemic disease. Lymphoid tissue includes thymus and bursa of fabrecious (outpouching of cloaca), both of which shrink up w/ sexual maturity.
· Heterophils instead of neuts w/ rod shaped granules, nucleated thrombocytes instead of platelets, nRBCs.

Avocado – Pulmonary edema and death in birds.

Avulsion fracture - A fragment of bone, which is the site of insertion of a muscle, tendon or ligament, is detached as a result of a forcef ul pull. Repair with a pin or screw.

Babesiosis – *Babesia canis, B. gibsoni* in dogs, *B. felis* in cats, *B. bigemina, B. bovis* in cows. Intraerythrocytic protozoan parasite transmitted by ticks. Dogs and cats – *Rhipicephalus*, the brown dog tick and some *Dermacentor*. *Boophilus* tick spp in cattle. Destroys RBCs intravascularly during escape from cells. No human health risk.
· Clinical signs – Can look just like IMHA, regenerative anemia. Most subclinical. If immunocompromised or splenectomized (parasitized cells removed by spleen), see Hgburia, hgbemia, anemia, hemolysis, icterus. Death.
· Diagnosis – Hx of tick infestations. Giemsa-stained capillary blood or organ smears. ELISA, IFA. Often Coombs +, polyclonal gammopathy.
· Treament – Imidocarb dipropionate (Imizol), Diminazene aceturate (Berenil). Feline may be nonresponsive, primaquine phosphate reported to be effective.

Bacillary hemoglobinuria - *Clostridium hemolyticum*. "Red water disease." Acute, infectious, toxemic disease primarily of cattle. Soil borne organism found naturally in alimentary tract of cattle. Latent spores become lodged in the liver, where they germinate. The resulting vegetative cells produce phospholipase C, which causes acute hemolytic anemia.
· Clinical findings - Acute hemolytic anemia. Sudden onset of severe depression, fever, abdominal pain, dyspnea, dysentery, hemoglobinuria, anemia, jaundice.
· Diagnosis - Port-wine colored urine. Liver infarct. Normal size and consistency of spleen, IFA of liver.
· Control - Early treatment with penicillin – *C. hemolyticum* bacterin in endemic areas.

Barium Series – Should move out of stomach into duodenum by 30 min. Reach ileocolic valve w/in 2 hrs.

Beak and Feather Virus – Immunosuppressive disease, often die of 2° causes. Feather disease w/ damaged follicles, dystrophic feathers, hemorrhage in shafts. Necrotic beaks. Old world birds at risk PCR of blood sample to dx.

Bence-Jones Proteins – In urine, comprised of immunoglobulin light chains.

Bethanocol – Parasympathomimetic used for treating disorders of micturition when no obstruction present. Other drugs include dantrolene, diazepam, diethylstilbestrol, estrogen, testosterone, propantheline. Cholinergic, effects primarily muscarinic, negligible nicotinic activity. Has ↑ duration of action compared to acetylcholine. Used to ↑ detrusor muscle tone and stimulate bladder contractions in small animals. Also an esophageal or GI stimulant, but metoclopramide and neostigmine are better.

Bicarbonate Deficit Replacement - Base deficit x 0.3 x kg = mEq bicarbonate
· Normals: base deficit 0 ± 4 mEq/L
bicarbonate 24 ± 4mEq/L
CO2 25 ± 4mEq/L
· Base deficit values below -10 and bicarbonate values below 14 warrant therapy.

Biliary Tract Obstruction – Bilirubin causes normal colored feces. If no bilirubin, as in complete obstruction, get pale white feces (i/d, rice will also do this). 1st change is ↑ SAP, then hyperbilirubinuria, then hyperbilirubinemia. #1 cause of BTO is pancreatitis. In surgery, if see little white dots, suponified fat, not mets. Biopsy in pancreatitis in cats (uncommon).

Bismuth Subsalicylate – Effective antisecretory dt salicylate. Good for acute diarrhea.

Blackleg - *Clostridium chaovoei*. Also *C. septicum* and *sordelli*. An acute febrile disease of cattle and sheep characterized by myonecrosis and emphysematous swelling, usually in the heavy muscles. Caused by ingestion of spores and deposition into mm. Usually in young adult beef cattle w/ no hx of trauma. Usually trauma induced in sheep. Most common in summer and fall.
· Clinical findings - Crepitant swellings of the heavy muscles. Acute lameness. Acute death in healthy young beef cattle.
· Diagnosis - History, clinical findings, IFA.
· Control - Vaccination

Blastomycosis - *Blastomyces dermatitidis.* Fungal disease of the midwest. Hunting dogs. Large (8-20 μ m) broad based budding yeast w/ refractive cell wall. Infection causes primary granulomatous or pyogranulomatous lesions in the lungs. N∅s infiltrate. May occur in the skin, eyes, bone and elsewhere. Draining cutaneous tracts, respiratory disease. Bone diz looks like tumor (ddx coccidio). AGID test, serology. Tx w/ amphotericin B (nephrotoxic). Poor px if disseminated.

Blister Beetle – Cantharidin toxicity. Most often in horses. Blister beetles swarm in alfalfa hay during harvesting. Beetles contain cantharidin, a potent irritant and vesicant that causes GI and renal signs as well as hyperemia and ulceration of the oral, esophageal and GI mucosa. Clinical signs include colic, salivation, choke, pollakiuria, hematuria, hypocalcemia, hypomagnesemia. Horses can die within 48 hours. Treat with supportive care.

Blood - Hemoglobin formation consists of a globin molecule and four heme groups. Each heme group contains an iron atom with which a molecule may associate and dissociate. Each Hbg molecule can transport a max of four molecules of O_2. Each erythrocyte contains 200-300 million molecules of hemoglobin. When blood passes through the lungs, Hgb becomes saturated with O_2, forming oxyhemoglobin. When this blood passes through body tissues, some of the O_2 dissociates from the Hgb. Normal blood contains 15 grams Hgb per decaliter. 98% of that is saturated with oxygen.

Blood Transfusion – wt (lbs) x 40(dog) or 30 (cat) x desired PCV – patient PCV/PCV of donor. Rate approx 10ml/kg/hr, slowly at first to check for adverse rxns. If giving to fast, patient will vomit.

Blood Types –
· Cat – A, B, and AB. Severe transfusion rxns in type B cats receiving type A blood. Type Bs carry alloantibodies to type A. Purebreds are more commonly type B. Risk for severe rxn on 1st transfusion. AB is very rare.
· Dog – A (DEA1.1 or DEA1.2), B,C,D, F, Tr (DEA7), J,L,M,N. Natural antibodies are anti-B,-D,-Tr. Donors should be DEA1.1, DEA1.2 and DEA7 negative. Neonatal isoerythrolysis assoc w/ anti-DEA1.1.
· Horse – A,C,D,K,P,Q,T,U. Natural antibodies anti-A,-C. NI assoc w/ Aa or Qa. Donors should be non Aa or Qa.
· Cow – A,B,C,F,J,L,M,R,S,T,Z. Natural antibodies anti-J. B system most complex w/ >1000 alleles.
· Blood Donor – Ideally same blood type or at least w/out reactive antigens
· Cross Match **-** Major: 2 drops donor RBC in 2 drops recipient serum; if incompatible, recipient serum contains Abs to donor RBCs. Most important, if incompatible, cannot tranfuse for any reason. Minor: 2 drops recipient RBC

in 2 drops donor serum; if incompatible, donor serum contains Ab to recipient RBCs. Cannot transfuse plasma, but can RBCs, if washed and major cross match compatible.

Blood Volume - Total body water = 60% of body weight; ECF = 50% of TBW, ICF = 50% of TBW. ECF divided into plasma volume (8% TBW), IF (37%TBW), and TF (5%TBW). Blood volume can be approximated as 10% body weight, plasma volume as ½ blood volume. Normal blood volume is 90mls/kg in dog, 50mls/kg in cat, 75mls/kg in horse. Blood loss exceeding 20-25% blood volume can lead to shock.

Blue Tongue Virus - Orbivirus carried by *Culicoides.* Endemic in USA. Disease of sheep, cattle, goats, and wild ruminants. Cattle are the reservoir. Inappetance in cattle and goats, severe disease in sheep and deer.
· Clinical signs - Sheep- hyperemia of muzzle, lips, ears; dyspnea, erosion/ulceration of oral mucosa; muscle necrosis, cyanotic tongue. Abortions, congenital defects. Mortality 0-30%. Cattle - usually asymptomatic. If develop clinical signs, same as sheep. If infected during gestation, may abort or give birth to abnormal calves.
· Diagnosis and Prevention – IFA. Vaccinate sheep. Insect control

Bog Spavin - Chronic synovitis in tibiotarsal (hock) joint causing obvious distension of joint capsule.

Bone Blood Supply - Diaphyseal nutrient artery enters and passes through cortex to medullary cavity w/out supplying collaterals to the cortex. Divides into ascending and descending branches which anastomose with the epiphyseometaphyseal vessels to supply the BM and compact and cancellous bone. Blood flows centrifugally through cortex to exit via periosteal venules. In areas of the cortex with heavy fascial attachment, the outer 1/3 of the cortex is supplied by periosteal arteries.

Bone Repair - Sequence of events: trauma - local blood vessel damage, local necrosis of bone and soft tissue back to sites of intact vascular perfusion. Active hyperemia to help with fracture healing. Removal of necrotic tissue and bone. Clot organization. Formation of callus. Fibrous callus appears 4-5 days after fracture. Bony callus visible radiographically 11- 38 days after fracture. Remodeling of callus. Trabecular bone converted into compact bone between ends of bone fragments.

Bone Spavin – DJD of hock joint terminating in the formation of exostoses and ankylosis of the joint.

Borreliosis – Tick-born bacterial disease of domestic animals and man. See Lyme Disease.

Botulism - Ingestion of *Clostridium botulinum* toxin or via wound. Neurotoxin. Prevents synthesis of acetylcholine at motor end plates. Clinical signs are weakness, flaccid paralysis w/ intact pain perception. Progressive. Disturbed vision, difficulty chewing and swallowing, generalized progressive weakness. Shaker foals. Death is due to respiratory or cardiac paralysis. Difficult to isolate organism. Once bound to nerves, antitoxin will no affect.

Bovine Corona Virus – Neonatal Calf Diarrhea. Winter dysentery. Fecal-oral w/ possible respiratory transmission. Can cause diarrhea in HUMANS.

Bovine Leukosis Virus – Retrovirus. AKA lymphosarcoma, malignant lymphoma, leukemia. Common cattle disease, 2nd most common bovine neoplasia after SCC. Transmitted by transfer of blood b/w animals. Trauma and surgery most common mechanisms of transmission, also insect vectors. Only 3-5% of those infected get LSA.
· Clinical findings - 4 syndromes- calf, thymic, skin and adult forms. The first 3 are not contagious; the adult form is from BLV. Calf form - calves < 6 mo old; widespread tumor metastasis. Thymic form – 6-8 mo old calves. Skin leukosis - only nonfatal form, seen in young adults; superficial cutaneous tumors regress after a few weeks. Adult form - adults 4 -8 yrs old, wide distribution of metastasis.
· Diagnosis - Clinical signs. Serologic test for BLV (adult form only). Severe lymphocytosis (>30,000) is not enough to dx LSA, need histologic dx.
· Control - No treatment. Test for BLV and cull positive animals or segregate all BLV reactors from nonreactors.

Bovine Respiratory Disease – BRD, Shipping Fever. *Mannheimia (pasteurella) haemolytica* is smoking gun, others

involved. Common disease of stocker and feedlot calves. Huge economic impact to beef cow industry. Stress, FPT, host, agents and environment all affect. Preconditioning to minimize. Tx w/ Ceftiofur (no w/d time), enrofloxacin, tilmicosin (not in dairy cattle, 28d w/d in beef).

Bovine Spongiform Encephalopathy – Mad Cow Disease. Progressive, fatal, neurologic diz of adult domestic cattle. Resembles Scrapie in sheep. 1st dx in Britain in 1986. Caused by prions. Prion agents cause Creutzfeldt-Jakob diz of man, although no evidence that diz acquired from animals. Transmitted by food-borne exposure to agent via contaminated meat and bone meal.

· Clinical signs – Subtle initially, behavioral. Progress over weeks to mos, trigeminal nn signs (licking, sneezing, head rubbing, tooth grinding). Exaggerated responses, frenzy, kicking, startle response. Terminal state usu w/in 3 mos w/ general hypokinesis, salivating, gait ataxia, falling, paresis. Intense pruritus of trunk seen in sheep Scrapie does not occur.

· Diagnosis – Definitive dx requires histologic exam of hindbrain.

· Treatment and control – No effective tx. Ruminant derived proteins are prohibited in ruminant rations in Britain.

Bovine Viral Diarrhea – Flaviviridae. Pestivirus. RNA virus, tremendous amounts of variants, mutates frequently. Respiratory diz in feeder animals, repro dz in pregnant cows. Most common in calves 8-24 months old when maternal antibodies have declined. Endemic, 85-90% of cattle seropositive. Also other farm and wildlife spp. Cytopathic or noncytopathic. Infection of fetuses w/ noncytopathic strains results in persistent infection and immunotolerance. PI calve only created in utero. These calves important in perpetuation of disease, as they are seronegative (don't have Ab response)and shed lots of virus. Harbored in WBCs.

· Clinical findings - Infection usually subclinical. Fever, anorexia, depression, erosions and hemorrhages of the GIT, diarrhea, dehydration. Oral lesions common, respiratory signs. Infections during pregnancy results in abortion, weak calves, or calves with congenital infections. Infection 120 - 150 days gestation results in congenital defects such as cerebellar hypoplasia, eye problems, hydrocephalus, tight curly coats.

· Diagnosis - Hx, clin signs, paired serum samples, IFA. PCR ear punch test. Virus isolation

· Control and prevent – Test and eliminate. Vaccine. Do not run pregnant sheep with cows since BVD may result in Border Disease. Biosecurity. Good nutrition.

· Acute Infection – subclinical, peracute, hemorrhagic syndrome, repiratory diz, venereal infections. Occurs when naïve cattle are exposed to PI cattle.

· Mucosal Disease – Acute, chronic, diz w/ recovery, delaye onset. Result of chronic or PI of noncytopathic BVDV w/ "super infection" by cytopathically related type.

· Fetal Infection – Abortion, stillborn, congenital defect, PI, normal calf born seropositive.

Brackenfern - Contains thiaminase. Causes thiamine deficiency in nonruminants, esp horses. Polioencephalomalacia in
sheep dt impaired thiamine metabolism. Aplastic anemia in cattle.

· Clinical findings - Thiamine deficiency in horses - anorexia, incoordination, crouching stance. Cattle - acute hemorrhagic syndrome, clots in urine, hematuria, pink milk. Chronic enzootic hematuria.

· Diagnosis - Blood thiamine levels.

· Treatment - Thiamine supplementation. Whole blood transfusion. N-betyl alcohol.

Brucellosis – Bacterial infection of cattle, pigs, sheep, goats, dogs, people, horses. **ZOONOTIC.** Characterized by abortion, retained placenta, and orchitis.

· **Brucellosis in cattle -** *Brucella abortus* is #1; also *B. suis, B. melitensis.* AKA Contagious abortion, Bang's disease.

- Transmission - Via ingestion of organism, venereal, mechanical transmission. Organism present in aborted fetuses, membranes, uterine discharges. Can also enter body through mucous membranes, conjunctiva, wounds, intact skin.
- Clinical findings – ABORTION. Also retained placentas, reduced milk yield, orchitis.
- Diagnosis - Bacteriology or serology. Serum agglutination is standard test. ELISA to detect antibodies in milk and serum. Best recovered from stomach/lungs of aborted fetus.
- Screening test procedures - Brucella milk ring test, pooled milk samples tested. Market cattle testing - serum testing of cattle sent to slaughter.

- Control - Test and eliminate reactors. Vax w/ Strain 19 or RB51. Usually vax heifers only. All dairy animals must be vaccinated at 4-8 mos of age. Vax of beef heifers is optional at 4 - 12 mos of age. Do not vaccinate any animal over the max age. ID vax calves by tattoo and eartag. Place tattoo and official orange eartag in R ear. Precede shield with letter corresponding to quarter of the year (A, B, C, D). The shield should be followed by the number corresponding to the last number of the year.

· **Brucellosis in dogs -** *Brucella canis*. 3rd trimester abortion – orchitis. Also *B. abortus, B. suis, or B. melitensis* associated with infected domestic livestock.

· **Brucellosis in sheep -** *Brucella melitensis*, abortion. *B. ovis,* produces disease unique to sheep. Epididymitis and orchitis impair fertility.

· **Brucellosis in pigs –** *B. suis*. Usually self limiting, can remain in herd for yrs. Man working in pack houses at risk.

Prevalence highest in feral pigs. Brucellosis card test. No vax.

· **Brucellosis in horses –** *B. abortus, B. suis.* Suppurative bursitis, "fistulous withers" or "poll evil". Occasionally abortion. Unlikely source for disease to other horses, animals or man.

· **Brucellosis in people** – Undulent Fever. Usu mild, can be serious public health problem esp when *B. melitensis*.

Bucked shins – Front limb lameness in 2-3 yr old Thoroughbred or racing QH. Metacarpal bone painful on manual compression. Lameness likely dt microfractures in bone as result of compression during exercise at high speed. Metacarpal periostitis.

Bullous diseases – Autoimmune diseases of skin and mucous membranes characterized by pustules, vesicles, bulges, erosions and ulcerations. Occur in dogs, cats and horses.

· Pemphigus foliaceus – Young to middle aged dogs uncommonly, even less so in cats and horses. Pustular crusting disease sparing mucous membranes (no lesions in mouth). May form widespread heavy crusts, marked hyperkeratosis of footpads, and involvement of nailbeds that may lead to loss of the nails. Tx with high doses of immunosuppressive drugs.

· Pemphigus vulgaris – Less common than PF. Vesicular disease affecting mucous membranes. Blisters, vesicles (rupture quickly), erosions in mouth, rectum. Suprabasilar acantholysis. Tx with high doses of immunosuppressive drugs. Difficult to get into remission. Poor px.

· Bullous pemphigoid - Collies, DPs. Rare, sloughing diz. Lesions widespread, tend to concentrate in groin. Resembles severe scald. Below basement membrane (no acantholysis). Pred + Azathioprine. Remission frequent w/ LT drug tx. LT px poor.

· Pemphigus erythematosus – Affects face and ears, has features of DLE. Scaling lesions, hypopigmentation of the planum nasale. Not well defined.

· Pemphigus vegetans – Rare. Benign variant of pemphigus vulgaris. Bullae replaced by verrucoid hypertrophic vegetative masses.

· Discoid Lupus Erythematosus – Dermal SLE. Autoimmune skin disease of dogs characterized by depigmentation, erythema, scaling, erosions, ulcerations and crusting, particularly on and spreading up the bridge of the nose, and sometimes the face and lips. Immunoglobulins and/or complement are deposited at the basement membrane in the skin. Tx w/ tetracycline/niainamide promising.

· Systemic Lupus Erythematosus – Controversial. Multisystemic autoimmune disease of dogs and cats. Extremely wide variety of clinical signs may occur, but immune-mediated polyarthritis, hemolytic anemia and skin disease are most common.

Calcium Deficiency – Nutritional 2° hyperparathyroidism. More commonly dt PO_4 or vita D deficiencies, also excessive Ca:PO_4 ratios. Hand fed baby birds and iguanas, indoor pigs on processed feed, big cats fed only meat. Rickets in young or osteoporosis in adults. Folding fractures in bones, spinal cord compression, seizures. Tx non-irreversable damage w/ dietary correction.

Camplobacter – Acute enteritis in dogs. Bloody diarrhea. **ZOONOTIC**. Transmissible to people.

Candida – Fungal disease. Yeast infection of GIT in birds. "Sour crop", fuzzy white layer on crop/GIT. Tx w/ nystatin orally.

Capillaria aerophila - Respiratory parasite of carnivores. Ingestion of larvated eggs. Eggs hatch in intestine, larvae reach lungs via circulatory system. Eggs layed in lungs, coughed up and swallowed. Clinical signs include coughing, sneezing, and nasal discharge. Diagnose w/ fecal float, see eggs with bipolar plugs. Treat with levamisole, fenbendozole.
Capillaria plica - Bladder worm. Found in kidney, ureter, bladder of dogs, cats. No clinical signs. Earthworm host. Eggs passed in urine. Treat with fenbendozole, ivermectin, levamisole.

Caprine Arthritis-Encephalitis (CAE) – Lentivirus (non-oncogenic retrovirus) of goats. Arthritis in older goats, neurologic diz in goats < 1y.o. Adult dairy goats get chronic arthritis and mastitis. Young get leukoencephalomyelitis, ascending paralysis. Transmitted through milk and colostrum. Most goats are infected young, carry virus and develop years later. Dx by serology, AGID or ELISA. Prevention - feed baby goats pasteurized milk. Test and cull.

Calcitriol – Synthesized in kidney. Acts on intestine and kidneys to maintain normal calcium levels.

Carbohydrate Engorgement - ↑ fermentable feedstuff, new ↑ carbo diet (pasture). Rumenal organisms proliferate and cause ceased motility. Bloat, splashy rumen. Fluid shifts into rumen = dehydration. Rumen ph < 5.5, sour. Tx w/ oral antacids/carmilax. Remove grain.

Cardiac Arrhythmias
· Sinus arrhythmia - Normal in dogs, uncommon in cats.
· Sinus bradycardia - Caused by increased vagal tone. Treat with atropine, glycopyrrolate, isoproterenol, artificial pacemaker.
· Sinus tachycardia - Caused by atrial enlargement, stress response. Treat underlying cause. Placing pressure on eyeballs will induce vagal response, slow heart rate.
· Heartbeat :
- S1 = Signals closure of AV valves and start of systole
- S2 = Signals closure of semilunar valves and end of sytole
- S3 = Heard if ↑ venous return; pregnancy
- S4 = Assoc w/ atrial contraction. Immediately precedes S1. Can be heard in horses.

Cardiac Disease
· Heart Block – Middle aged, older dogs. ↑ vagal tone dt drugs, endocarditis, DCM, HCM, hyperkalemia. If high grade, may see syncope, exer intol, weakness. On ECG, ↓ HR, P w/ no QRS, large T. 1_{st}, 2_{nd} or 3_{rd} (complete) degree.
Long term mgmt in pacemaker. Do not give antiarrythmic drugs, may suppress escape rhythm.
· Sick Sinus Syndrome – Female mini schnauz, dachs, cocers, pugs. May see w/ supraventricular tachyarrythmias. Episodic weakness, syncope. ECG, sinus bradycardia, sinus arrest, SA block. HR goes from 220 to 0 and back to 220. Permanent pacemaker reqd for LT tx. Asymptomatic dogs w/ abnormal ECG do not require tx.
· Supraventricular Tachycardia - Atrial premature contractions, paroxysmal atrial tachycardia, atrial flutter, atrial fibrillation. Dt atrial diz, enlgd atria (MR, DCM), CHF, digitalis toxicity. HR>180. May or may not be hemodynamically significant. "Regularly irregular." ECG, normal, narrow QRS. Tx w/ vagal maneuver to restore sinus rhythm. Also, β blocker, Ca_{++} channel blocker. Digoxin for chronic, LT tx.
· Atrial Fibrillation – Dogs>cats. Assoc w/ MR, DCM, GDV, anesth, heatstroke, trauma. Rapid, irregular pulse w/ chaotic rhythm. "Irregularly irregular." ECG, chaotic pattern w/ no demonstrable P waves on any lead. Can't cure. Slow ventricular response rate so heart can fill better. β blocker, Ca_{++} channel blocker. Digoxin for chronic, LT tx.
· VPC – Dt myocarditis, DCM, lyte disorders, trauma. Rarely hemodynamic signif unless frequent, then see hypotension, acid/base disturbance. ECG, bizarre QRS > 3 consecutive beats not preceded by normal P wave. HR > 160-180. Eliminate clinical signs and prevent sudden death. IV lidocaine or procainamide and O_2 admin.
· Valvular Heart Disease – Geriatric, small breed dogs w/ murmur. Ddx trach collapse, COPD, bronchial diz, endocardiosis, heartworms, neoplasia. Nonprod, honking cough, thin, weak, rapid pulse, tachyarrhythmia. Dx w/ thor rads. LA, LV enlgmt (VHS>10.5). Echo, see thickened, nodular valve. Tx depends on severity. ACE inhibitors, Na_+ restricted diet. Add diruetics if edema. $\pm$ digitalis, cough suppressants, bronchodilators.

· Pericardial Disease – Congenital, infectious, idiopathic, neoplasia (GSD, GR, Box, Bull). Diastolic heart dysfxn. R
CHF, abdominal distention, jug venous disten, pleural effusion. NO murmur, gallop or arrhythmia. Muffled heart sounds. Rads, see huge, globoid heart. Echo, see echo free space b/w myocardium and pericardium. ECG, may see electrical alternans. Pericardiocentesis. Avoid diuretic and vasodilators.
· HCM – Cats, middle aged males. Diastolic heart dysfxn. Pale mm, jug venous dist, lack of femoral pulse, murmur,
gallop. Rear limb paralysis, pain. Usu no arrhythmia. Echo is definitive, enlgd heart at expense of lumen. Relax and slow heart w/ β blocker (atenolol), Ca^{++} channel blocker (diltiazem). Oxygen. $\pm$ aspirin, furosemide. No digitalis, pump is OK.
· DCM – Large breed dogs, male>female, 2-5 y.o. DP, GSD, St.B, Irish wolf. Cockers also. Rare in cats unless taurine
deficiency. Systolic dysfxn. Coughing, wt loss, weakness, ascites, syncope, ADR. Weak femoral pulses, arrhythmias (atrial fib and Vtach), gallops, jug venous dist. Rads, pulm vv and caudal vena cava enlgd, pulmonary edema. Echo, dilation of atria and ventricles. $\downarrow$ afterload and augment contractility. ACE inhibitor (enalapril). Digoxin, β blocker. Diuretic if congested, procainamide if vtach.

Cardiac Drugs

Vasodilators:
· ACE Inhibitors – Inhibit angiotensin I $\rightarrow$ angiotensin II and $\therefore$ production of aldosterone. $\downarrow$ peripheral vasoconstriction and Na^+ and H_2O retention. Afterload and preload reducers. Vasodilation and reverse remodeling. The "–pril: drugs - Enalapril (Enocard), used for DCM, prodrug activated in liver, renal clearance. Benazapril same by hepatic clearance and SID. Side effects include renal failure ($\downarrow$ GFR), hypotension. Do not use in conjunction w/ NSAIDs (like Rimadyl).
· Hydralazine – Pure arteriolar vasodilator. Potent afterload reducer, $\downarrow$ BP. Indicated for chronic valve diz and DCM. Must titrate dose. Side effects include hypotension and $\uparrow$ HR.
· Amlodipine – Ca^{++} channel blocker. Arteriolar vasodilator. Treat hypertension in cats (w/out heart diz) and in conjunction w/ ACE inhibitor in dog for more $\downarrow$ afterload.
· Nitroglycerin – Preload reducer, venous capacitance. Emergency use for CHF, blood in shunted to capacitance vv.

Antiarrhythmics:
· Procainamide – Membrane stabilizer. Slowed conduction, less automaticity. IV emergency tx of ventricular arrythmias.
· Lidocaine – Membrane stabilizer. Emergency tx for ventricular arrythmias. IV, short $t_{½}$, so slow IV drip.
· Propanolol – Class II β blocker. Negative chronotrope and inotrope. For atrial tachycardia and HCM to $\downarrow$ heart and $\uparrow$ filling time. Side effects include bronchoconstriction, bradyarrythmias, hypotension, heart failure, hypoglycemia.
· Atenolol – Class II β blocker, specific to β_1. Don't see bronchiolar effects.
· Diltiazem - Ca^{++} channel blocker. Negative chronotrope and inotrope, $\downarrow$ conduction. Atrial tachycardia and HCM.
· Digoxin – Cardiac glycoside. Positive inotrope, negative chronotrope. Supraventricular tachycardias, CHF, DHF. Side effect is arrhythmogenicity, N, V, D via stimulation of CRTZ. Dose on lean body weight.

Positive Inotropes:
· Dobutamine – Direct β_1 stimulation. Positive inotrope and chronotrope. Emergency CHF. CRI. Arrythmogenic.
· Epinephrine - α_1, α_2, β_1, β_2 stimulation. Potent vasopressor dt positive inotrope and chronotrope. Emergency tx of cardiac standstill. Very arrythmogenic.

Diuretics:
· Furosemide – K^+ wasting diuretic, use when congestive diz. See Diuretics.
· Spironolactone – Antialdosterone diuretic; blocks effects at distal tubules, spares K^+, eliminates Na^+ and Cl^-. Not

potent by itself, use in combo w/ other diuretics. Good for ascites. Careful in combo w/ ACE inhibitor. Also has reverse remodeling effects on the heart, antifibrotic.

Cardiovascular Disease in Equine – Most common congenital defect is VSD. Loud R systolic murmur. PDA continuous murmur normal for 1st week of horse's life. Acquired valvular disease dt rupture tendinae, hypertension, endocarditis. 1st most common is aorta, then mitral, then tricuspid (cows get it at tricuspid valve). Can often hear physiologic flow murmurs, II/VI is normal esp in athletic horse. Most common arrhythmia in horses is atrial fibrillation, irregularly irregular beat, tx w/ quinidine. 2° AV Block fairly common finding, can hear extra heart sound. Increase heart rate (exercise) and should go away. Heart failure – lasix and digoxin.

Carpus Valgus – In foals usually in conjunction with fetlock varus. Tx w/ periosteal stripping (on side want to grow faster), growth plate reduction, physeal intervention.

Caseous Lymphadenitis - *Corynebacterium pseudotuberculosis*. Caseous abscessation of lymph nodes and internal organs in sheep and goats. Also in equine and bovine. Infection via contamination of open skin wounds. Diagnosis via abscess aspirate or serology (Synergistic Hemolysin Inhibition Test). Infected for life. Herd strategy is to cull then leave pasture empty for 6 mos. Can lance and flush abscesses - frequent recurrence. Can treat with NaI and penicillin to keep from getting worse (not to cure). **ZOONOTIC**, wool workers get from shearing nicks.

Castor Beans - Extremely toxic, contain *Ricinus communis* (ricin). Violent purgation, straining w/ bloody diarrhea, weakness, salivation, trembling, incoordination. All spp effected, cultivated in south. Potential bioterrorism weapon.

Cat Scratch Fever - Benign lymphadenitis of **HUMANS** believed to be caused by infectious agent, *Bartonella henselae*, *B. quintana*. Usu assoc w/ scratch or bite from cat.

Cataracts – Opacity to the lens of the eye or its capsule. Surgical removal of lens. Dogs more commonly than other species. Cats and horses, most cataracts 2° to inflammation. Congenital and acquired, juvenile onset, adult onset.

Cauda Equina Syndrome – Group of signs w/ several etiologies. U/F incontinence, posterior ataxia, hypo/anesthesia of tail and perineum, penile paralysis. Progressive. Dt EHV1, strep ag, EPM. Euthanize, do not get better. Ddx is fractured sacrum.

Cephalosporins – G+, some G-, anaerobes. Bactericidal. Beta-lactam antibiotics. Inhibit cell wall synthesis. More effective against actively growing bacteria. See Antiobiotics section.

Chediak-Higashi Syndrome – Blue smoke persians. Oculocutaneous albinism. Bleeding disorders.

Cheyletiella - "Walking dandruff." Occurs in dogs, cats, rabbits. **ZOONOTIC**. Likes high altitudes (CO). Highly contagious scaling on dorsal trunk. Moderate to intense pruritus. Alopecia and inflammatory changes 2° to scratching. Treat environment, ivermectin, sulfur shampoo.

Chinchillas – Require regular dust baths to maintain healthy coat and skin. Pans should be provided in cages. Grab by tail.

Chlamydia psittaci – Psittacosis. Common infectious disease of birds. **ZOONOTIC**. Gives people URT infection, flulike signs. Signs vary w/ avian spp from subclinical to systemic disease involving respiratory tract and liver, see yellow urates. Very high WBC in birds (ddx Mycobacterium (avian TB), Aspergillosis). Dx via serology (EBA test) or PCR of oral/cloacal swabs. Tx w/ doxycycline.

Choke - Obstruction of esophagus by food masses or FB. Horses choke on greedily eaten dry grains. Localized esophageal dilation, hemorrhage necrosis. Exhibit anxiety, arched neck, retching, salivation. Food, froth through nose. May get aspiration pneumonia. Pull food, provide water, painkillers, sedatives. May pass stomach tube.

Cholangitis/Cholangiohepatitis – Common hepatic diz of cats, dogs get also. ↑ ALT, ↑ SAP, ↑ bilirubin. Bx to dx, culture and cytology of bile. Suppurative form dt ascending infection. Has ↑ neutrophils; tx w/ antibiotic

such as amoxicillin and/or enrofloxacin. Nonsuppurative form has lymphs and plasma cells. Imm mediated diz, tx w/ prednisolone.

Chorioptic Mange – *Chorioptes bovis.* Most common mange in cattle. Pastern area most common - "leg mange". High proportion of cattle may be infested without exhibiting signs. More prevalent in winter. Non-zoonotic but **REPORTABLE**, since r/o sarcoptic mange which is zoonotic.

Chronic Active Hepatitis - Group of diseases that tend to progress to cirrhosis. Glucocorticoids indicated in moderate to severe symptomatic autoimmune chronic active hepatitis. They are not indicated in asymptomatic cases, mild cases, or viral-induced disease.

Chronic Obstructive Pulmonary Disease – COPD, heaves, asthma. Allergic rxn thought to initiate. Usu in north when kept indoors. Prevalence ↑ w/ age. Inflammation, chronic bronchoconstriction, thickened bronchi. ↑ expiratory effort, exercise intolerance, cough. Afebrile. Dx w/ endoscopy, TB asp, thor auscultation of expiratory wheezes. Tx with environmental changes, antiinflammatories, steroids, bronchodilators. Summer Pasture Associated OPD – same but summer, south, in pasture.

Chronic Urticaria - Characterized by transient wheals in the skin or mucous membranes. Most frequently recognized in the horse. Drugs and ingestants are most frequent causes. Treat with corticosteroids, avoidance of the allergens, hyposensitization to inhaled allergens.

Chylothorax – Accumulation of chylous fluid in the pleural space. High triglyceride [ ] w/ low cholesterol. Dt malignancy, trauma, congenital, pancreatic, parasitic, infectious, idiopathic, lymphangiectasis. Conservative tx is sporadic thoracocentesis, chest tube placement. If fails, pleurodesis (variable outcome). Treat cause (i.e. pericardectomy).

Cirrhosis – End stage liver diz from any cause. Dogs > cats. Cobblestone liver. Cockers ↑ risk. See microhepatica on rads, need bx to confirm. Supportive tx, slow progression.

Clostridial Diseases – Anaerobic, spore-forming, exo- or enterotoxin forming.

· Bacillary Hemoglobinuria – *C. haemolyticum*. Cattle, red water disease. Sudden death, Hgburia.

· Blackleg – *C. chauvoei* (also *septicum, novyi, sordelli*). Cattle, sheep. Swelling, hemorrhage, and emphysema in heavy muscles. Rancid butter odor.

· Botulism – *C. botulinum*. Rapidly fatal motor paralysis by ingestion of carrion and subsequent neuro-intoxication (not
infection). Neuromuscular weakness progessing to paralysis.

· Hemorrhagic Enteritis and Enterotoxemia - *C. perfringens*

· Infectious Necrotic Hepatitis – Black disease. *C. novyi* + liver flukes. Usually in sudden death in sheep.

· Malignant Edema – *C. septicum* usually, also *chauvoei, perfringens, sordelli, novyi*. Farm animals.

· Tetanus - *C. tetani*. Neurotoxin in necrotic tissue. All mammals (dogs, cats, birds seem resistant). Stiffness, spasms, progressive. Immunization.

Club foot – Caused by deep digital flexor contracture. Results in flexion of the distal interphalangeal joint, resulting in a raised heel (club foot). Treat with a distal check desmotomy, corrective shoeing. If nonresponsive, deep digital flexor tendonotomy may be required for salvage.

Coagulation – Goal to form a localizeed fibrin meshwork. 3 components necessary for normal coagulation are intact vasculature (trauma, vasculitis), coagulation factors (DIC, rodenticide, liver failure, congenital), and platelets (aspirin, NSAIDs). Most common bleeding problems are dt thrombocytopenia and coag factor deficiency.

· Intrinsic pathway – Starts w/ exposure to abnormal surface. Factors XII, XI, IX, VIII. Factor VIII deficiency is hemophilia A, most common inherited bleeding deficiency in dogs and cats. X-linked, females are asymptomatic carriers, males are affected. Factor IX deficiency is hemophilia B. In cats, Factor XII deficiency commonly recognized but rarely causes clinical bleeding.

· Extrinsic pathway – Starts w/ tissue injury, factor III (Thromboplastin) released. Factor VII.

· Common pathway – Factor V, X, prothrombin to thrombin, fibrinogen to fibrin.
· ATIII – Thrombin antagonist. Acts on II, IX, X, XI, XII.
· Vitamin K dependent factors - II, VII, IX, X. Vita K antagonism or deficiency assoc w/ rodenticide tox (warfarin, coumarin), malabsorption, BTO, heriditary (devon rex cats), and hemorrhagic porcine stress syndrome. Expect prolonged clotting times (PT, then PTT). PIVKA. If suspicious, tx w/ vita K and watch for improved clotting times w/in 24-48 hrs.

Vascular or platelet abnormalities Coagulation Factor Abnormalities
· petechiation
· hematomas rare
· multiple sites common
· mucosal bleeding common
· hemarthrosis rare
· prolonged bleeding from cuts
· purpura and ecchymoses common
· body cavity hemorrhage rare
· petechiation rare
· hematomas common
· frequently localized
· mucosal bleeding can occur
· hemarthrosis common; delayed onset of bleeding,
then profuse rebleeding
· purpura and ecchymoses rare
· big body cavity hemorrhage common
· Test of vasculature – Bleeding time test, biopsy.
· Test of platelets – Need good,clean stick. Platelet count, blood smear, platelet aggregation, bleeding time test.
· Test of coag factors – Intrinsic system w/ ACT, PTT (XII, XI, X, IX, VIII, II or I). Extrinsic system w/ PT (VII, X, V,
II, I), also good test for vita K antagonism since factor VII has shortest t½ of vita K dependent factors.
· Fibrinogen and FDP assay for DIC, vWD assay in certain breeds (DPs), PIVKA (glorified PT, rodenticide testing).
· Inhibitors of coagulation – ATIII, aspirin, EDTA (binds divaalent Ca ions), heparing (activates ATIII), dicoumarol
(vita K antagonist, rodenticide).

Coccidiomycosis - *Coccidioides immitis.* San Joaquin Valley Fever. Dimorphic soil pathogen. Fungus found in arid regions of SW USA. Infection via inhalation of fungal spores. Most common in dogs. Large (50+ μ m) round organism w/ thick basophilic walls and small internal structures. Acute infections are respiratory in nature and usu self-limiting. Chronic respiratory disease affecting lungs, can disseminate to eye and bone. Osseus involvement has poor LT px, resembles osteosarcoma. Bone lesion of baboons.
· Clinical signs - Chronic cough, anorexic, cachexia, lameness, big joints, fever, intermittent diarrhea.
· Diagnosis - Dog w/ chronic bronchopulmonary diz in endemic area. Pulmonary nodules and enlgd hilar ln found on thor rads. Positive coccidiodin test indicates exposure. Serology helpful, do not culture.
· Treatment: Amphotericin B is drug of choice.

Coccidiosis - Causes acute invasion and destruction of intestinal mucosa. Problem in young animals, develop immunity as adults. Host-specific. Oocysts sporulate in environment w/in several days. Infection via ingestion of sporulated oocysts. Clean environment daily. Diarrhea may precede output of oocysts, so not always possible to dx coccidiosis via fecal exam. Impression smear of intestine more diagnostic. Finding oocysts in feces does not indicate coccidiosis infection unless clinical signs are present. Treat w/ sulfadimethoxine, a folate antagonist and coccidiostat and good sanitation.
· Poultry - *Eimeria*, *Cryptosporidia*
· Small animals - *Isospora*, *Cryptosporidia*

· Large animals - cows/sheep/goats/pigs - *Eimeria*, *Cryptosporidia*. Diz of pigs 5 - 15 days old.

Colic – SI of equine approx 80 feet. Bands on colon: cecum, RVC, LVC have 4 bands; LDC and pelvic flexure have 1 band; RDC has 3 bands. Gas/spasmodic colic or impaction colic. Never use Acepromazine in shocky horse, will collapse. Dx/Tx – HR/Resp, gut sounds, pass tube, mineral oil if not refluxing, rectal exam, belly tap, NSAIDs, walk. Refer if
nonresponsive pain, reflux.
· Small intestine is either strangulating (SI torsion, SI volvulus, strangulating lipoma) or nonstrangulating (ileal impaction, proximal enteritis). Anterior enteritis DPJ – stinky, copius reflux, feels better when removed.
· Large colon is either colon torsion (nephrosplenic ligament = L dorsal displacement, or tangled w/ cecum = R) or impaction (transverse colon, pelvic flexure, ileocecal valve).
· Enteroliths – Arabians, CA, alfalfa hay.

Collie Eye Anomaly - Recessive inherited choroidal hypoplasia. Associated defects include scleral ectasia, coloboma of the optic disc, retinal folds and detachment, microphthalmia. Seen almost exclusively in collies and shetland sheepdogs.

Color Dilute Alopecia – Congenital defect in blue dobies, chows, chihuahuas. Clumped melanosomes in hairs. No cure, decrease risk of 2° bacterial infections.

Combined Immunodeficiency Syndrome - Inherited defect of immunity in Arab foals. Lack of immunoglobulin synthesis, absence of cell-mediated immunity, thymic hypoplasia, marked reduction of lymphocytes. Autosomal recessive.
· Clinical signs - Foal normal at birth dt maternal antibodies. As maternal antibodies decline, foal succumbs to succession of respiratory infections.
· Diagnosis - Precolostral serum samples have no detectable IgM antibody and lymphocyte count < 1000 cells/ml in peripheral blood.

Congenital Hyperlipidemia - Inherited disease of miniature schnauzers.

Constipation – 1) Protatomegaly in dogs, 2) pelvic fractures in cats (real concer if cat preg), 3) hypothroidism in dogs.

Contagious Ecthyma - aka Contagious Pustular Dermatitis, Sore Mouth, Orf. Poxvirus, related to pseudocowpox and bovine papular stomatitis. Infectious dermatitis of sheep and goats transmitted by direct contact, usually in young. Goats > sheep. Organism is highly resistant to dessication. Lesions on skin of lips with extension into oral mucosa, also on feet, interdigital regions. Vaccination. Once recovered usu highly resistant. **ZOONOTIC**, vets and sheep handlers lesions on hands, face usu more proliferative, distressing.

Contagious Equine Metritis - *Taylorella equigenitalis*. Highly contagious venereal disease of horses. **REPORTABLE**.
Transmitted during coitus, resides in smegma of stallion prepuce. Self-limiting.
· Clinical signs – None in males. Mare develop endometritis w/ vulvar discharge 2-6 days after service. Low conception rate. Once infection subsides, fertility is regained. Abortion uncommon.
· Diagnosis - Recovery of organism. Hemagglutinating antibody.

Copper Deficiency - Common in Texas in young pastured ruminants. Cu stored in liver, absorbed in SI and excreted in bile. 1º dt decreased Cu in soil and forage, 2º dt interdependent - ↑ Mo ↓ Cu, ↑ Fe ↓ Cu, S→Mo.
· Clinical signs – Unthiftiness, achromotrichia, diarrhea, lameness, demyelinization, falling disease. Swayback in lambs, anemia.
· Diagnosis – Liver Cu [ ], serum Cu [ ], cerulopasmin in serum, diet Cu [ ].
· Treatment – Copper gylcinate injection every 6 mos SQ. Copper sulfate in feed. Copper oxide needle bolus.
· Prevent – Salt/trace mineral mixes with Cu. $CuSO_4$ fertilizer.

Copper Poisoning – Sheep. Chronic ingestion of excess amount of Cu leads to sequestration in liver. A stressor induces sudden release of copper from the liver, resulting in severe intravascular hemolysis.
· Clinical findings - Acute hemolytic crisis, depression, weakness, anorexia, hemoglobinuria, jaundice.
· Control - Restrict copper intake; supplement with molybdenum.

Copper Storage Hepatopathy of Bedlington Terriers - Recessive inherited copper storage disease in which Bedlington terriers accumulate copper in liver. See signs of liver disease, slowly progressive hepatopathy, usu by 3 yrs old.. Incurable. Manage with penicillamine. Trientine. Severe disease. See similar diz in Westies, but mild.

Corkscrew Claw - Heritable defect of the lateral claw of cattle. Causes serious 2° lameness. Must trim continually. Cannot diagnose from dorsal aspect. Cull.

Coronavirus – Milder than parvo but cannot distinguish by clinical signs. Diarrhea, vomiting.

Corticosteroid Responsive Meningitis - Large breed, < 2 y.o., cervical pain, rare to have neuro disorder, px excellent with treatment.

Corynebacterium pseudotuberculosis
· Horse – Causes pectoral abscesses. Seasonal, late summer and fall. Transmitted by fomites, arthropods, skin wound. Lance abscesses, flush with iodine. Penicillin or TMS may be used, but antibiotic therapy may delay abscess maturation.
· Sheep/Goats - see Caseous Lymphadenitis in sheep and goats.

Cranial Nerves
· CN I - Olfactory nerve. Sense of smell.
· CN II - Optic nerve. Vision. Prechiasmal vs postchiasmal (PLR intact, no menace).
· CN III - Oculomotor nerve. Motor to muscles of eye, constriction of pupil, accommodation. Divide into 3 major branches: Ophthalmic n. (sensory to eyeball, medial canthus, nasal mucosa), Maxillary n. (sensory to dorsal/rostral head), Mandibular n.(motor to mastication mm. and sensory to lower jaw).
· CN IV - Trochlear nerve. Motor to dorsal oblique muscle of the eye.
· CN V - Trigeminal nerve. Motor to muscles of mastication and sensory to head.
· CN VI - Abducens nerve. Motor to lateral rectus and retractor bulbi. Abduction of eyeball.
· CN VII - Facial nerve. Motor to muscles of facial expression and sensory to rostral tongue/taste.
· CN VIII - Vestibulocochlear nerve. Sense of hearing and proprioception.
· CN IX - Glossopharyngeal nerve. Motor and sensory to pharynx and caudal tongue. Gag reflex, taste on caudal 1/3 of tongue, involuntary phase of swallowing.
· CN X - Vagus nerve. Parasympathetic to viscera of neck, thorax, abdomen. Motor to skeletal mm of pharynx, laryns esophagus and sensory to mucosa. Gag reflex, coughing, swallowing.
· CN XI - Accessory nerve. Motor to skeletal mm of neck and trapezius.
· CN XII - Hypoglossal nerve. Motor to intrinsic and extrinsic mm of tongue.
· Remember CN w/ parasympathetic functions: CN III, VII, IX, X, XI.
· OOOTTAFVGVAH; SSMMBMBSBBMM.

Crotalaria - Group of plants that contain pyrrolizidine alkaloids. Liver damage in horses.

Cruciate Ligament - Cranial cruciate ligament rupture most common, medial meniscal tear accompanies w/ clicking noise. Dx via cranial drawer motion in acute cases, capsular thickening in chronic cases. Rad signs include loss of infrapatellar fat pad, joint mice, reactive new bone at tendon insertions (caudal femur, cranial tibial plateau). Multiple techniques to repair. Conservative therapy works in small animals. Surgical repair necessary in larger animals (>15kg). CCLR in bovine, cannot kick. In dairy, usu dt trauma. In bulls, dt conformation. Salvage.

Cryptococcosis – *Cryptococcus neoformans.* Encapsulated fungal organism found in soil, pigeon droppings. Yeast w/ narrow based budding and thick, clear mucin capsule. Infection via inhalation of spores - cats > dogs.

· Clinical features – Nose and brain. Cats: Roman nose. Swelling or draining fistula over facial bone, chronic nasal discharge. Dogs: CNS signs, granulomatous chorioretinitis.
· Diagnosis - Latex agglutination test detects circulating antigen. One of few sensitive, specific serologic tests for fungal infection. Cytologic dx relatively easy as can ID capsule. CSF fluid, India ink – clear vacuoles.
· Treatment - Several protocols, Amphotericin B, ketoconazole, fluconazole if in CNS.

Cryptosporidium – Flat calf syndrome. **ZOONOTIC**, kills immunosuppressed (AIDS).

Curb – Spraining and thickening of the plantar tarsal ligament.

Cushings – Hyperadrenocorticism. Elevated cortisol 2° to excessive pituitary excretion of ACTH, excess cortisol production by the adrenal gland, or excess exogenous cortisol. Most common in dogs is pituitary tumor.
· Clinical findings – PU/PD, bilaterally symmetrical alopecia, pendulous abdomen. PP, panting, weakness, muscle wasting, calcinosis cutis. Eosinopenia, neutrophilia, hepatomegaly, ↑ SAP.
· Diagnosis - ACTH stimulation test (can determine if iatrogenic). Low-dose dex suppression test. High-dose dex suppression test. Will not depress adrenal tumors. Abdominal ultrasound to visualize adrenal tumors. Urine cortisol:urine creatinine test, if ↑ may have it, further testing reqd.
· Treatment - opDDD (Mitotane). Removal of adrenal tumor. Ketaconazole (impairs steroid synthesis), deprenyl.
· Feline Cushings – Diabetes and thin skin. Dx w/ HDD. Difficult to dx, no good tx.

Cutaneous Asthenia – Ehlers-Danlos syndrome. Inherited defects in collagen production. Dermatosparaxis = torn skin; stretchy, loose, fragile skin, impaired wound healing. In cats, ddx acquired skin fragility and hyperadrenocorticism. Often unsuitable as pets.

Cyanide Poisoning - Inhibits cytochrome oxidase and causes death from anoxia. Cherry red blood. Dyspnea, tachycardia, salivation, vomiting, asphyxial convulsions. Bitter almond odor. Treat w/ sodium nitrate, sodium thiosulfate. Sorghums.

Cyclophosphamide – Antineoplastic, immunosuppressive. Alkylating agent. Interferes w/ DNA replication, RNA transcription and replication. Disrupts nucleic acid fxn. Adverse effects include myelosuppression, gastroenterocolitis. Hemorrhagic cystitis rare in cats; 1/3 of dogs receiving > 2 mos develop hemorrhagic cystitis.

Cyclosporine – Immunosuppressive. Suppresses T lymphocytes; used in organ transplant recipients.

Cytauxzoon felis – Natural parasites of wild felids. Transmitted by *Dermacentor variabilis* tick. Multiply in macrophages (unlike *Theileria* which multiply in lymphocytes). When transmitted via tick to domestic cats, causes acute and usu fatal diz. Transmission via blood infection usual variable and often not fatal.
· Clinical signs – Onset ~10d, with severe signs w/in the next week. Febrile, dyspneic, dehydrated. Icteric and anemic. At necropsy, spleno/hepatomegaly, enlgd ln, edematous kidneys. Edema, congestion, and petechia of lungs.
· Diagnosis – Normocytic, normochromic anemia w/ leukopenia and pronounced lymphopenia. Occasionally can dx via blood smear, see macrophages w/ schizonts in cytoplasm.
· Treatment – Little success. Tick avoidance.

Dacryocystitis - Inflammation of lacrimal sac. Obstuction of proximal nasolacrimal duct by inflammatory debris, FBs or masses. Produces epiphora and 2° conjunctivitis refractory to treatment.

Daily Water Requirements - 50-75 mL/kg/day.

Declaw – Onychectomy. Surgical removal of the third phalanges and claws. Need to remove entire ungual crest or claw will grow back.

Dehorn Goats - Should be done day 1-2. Hot iron debudding method of choice (careful not to burn brain). Use restraint box and nerve block or general anesthesia.

Demodectic Mange –

· Dog – Face, lips, eyes, legs, feet. Folliculitis w/ alopecia, pustule formation. Nonpruritic. Generalized demodecosis indicates immunosuppression. Normal flora of dogs passed from bitch to pups w/in 1st few days. Dx by deep skin scraping. Tx w/ Amitraz (Mitoban - MAO inhibitor, yohimbine will reverse) once a week until two (-) skin scrapings. Amitraz is only licensed drug for tx. Also ivermectin, milbemycin given daily. Steroids contraindicated.

· Cat – Stumpy demodex, *Demodex gatoi*. Pruritic, contagious. Broad superficial scraping as lives in surface. Do NOT use Mitoban, will kill cats. Lyme sulfur dips once a week for 6 weeks (do not allow licking of wet dip).

Dentistry – See dental formulas in Merck, p. 131-132. In aging animal see narrow pulp cavity, thick dentin, and loss of definition of lamina dura. Scale below gum line q/ currette (subgingival). Scale above gum line w/ scaler (supragingival).

· Large animal – Horse most commonly, sharp points develop (buccal uppers, lingual lowers), see quidding, slow eating, reluctance to drink cold water; wave mouth, step mouth. Removal of deciduous canine teeth in piglets, tusk amputation in boars.

· Small animal – Periodontal disease is bacterial infection of tissue surrounding the teeth. Gingivitis is inflammation of marginal gingival tissues induced by bacterial plaque (peridontal ligament or alveolar bone not affected). Reversible w/ teeth cleaning below gingival margin, but may progress to periodontitis. Periodontitis is destructive inflammatory process driven by plaque that destroys gingiva, periodontal ligament, alveolar bone and root cementum. Tx w/ cleaning below and above gum line.

· Gingival Hyperplasia – Benign overgrowth of gums, predisposition in brachycephalic breeds (familial gingival hypertrophy). Usu asymptomatic, if problematic, gingivectomy.

· Neck Lesions – In cats, destructive diz of tooth crown and roots. Rads to see if treatable.

· Feline Stomatitis Complex – Intense reaction to diz, severe inflammation of oral cavity. Tx w/ aggressive dental or may require full mouth extractions.

Dermacentor variabilus – American dog tick. Transmits RMSF, tularemia, anaplasmosis (mice).

Dermatomyositis - Inherited diz of collies, shelties, corgi. Etiology unknown, likely autosomal dominant. Skin lesions and rare myositis. Dx by biopsy and clinical sx. Tx controversial.

Dermatophilosis - *Dermatophilus congolensis*. Equine. G+ bacterial infection of the epidermis. Grows under wet conditions. Raised tufts of hair, crusty lesions which pull off to reveal moist, red lesion underneath. Dorsum, muzzle, and distal limbs. Dx via cytology, gram stain. To tx, wear gloves, remove and destroy crusts, povidone iodine shampoo.

ZOONOTIC.

Dermatophytosis – Ringworm. Transmission via contact with infected individuals, fomites. Most susceptible are young, debilitated or immunocompromised. Face, feet, or anywhere. Epidermal collarettes, scale, alopecia. Infect only growing hairs. Cats are often a reservoir.

· Diagnosis -Wood's lamp will fluoresce with *M. canis* 50% of the time. DTM – growth apparent 3-7 days, maybe 3 wks. Dermatophytes produce color change to red when colony 1st visible (saprophytes will eventually cause color change, need to look at DTM cultures daily). KOH staining for direct identification.

- Cattle/sheep/goats - *Trichophyton verrucosum*.
- Horse - *Trichophyton equinum*. Saddle, tack, pastern. Submit fungal culture to lab (B complex, hard to grow). More common in winter with stabled animals.
- Pig - *Microsporum nanum*.
- Dog - > 70% caused by *Microsporum canis* - alopecic scaly patches with broken hairs. *M. gypsum* lives in soil. *Trichophyton mentagrophytes* is harbored in rodents, nasty, inflammatory disease seen in immunosuppressed.
- Cat - > 98% caused by *M. canis,* focal alopecia, scaling, crusting around ears, face, extremities. Cats harbor *M. Canis*, look for source. Can dx via toothbrush technique, place onto auger for fungal growth.

· Treatment – Usually self-limiting, but **ZOONOTIC**. Griseofulvin (teratogenic, admin only if > 12 wks, add fat for absorption, do NOT used in FIV+ cats, idiosyncratic BM aplasia in cats) and lime sulfur. Oral lufenuron

(Program). Can consider topicals – miconazole, clotrimazole, nystatin, thiabendazole. Lime sulfur. Steroids contraindicated.

Diabetes Mellitus – Dog, insulin dependent. Cat, insulin dependent or non-insulin dependent (achieve remission with high fiber, high protein diet, weight loss, or oral hypoglycemics). Treat diabetic ketoacidosis with regular insulin. Insulin antagonists include cortisol, growth hormone, epinephrine, and glucagon.

Dilated Cardiomyopathy – DCM. Most common in large breed dogs, esp DPs. Usu present for exercise intolerance and cough. Arrythmias commonly associated with DCM include atrial fibrillation and VPCs. Mainstays of tx are diuretics (if congested) and ACE inhibitors. Digoxin and vasodilators also. In feline, usu dt taurine deficiency (rare). Treat with taurine supplementation and resolves.

Diaphragmatic Flutter – aka Synchronous Diaphragmatic Flutter, "Thumps". Horse. Violent, unilateral hiccoughs occur w/ each heartbeat dt stimulation of the phrenic nerve by cardiac electrical discharge. Often related to athletic stress resulting in metabolic alkalosis, hypocalcemia, and electrolyte imbalance. Treat with calcium.

Diaphragmatic Hernia - Congenital or acquired (blunt trauma to abdomen and caudal chest). Abdominal viscera contained w/in thorax. Dx via rads, contrast rads or U/S. Surgical correction.

Dictyocaulus arnfieldi – Equine lungworms. Donkey, mules and asses are inapparent carriers. Chronic cough, ↑ expiratory effort, crackles/wheezes. Dx w/ Baermann float, hx, TTA. Tx w/ ivermectin. Do not graze horses w/ donkeys.

Digoxin – Toxicity is common. Hypokalemia increases toxicity dt ↑ binding of digoxin to myocytes. Cleared by kidneys, therefore renal disease also increases toxicity.

Digital Dermatidis – Hairy Heel Warts. #1 foot disease of dairy cattle. Most painful foot lesion seen. Anaerobic spirochete (Treponema). Highly contagious, difficult to eradicate. 90-95% in rear. Pain is diagnostic. Treat herd with topical oxytetracycline long term.

Diplidium caninum – Dogs, cats acquire from fleas. Tx w/ Praziquantel (Droncit) or Fenbendazole (Panacur). See tapeworms.

Discospondylitis – Infectious diz of nervous/ms systems. *Staphylococcus intermedius/aureus*. Also dt *Brucella canis* (always check for), aspergillosus. Hematogenous or directly via grass awn (CA). Caudal cervical, midthoracic, L7-S1. Large breed, male, intact, middle aged dogs. Dx via rads, see lysis of end plates; culture of urine, blood; brucella titer. Tx cephalosporin (Β -lactamase resistant Ab). If Brucella, treat with tetracycline, minocycline.

Distemper – Paramyxovirus. Initial respiratory signs, GI and CNS (chewing gum fits) signs may follow. Hyperkeratosis of the footpads and nasal planum. Suspect in any febrile condition in puppies. Febrile catarrhal illness with neurologic sequelae justifies dx of distemper. IFA of epithelium, buffy coat, necropsy. Demonstration of virus-specific IgM. Ferrets can contract diz, show rash on chin and inguinal area, anorexia, photophobia.

Diuretics

- Aldosterone antagonists – Late distal tubules. Weak. Spironolactone (also K^+ sparing).
- Carbonic anhydrase inhibitor – Proximal tubules. Weak. Acetazolamide, used more often to ↓ IOP as tx in glaucoma.
- *High ceiling diuretics – Ascending loop of henle. Potent. Furosemide (K^+ wasting). Most common.
- Osmotics – Proximal tubules. Moderate potency. Mannitol, often used for renal failure prophy, ↓ IOP, ↓ ICP (contraindicated w/ intracranial hemorrhage), mobilization of cellular edema.
- K+ sparing – Weak. Triamterene.
- Simple – Ethyl alcohol.
- Thiazides – Distal tubules. Moderate potency. Benzathiazide (K^+ wasting), often used in edema mgmt.

Dorsal Displacement of the Soft Palate – In equine, exercise intolerance dt compromised airway. Gurgling, dyspnea, noise, "swallows tongue", cough. Race horse that quits running suddenly. Dx via endoscopy (treadmill), rads. Treatment one of more of the following: 1) Sternothyrohyoid myectomy = strap mm. resection. 2)

Staphylectomy = trim caudal edge of soft palate. 3) Epiglottic augmentation w/ teflon. 4) Lou Ellen's tendenectomy. Ddx from entrapped epiglottis. Cannot see outline of epiglottis w/ DDSP.

Dourine - African venereal disease of horses caused by *Trypanosoma equiperdum.*

Downer Cow – 2° to inciting cause. Cycle of ischemia, hypoxemia, edema. BAR, drink and eat, but can't rise. ↑ CK in short term, ↑ AST long term; not prognostic. Tx is supportive care, soft bedding, turn, flotation. Dairy, usu Milk Fever. Beef, pregnant in winter, starvation, malnutrition.

Doxorubicin (Adriamycin) – Antineoplastic agent. Causes inhibition of DNA synthesis, DNA-dependent RNA synthesis and protein synthesis. Acute toxicity assoc w/ cardiac arrhythmias and mast cell degranulation (independent of IgE). Cumulative toxicity assoc w/ diffuse cardiomyopathy.

Dysautonomia – Cats. Dysfunction of autonomic nervous system. Megaesophagus, dry mucous membranes, atonic bladder, accumulation of feces in rectum.

- Diagnosis - Histopathic examination of autonomic ganglia
- Treatment - Symptomatic (bethenecol, metoclopramide). Poor prognosis.

Echinococcus granulosus – Adult stage resides in intestine of wild or domestic canids. Eggs passed in feces are ingested by herbivores.

ECG – Recording of electrical activity of heart that reaches the body surface. Sum of electrical activity, relative voltage.

- P wave – Atrial depolarization (firing of SA node)
- QRS complex – Ventricular depolarization (AV node - bundle of His – purkinje fibers)
- T wave – Ventricular repolarization (diastole, membrane potential restored)
- PR segment – AV nodal delay (conduction time through atria)
- ST segment – Refractory period; ventricles contracted and empty
- TP interval – Repolarized, waiting for next P. Ventricles relaxed and filling.
- QT interval – Total time of ventricular electrical activity.

Edema – 1) Low oncotic pressure (low protein), 2) High hydrostatic pressure, 3) Lymphatic blockage (ventral edema), 4) Vasculites (leakage).

Effusions -

- Pure transudate – ↓ oncotic pressure. Poorly cellular (<1000 cells), TP < 2.5, and s.g.< 1.017. Hypoalbuminemia dt hepatic insufficiency, PLN, PLE.
- Modified transudate - ↑ hydrostatic pressure. Higher TP >=2.5, s.g. < 1.017, moderate cellularity (500 - 10,000). Portal hypertension. Hepatic disease , right heart failure, abdominal neoplasia.
- Nonseptic exudate – Inflammation. High TP > 3.0, s.g. >1.025, increased cellularity w/ neutrophils and macrophages (>5000 cells). Nondegenerate neutrophils. Uroabdomen, biliary tract rupture, FIP, neoplasia, pancreatitis.
- Septic exudate – Septic inflammation. Degenerate neutrophils and bacteria.
- Bilious effusion – Brown/green exudate.
- Chylous effusion – Milky white/pink opaque; TP > 2.5, s.g. > 1.018, variable cellularity (lymphs/neuts). High triglycerides (fluid>sera by 2-3:1), cholesterol less then in serum.

Egg Binding – In birds that are laying a lot or in older birds that have never layed before. Causes space occupying mass problems w/ MS, GIT, Resp. Palpable eggs or visualized on rads. Tx w/ following: 1) warmth, 2) humidity, 3) support (steroids, fluids), 4) Ca^{++} injection, 5) oxytocin injection, 6) repeat Ca^{++} injection, 7) repeat oxytocin injection, 8) express egg in small bird, 9) 12 cc syringe and needle to suck out egg contents, 10) surgery if large bird.

Ehrlichia canis – Vector is *Rhipicephalus sanguineus*, brown dog tick. Seen as coccoid bodies in the cytoplasm of WBCs. Monocytes affected most frequently. *E. platys* often concurrent infection; usu asymptomatic is alone.

· Clinical findings - Signs arise from involvement of lymphoreticular and blood system. Thrombocytopenia, bleeding tendencies, stiffness, generalized lymphadenopothy, splenomegaly, fever. Associated w/ benign lymphocytosis and monoclonal/polyclonal gammopathy.
· Diagnosis - IFA, demonstration of organisms in WBCS, clinical signs.
· Treatment – Doxycycline. Tetracycline. Chloramphenicol is acceptable tx as well.
Ehrlichia equi – Vector unknown. Found in neutrophils. Fever, anorexia, depression, limb edema, petechiation, icterus, reluctance to move. Dx by cytoplasmic inclusion bodies. Tx w/ oxytetracycline.

Endocarditis - Most common on mitral and aortic valves of dogs and cats. Streptococcus most common.
· Clinical signs - Recurrent fever, heart murmur, shifting leg lameness, signs of systemic embolization.
· Diagnosis - Demonstration of lesions on heart valve – echocardiogram. Positive blood/joint culture with demonstration of heart involvement.
· Treatment - High dose broad spectrum antibiotics.

Enema – Phosphate enemas should not be used in cats as can precipitate potentially fatal hyperphosphatemia, hypocalcemia, and hypernatremia.

Eosinophilic Granuloma – Hypersensitivity reaction found in cats, dogs and horses. In cats, nonpruritic eosinophilic ulcer found on upper lip, pruritic eosinophilic plaque found on medial thigh, eosinophilic linear granuloma on mouth or legs. Treat with corticosteroids.

Epiglottic Entrapment – Equine. Slight exercise intolerance, inspiratory and expiratory noise. Dx via endoscopy, shape of epiglottis still visualized (unlike DDSP). Tx by splitting ariepiglottic fold. Surgical excision via laryngotomy, transendoscopic laser axia division, or oral w/ hook or laser.

Epizootic Bovine Abortion - Foothill abortion. Agent unknown. Infectious disease of cattle manifested by abortion (3rd trimester) or weak calves. Endemic in foothills of California, Nevada, and southern Oregon. Vector is Pajaroello tick, *Ornithodoros coriaceus*. Aborted fetuses have enlarged and nodular liver, edema, erythema, petechial hemorrhages.

Equine Encephalomyelitis – Arbo virus. Togavirus. Sleeping Sickness. EEE, WEE, VEE. Causes CNS dysfunction, mortality. Transmitted by mosquito-vertebrate (bird)-mosquito cycle in late summer and fall. EEE – most potent. VEE can go from horse to horse via respiratory droplets. Virus travels via lymphatics and replicates in M∅ and neuts.

ZOONOTIC – all 3 can cause mild flu-like symptoms to death, usu follow equine infection ~ 2 wks. VEE from horse ↔ man. Use repellents.
· Clinical signs – Fever, altered mentation, impaired vision, aimless, head pressing, circling, can't swallow, ataxic, paresis, paralysis. Motor irritation, ↑ sensitivity. Lymphopenia, leukopenia.
· Diagnosis – Clin sx, hx, season. Serology, paired sera. Virus isolation.
· Treament and Control - Supportive care. Vax valuable horses in mosquito area 2x/yr. EEE and WEE killed w/ sht term immunity. VEE – MLV, long term immunity.

EHV1 – Herpesvirus 1. CNS, abortion, respiratory. Acute respiratory disease. Occurs in dense populations of horses. Late term abortion of fresh fetuses causing necrosis of bronchial epithelium, sloughing mucosa, fibrin formation and cast formation. Neurologic disease (immune mediated vasculites) from mild incoordination to severe posterior paralysis, back>front, flaccid tail, incontinence; encephalomyelitis. Vax not protective for this form. Dx by 4 fold increase in titer. Supportive care. Short term (4-5 mos) vax avail. Tx is supportive. If remain standing, px pretty good.

EHV2 – Herpesvirus 2. Respiratory disease only.

EHV3 – Herpesvirus 3. Equine coital exanthema. Benign veneral disease of horses. Causes red nodules on genital mucosa.

Equine Infectious Anemia – EIA. Transmitted by transfer of blood from an infected horse via bloodsucking flies, contaminated needles, etc.

· Clinical findings - Intermittent fever, depression, anemia. Vasculitis.

· Diagnosis - Coggins test. Can get a false positive if foal's dam was infected.

Equine Influenza Virus – 1-2 yr old horses. Many different strains. Sudden onset of fever, explosive dry cough, serous nasal dischg. Usally self-limiting, tx w/ rest and supporting care. Worry about 2° infection and time away from training.

Equine LMN Disease - ~Lou Gerhrig's Disease (ALS). Slowly progressive disease w/ muscle fasciculation, asting, lays down, raised tailhead. Debilitation w/ good appetite. Excessive sweating. Dx by mm biopsy of tail, accessory nn biopsy. No treatment. May stabilize but do not recover.

Equine Protozoal Myelitis – *Sarcocystis neurona*, sporozoan parasite. #1 neuro disease of equine. DH = opossums, aberrant host = birds, dead end host = horses. Horses eat opossum feces or contaminated feed/water. Sarcocystis invade CNS. Subtle, slow onset. GREAT MIMICKER. Multifocal, asymmetrical, progressive spinal cord disease. Focal area of mm atrophy. Dx via serology (just show exposure), CSF, DNA. Tx w/ folic acid antagonists – TMS plus pyrimethamine. New drug is toltrauril. Guarded px.

Equine Viral Arteritis - Togavirus. Transmitted via respiratory and venereal routes.

· Clinical findings - Acute severe infection of the upper respiratory tract. Vasculitis causing limb and ventral edema. Abortion of partially autolyzed fetuses. Chemosis, blepharosposm, profuse discharge.

Erysipelas – *Erysipelothrix rhusiopathiae* bacteria found in water, soil, decaying matter, slime on fish, etc. Causes swine erysipelas, nonsuppurative arthritis in lambs, postdipping lameness in sheep, acute septicemia in turkeys, ducks. In man, usu localized termed erysipeloid (not same as strep infection erysipelas in man).

· Clinical signs – Growing pigs. Acute septicemia, skin (subacute) form, chronic arthritis and joint effusion, vegetative endocarditis. Death. High fever, walk on toes, squeal. Skin discoloration w/ erythema, diamond-shaped skin lesions sloughing earstips and tails. Enlarged ln and spleen, edematous and congested lungs.

· Diagnosis – Dx w/ tx of penicillin – response seen w/in 24 hrs. Diamond shaped lesions are diagnostic. Necropsy.

· Prevention and treatment – Immunization. Antiserum. Penicillin. Eliminate carriers, good sanitation, regular vax.

Erythema Multiforme - Unknown cause, likely immune complex. Reaction pattern of drug eruption. Characterized by erythematous papules on the skin of the abdomen that expand peripherally leading to the development of annular lesions with normal centers. Occurs in pigs and other species. Treat with prednisone. Toxic Epidermal Necrosis is severe whole body EM.

Escheria coli – Diarrhea, dysentery in young cattle, mastitis in older. Calves – enterotoxigenic colibacillosis in 4-7 day old. Vaccinate cow w/ K99 antigen vax.

Esophageal Stricture – Balloon, do not cut.

Esophageal Tumors – Rads w/ mass in chest at proper region could be in esophagus. 1) Fibrosacrcoma = *Spirocerca lupi*.

2) Leiomyoma usu at lower esoph sphincter, esp in beagles. Treatable. 3) Carcinoma, uncommon.

Esophagitis – Occus post anesthesia dt gastroesphogeal reflux. Tetracyclines can cause (esp Doxy). Toxins can cause also, cat lay on disinfectant than like clean. Follow oral meds w/ water/food.

Estrogen Therapy – For mismating in canines. Many side effects, younger (<4 yrs) are more tolerant. See bone marrow toxicity (aplastic anemia), 30% ↑ chance of uterine infection, longer heat. Success rate directly related to time b/w mating and onset of tx.

Ethmoid Hematoma – Unilateral epistaxis dt ethmoid turbinate mass, not exercise induced. Usu in middle aged horses. Dx w/ endoscopy. Repair with sinus flap. More contemporary tx is inject w/ 10% formalin or ND:YAG laser to burn off. Bloody procedure. Ddx – gutteral pouch mycosis. If bilateral epistaxis, ddx EIPH or FB.

Ethylene Glycol Toxicity - Antifreeze is most common source in dog and cats. Results in calcium oxalate crystal formation and acute tubular necrosis resulting in pale kidneys w/ swollen cortices on necropsy.

· Clinical signs – 1st stage see CNS signs, drunk. Nausea, vomiting, ataxia, seizures. Appear to feel better than 2nd stage of cardiopulmonary signs (mild or absent). 3rd stage is acute renal failure, acidosis.

· Diagnosis - Metabolic acidosis, increased anion gap, isosthenuria, serum hyperosmolality, calcium oxalate crystalluria. On U/S, see ↑ renal cortical echogenicity. In house kit.

· Treatment - IV ethanol or 4-methylpyrazole to inhibit ethylene glycol metabolism. Must be w/in 8 hrs of ingestion.

Exercise Induced Pulmonary Hemorrhage – Blood from lungs (caudodorsal lung field) as consequence of exercise. See epistaxis, gurgling, swallowing, exercise intolerance. Endoscopy for def dx, TBAsp will see hemosiderin-laden macrophages. No treatment.

Exertional Rhabdomyoloysis Syndrome – Monday morning disease, Tying up. Most common muscle disorder in horses affecting all breeds, usually > 2 yrs. More common in females. Excess carbs in diet implicated. Polysaccharide storage disease is a subset.

· Clinical signs - Stiffness and gait alterations to severe mm cramping and immobility, profuse sweating, firm mm groups, myoglobinuria if severe.

· Diagnosis – Clin signs, ↑ CPK, AST. Mild metabolic alkalosis (NOT lactic acidosis), ↓ Cl^-, ↓ Ca^{++}, ↓ fractional excretion of K^+, myoglobinuria. Muscle biopsy dx some subsets. Ddx iliac thrombosis.

· Treatment – REST. Supportive. Phenytoin in chronic myopathy. Dantrolene sodium best as preventative, little to relieve current signs.

Exocrine Pancreatic Insufficiency – Maldigestive syndrome usu dt pancreatic atrophy. Common in GSD and collies. Chronic SI diarrhea, ravenous appetite, wt loss. Often have concurrent bacterial overgrowth. Test w/ TLI. Check TLI on any dog w/ non PLE SI diarrhea. May see slate gray feces. Never eliminate EPI based upon failure to respond to replacement enzyme therapy.

False Hellibore – Veratum californicum. Alkaloid causing cyclops in cattle.

Fasciola hepatica - Liver fluke. IH = snail. Flukes create tissue damage in liver and bile ducts.

Feline Acne - Involves skin on point of chin and lips; blackheads. No treatment usually reqd, unless progresses to furunculosis.

Feline Endocrine Alopecia - Bilateral symmetrical hair loss on the posterior abdomen, inner thighs, perineum of male neutered cats. Sex hormone deficiency suspected.

Feline Immunodeficiency Virus – Lentivirus. Causes lifelong infection. Transmission through cat bite wounds. Virus is not highly contagious and will not disseminate through a household if cats do not fight. Many FIV cats are asymptomatic and many do not die of FIV-related causes. Diagnose via FIV ELISA.

Feline Infectious Peritonitis – Coronavirus. Remains infectious in environment up to 6 wks but easily killed by disinfectants. Spread in secretions and excretions. Risk factors included popu density, amt of shedding, breed (persians, birmans predisposed). Feline Enteric Coronavirus usu causes mild, self-ltg diarrhea in young cats. Some FECV mutate to FIP. Biphasic - <6-12 wks old or >13 yrs old. FeLV, stress, crowding, concurrent diz ↑ risk (steroids affect humoral immunity and do NOT ↑ risk). Up to 50% are FeLV+.

· Clinical Signs – Effusive FIP – fluctuating, Ab responsive fever; lethargy, anorexia, wt loss; ascites, pleural fluid, pericardial and scrotal fluid accumulation rarely. Noneffusive FIP – same, but instead of fluid accumulation, have pyogranulomatous reaction causing local tissue necrosis and decreased organ function. Also see serious ocular changes and CNS changes.

· Diagnosis – Hyperproteinemia, kidney/liver abn. Hyperglobulinemia and thrombocytopenia. Keratitic ppts in eyes. Ascites fluid is thick, straw colored, pyogranulomatous nonseptic exudate w/ moderate cellularity and high protein levels. On smears, background has characteristic eosinophilic stippled appearance. FECV serology not helpful. Antibody tests crossreact with enteric coronavirus antibodies. Do not do FIP Serology.
· Treatment – None. Palliative aimed at suppressing immune complex components (pred, cyclophosphamide, broad spec Abs).
· Prevention – Environmental control. DO NOT use vax – sensitizes cat to infection.

Feline Leprosy – *Mycobacterium lepraemurium.*

Feline Miliary Dermatitis - A papular, crusting skin disease located predominantly on the back with varying degrees of pruritus. Ectoparasites, food allergy, drug allergy, fungal or bacterial infection. Feline flea allergy.

Feline Panleukopenia – Parvovirus. aka Distemper. Similar to canine parvo. Cerebellar hypoplasia. Vax.

Feline Respiratory Disease Complex - Illness typified by rhinitis, conjunctivitis, lacrimation, salivation, oral ulcerations 40-45% are feline viral rhinotracheitis (herpes) and 40-45% are feline calicivirus. Feline pneumonitis (chlamydia) and mycoplasma are less important.
· **Feline Viral Rhinotracheitis** – Herpesvirus. Fever, sneezing, conjunctivitis, rhinitis, salivation. Ulcerative stomatitis, ulcerative keratitis. Affects conjunctiva and nasal passages. Intranuclear inclusion body. Tx corneal ulcers w/ topical acyclovir.
· **Feline Calicivirus** - Ulceration of oral mucosa. Serous rhinitis, conjunctivitis. Oral mucosa, lower respiratory tract.
· **Feline Pneumonitis** – **Chlamydia**. Conjunctivitis. Intracytoplasmic inclusion bodies. Chronic, low grade conjunctivitis. Tx w/ tetracycline.
· **Mycoplasma** – Conjunctivitis, rhinitis. Extracellular coccoid bodies on conjunctival epithelial cells.

Feline Stomatitis - Causes include feline herpes, calici, FELV, and FIV. See Dentistry section.

FeLV – Retrovirus. FeLV virus composed of variety of proteins which have different biologic functions. There are envelope proteins and core proteins. p27 is the core protein detected by IFA and ELISA. FELV is very labile and is destroyed in the environment within minutes.
· Transmission - Contact w/ body fluids is most common way. Bite wounds, blood transfusion, transmammary. 1/3 of cats exposed become persistently viremic and develop FeLV-related disorders. 2/3 of cats resist development of persistent viremia. 1/3 of transiently viremic cats become latently infected, virus hides in body and can be reexpressed
later in life.
· Diagnosis - Use antibodies against p27. IFA detects cell-associated viremia. ELISA detects serum-associated viremia.
ELISA is more sensitive and detects infection earlier. Cats w/ positive ELISA should be retested 6 weeks later for seroconversion.

FUS – Feline Urologic Sydrome. Multiple diz w/ multiple causes. 4 basic syndromes are urinary obstruction, urolitiasis, UTI and abnormal micturition.

Ferrets – *Mustelidae*. Most in US from Marshall Farms, tattoo on R pinna. Life span approx 4 yrs dt common diz. Hobs are males, Jills are females, have kits (gibs, sprits).
· Anatomy – Similar to cat. Can palpate everything. Change coat and body wt w/ season (lose 20% in summer). Venipuncture easy when anesth, cranial vena cava. Also jugular and cephalic vv. Ferrets have big spleens dt extramedullary hematopoiesis, esp if sick. Need to do dentals, calculus.
· Prev Med – Carnivores, 25% protein, 25% fat in diet, often feed cat food. Need constant supervision as get into everything. Need to immunize for canine distemper (premed w/ benadryl to prevent anaphylaxis) and rabies. Don't test for heartworms but put on preventative. Spay (prevent estrogen tox) and castrate. Stinky if not neutered.
· Clin Path – Creatinine does not ↑ w/ renal failure.

· GI Diz – If < 2yrs, FB. Can dx w/ palpation; hydrate than sx. If >2yrs, hairball. Long tubular stx on palp, hydrate and sx. Gastroenteritis often dt *Helicobacter musteli*, causes upper GI vomiting, melena. Tx w/ pepto bismol, metronidazole, amoxicillin. *Lawsonia intracellularis* can cause infl of ileum/cecum; mucus. Proliferative Bowel Diz. Tx w/ chloramphenicol. Coronavirus enteritis is green slime disease, Epizootic Catarrhal Enteritis. New ferret in house, green diarrhea, ALT>700. Usu self ltg, tx w/ broad spectrum antibiotic.
· Endocrine Diz – Induced ovulators, seasonal polyestrus, prolonged estrus. If remain in heat will die from estrogen toxicity (BM suppression, panctopenia). Can bleed to death from severe thombocytopenia. Don't have blood types. Ddx from ovarian remnant by response to hCG (will respond).
- Adrenal disorders include hyperplasia, adenoma. Clin signs for female, about 2 yrs old. Bilat symmetrical truncal alopecia, redist of fat, think skin, pendulous abdomen, vulvar swelling. Endocrine panel and U/S. No ACTH stim. Male, unable to urinate, obstructed urethra or enlgd prostate. Cut out to tx. R adrenal is on caudal vc. Lysodren is ACTH agonist that stops secretion from pituitary.
- Insulinoma – Tumor of pancreatic islet cells. Multicentric. Never mets. Most common cause of seizures in ferrets. Hx of collapse, weakness, hypoglycemia. Tx w/ prednisolone, diazoxide. Can sx remove but recur.
· Lymphoma – Like cat. Juvenile onset in < 1yr (very aggressive) or adult onset > 2yrs. Thin, cranial mediastinal mass w/ effusion, ln enlgmnt, multi-organ involvement. Dx w/ ln biopsy, usu popliteals. Try to avoid fat as ferrets pack fat around ln. Px is poor. Tx includes cyclophosphamide, vincristine, pred.
· Mast Cell Tumor – Males around prepuce.
· Infectious Diz – Green slime diz, see above.
- Influenza – Dec, Jan, Feb, exposure to human infection. Fever, URD, 2° bact infection, pneumonia. Non fatal.
- Canine Distemper – Extremely susceptible. Respiratory diz, crusty rash on chin, parakeratosis on nose, feet – hard pad diz. Will die. Vax to prevent but use benadryl 1_{st} to prevent anaphylaxis.
- Aleutian Mink Diz – Parvo virus. Vasculitis.
· Anatrichostoma – Cutaneous nematode worm. Excoriation and erosion on dorsal cervical skin. Dx when see eggs on skin scrape. Tx w/ ivermectin.
· Cardiac Diz – DCM is #1, px grave. Also get HCM rarely. Do see Heartworm Diz – Heart failure, pleural effusion, wasting, lethargy. Posterior paraparesis, murmur. Dx w/ rads. Tx w/ pred. Cat heartguard, ½ chew tablet.

Fescue – Summer Fescue Toxicosis. Toxin present in tall fescue forage or seed contaminated w/ endophytic fungus, *Acremonium coenophialum.* Produces ↓ weight gain, ↓ milk production, and agalactia in cattle, sheep and horses. Lameness w/ cold feet and pasterns, necrotic ears and tails.

Fetal Membranes - Embryonic membranes of the dog include the chorion, yolk sac, amnion, allantois.

Fibrotic Myopathy – Equine. Trauma to semimembranosus or semitendinosus muscles. Thick tissue band that needs to be transected.

Flail Chest - Loss of stabitily of chest wall due to multiple rib fractures. Loose chest segment moves in a direction which is reverse of normal; inward during inspiration, outward during expiration (paradoxical respiration).

Flatulence – Bacterial metabolism of malabsorbed carbohydrates reaching colon.

Fleas and Flea Control
· IGR – Pyriproxyfen, methoprene, fenoxycarb. Eggs will not hatch; cannot move into next life cycle.
· Chitin Inhibitors – Lufenuron (Program). Flea has to take blood meal then lays defective eggs that won't hatch. Larva unable to move into cocoon stage. Also gets dermatophytes.
· Imidacloprid – Advantage. Kills adults. Prevents post synaptic binding of Ach.
· Fipronil – Frontline. Kills adults and ticks. Inhibits GABA mediated Cl^- flux.
· Pyrethrins – Quick kill. Broken down by UV light.
· Permethrins – Synthetic pyrethrins. UV stable but slower kill.
· Nitenpyram – Capstar. Kills fleas quickly for short period of time.

Foot and Mouth Disease – Vesicular disease. Aphthovirus of picornavirus family. **REPORTABLE.** Seven serotypes, many strains. Mutate frequently. Extremely contagious disease of cloven-hooved animals. Ruminant, swine. Swine are accelerators of the disease. Camels resistant to natural infection. High morbidity, low mortality.

· Transmission - Contact, aerosolized virus, present in all secretions/excretions, contaminated feed (offal). Ranch contaminated for 1 month, can spread through wind easily. Can live in pharynx for up to 2 years.

· Clinical signs - Lameness, excessive salivation, dt ulceration of oral cavity, interdigital space, coronary band, teat and udder. Cardiac muscle necrosis. Long convalescent period.

· Diagnosis - Fluid sample from blister. ELISA.

· Test and slaughter - Huge economic impact. Last case in US in 1929, Canada and Mexico are free. Vax – killed, short duration at best.

Foothill Abortion - See Epizootic Bovine Abortion.

Footrot – *Fusobacterium necrophorum, Dichelobacter melaninogenicus, Bacteriodes nodosus.* Gram- obligate anaerobes, fecal contaminants. The major cause of lameness in beef and dairy cattle. Disease most prevalent during wet or very dry weather. Once skin broken, organisms in soil readily infect wound.

· Clinical findings - Edema and erythema of interdigital region w/ no evidence of foreign body. Severe lameness. Swollen, painful, stinks. Usu unilateral.

· Treatment - Systemic and local antibiotics, clean foot, remove necrotic mass. Response to Abs is fast, if no or little response probably not Footrot.

Fracture Classification - Classification by presence of a communicating wound.

· Closed f racture - No wound.

· Open fracture - Grade I has bone fragments penetrating skin from inside to outside. Grade II has soft tissue wound inflicted from the outside. Grade III is a wound from the outside with extensive skin, muscle and bone damage.

· Physeal fractures - Salter I breaks off entire physis, no metaphyseal or epiphyseal involvement. Salter II breaks off entire physis, plus takes a piece of the metaphysis. Salter III breaks off part of physis, up through epiphysis into joint. Salter IV is a longitudinal break through part of metaphysis, through the physis and through the epiphysis. Salter V is a crushing injury which results in premature closure of the growth plate.

Free Gas Bloat – Motility disorder, accumulation of gas in rumen. Often after pneumonia dt vagal effect. Left paralumbar fossa. Relieve easily w/ stomach tube. Career or dietary change to prevent.

Frothy Bloat – Legumes. Rumenal tympany, left paralumbar fossa. Antisurfactant.

Fungal Diseases - Common mycotic diseases that involve the lungs are blastomycosis, histoplasmosis, and coccidioidomycosis. Cryptococcus can also have pulmonary involvement, but the presenting signs reflect nasal infection. Enter respiratory tract via inhalation of fungal spores. Infection may be successfully eliminated w/out clinical signs, may progress to respiratory disease, or may spread systemically. Dogs with histo often present with GI signs. Dogs with coccidiomycosis often present with skeletal signs.

· Blastomycosis - *Blastomyces dermatitidis.* Large, broad-based, budding yeast w/ capsule wall. Midwest, acid soil near water. 1° causes granulomatous or pyogranulomatous lesions in the lungs. Lesions may occur in skin, eyes, bone and elsewhere. Draining cutaneous tracts, respiratory disease. Chest rads in dogs. Rare in cats. Amphotericin B. Poor px if disseminated.

· Coccidiomycosis - *Coccidioides immitis*. Dimorphic soil (alkaline) pathogen. Large, round w/ thick basophilic wall. Arid regions of SW USA. Most common in dogs. Chronic respiratory disease. Can disseminate to eye and bone. Chronic cough, anorexic, cachexia, lameness, enlgd joints, fever, intermittent diarrhea. Dog w/ chronic bronchopulmonary diz in endemic area. Pulmonary nodules and enlgd hilar ln found on thor rads. Positive coccidiodin test indicates exposure. Do NOT culture. Tx w/ Amphothericin B.

· Cryptococcosis – *Cryptococcus neoformans*. Narrow-based budding yeast w/ thick, clear mucin capsule. Found in soil, pigeon droppings. Cats > dogs. Cat w/ nasal discharge. Clinical features in cats include swelling or draining fistula over facial bone, chronic nasal discharge. Dogs see neurologic signs, granulomatous chorioretinitis. Dx by ID of fungal organism. Cryptococcal capsular antigen test. Tx w/ Amphotericin B or ketoconazole.

· Histoplasmosis - *Histoplasma capsulatum*. Small intracellular yeast, can be extracellular. Midwest, nitrogen rich

organic material (bat poop). 1° infection in lungs, also in GIT. May see in eye and bone. Syndrome includes hepatomegaly, lymphadenopathy, anasarca and emaciation. Tx w/ ketaconazole.

Furosemide – Lasix®. Loop diuretic, potassium wasting. Reduces absorption of electrolytes in ascending loop of Henle, ↓ reabsorption of sodium and chloride, ↑ excretion of potassium in distal renal tubule. Directly effects electrolyte transport in proximal tubule. No effect of carbonic anhydrase, does not antagonize aldosterone. The diuretic effect takes place within 5 minutes of IV dosing.

Gastric Dilatation Volvulus - EMERGENCY. Initiated by accumulation of gas. Aerophagia is most likely source. Dilatation precedes volvulus. Most common rotation is clockwise (as viewed w/ dog in dorsal recumbency). Displacement of pylorus occurs from R abdominal wall, toward ventral midline, passing over gastric fundus and body to L abdominal wall. Pathophysiologic effects include compression of posterior vena cava and portal vein, resulting in 2° sequestration of blood in splanchnic, renal and posterior muscular capillary beds. Cardiac arrythmias (VPCs, vtach, supravtach) can occur. Endotoxemia dt ↓ hepatic perfusion. Hypotension. Organ hypoxia. Focal myocardial ischemia and hypoxia.

· Diagnosis – Large breed, deep chested dog, dry heaving, abdominal pain, arched back. Anterior abdominal distention, tympanic. R lateral abdominal rads. Passing a stomach tube is not a way of def dx.

· Anesthesia - Neuroleptanalgesics and narcotic agents are suitable for both preop sedation and anesthetic induction. Acepromazine and short-acting barbiturates are contraindicated because of hypotensive, arrhythmogenic and respiratory depressant effects. Isoflurane has less CV depression than halo, enflurane or thiobarbiturates.

· Treatment – Shock tx. Dual cephalic catheters w/ shock fluids. Deflate stomach. Surgery to derotate and gastropexy. Antibiotics. Supplement K^+ if needed for cardiac abnormalities.

Gastric Outflow Obstruction – 1) Tumor, 2) Mucosal hypertrophy, 3) FB, 4) Pyloric stenosis (young, brachycephalic pup). Dx w/ barium, endoscopy, U/S. If barium in stomach >15 min in cat or >45 min in dog, abnormal. If FB such as bones, do not use tagamet, will ↓ dissolution.

Gastric Ulceration/Erosion – Unknown etiology. Caused by stress, NSAIDs, steroids (dex; not pred), mast cell tumor, GIT tumor. Often subclinical or colic or poor performance. See in non-glandular or squamous portion of margo plicatus in adults and glandular portion in foals. No bacterial cause. High risk is stall w/ high carbo diet. Can see melena w/ major blood loss. Amount of blood loss not indicative of size. Tx w/ proton pump blocker (omeprazole) or H2 blockers (ranitidine). Sucralfate for prophylaxis.

Gerbils – Do not grab by tail. Genetic predisposition for epilepsy.

Giardia – Protozoa. **ZOONOSIS**. Most human infections waterborne. Ingest cysts from contaminated water. Cysts very resistant in environment. Inhabit mucosal surfaces of small intestine. No part of giardia life cycle takes place in LI. Fecal-oral transmission. Prepatent period 5-14 days. Clinical findings may be inapparent or produce chronic diarrhea (cow patty, no blood or mucous). Dx/ trichrome stain or minimum of three $ZnSO_4$ floats, ELISA. Do not use sugar/salt floats, will damage cyst. Can see motile trophozoites in fresh feces wet mount (hot, steaming poop). Tx w/ metronidozole, fenbendazole. No tx 100% effective. Resistance and reinfection easy.

Glaucoma - Increased intraocular pressure damages the retina and optic nerve. Clinical signs include dilated, fixed or sluggish pupil, conjunctival injection, corneal edema, firm globe. May have lens displacement and rupture of Descemet's membrane. Glaucoma is classified as 1° or 2° , open angle or closed angle. Tx acute glaucoma as an emergency, ↑ IOP can permanently damage eye w/in few days. Treat w/ mannitol, carbonic anhydrase inhibitors, pilocarpine or timolol.

Glomerular Disease – Proteinuria w/ inactive urine sediment. Signs of glomerular disease, nephrotic syndrome - proteinuria, hypoalbuminemia, ascites, hypercholesterolemia. Progressive chronic diz w/ no cure, poor px.

· Glomerulonephritis - Deposition of immune complexes in the glomerular capillary wall. Tx by correcting underlying disease process if present. Use immunosuppressive therapy. Familial in bernese mountain dog and soft coated wheaten terriers.

· Amyloidosis – Extracellular deposit of glycoproteins. Stain distinctly w/ congo red stain. Amyloid is deposited in

renal medulla of cats and glomeruli in dogs. In dogs, deposit in glomerulus leads to proteinuria. In cats, in medullary portion so CRF w/ no proteinuria. Familial in abyssinian cats and shar pei dogs.

Gossypol - Toxic component of cottonseed meal. Causes severe myocardial necrosis and lung damage. Pigs are most sensitive. Also reproductive effects including ↓ spermatogenesis, irregular cycling, disruption of pregnancy. Hepatotoxicity.

Gout - Deposition of uric acid crystals in and around joints (articular gout - crippling) and on visceral surfaces (visceral gout – birds?). End result of renal failure. Can dx via fluid analysis, see monosodium urate crystals which are needle shaped and birefringent under polarized light. Allopurinal is the traditional treatment, stops additional lesions. Colchicine/probenecid may reverse lesions.

Granulosa Thecal Cell Tumors - Follicular cell tumor. May produce excessive amounts of estrogen, inducing endometrial hyperplasia and signs of hyperestrogenism. Most common in mare and cow. Mare shows masculine behavior (mounting, aggressiveness, vocalization). Dx via rectal exam, check testosterone level in blood. Surgical excision.

Grass Tetany - A metabolic disturbance characterized by hypomagnesemia. Most common in adult cows and ewes in heavy lactation on lush grass pasture. Clinical findings include acute convulsive episodes. In less severe cases, stiff, ill at ease, hypersensitive. Hypomagnesemia, hypocalcemia. Treat with IV calcium and magnesium. Prevent by supplementing magnesium during danger periods.

Griseofulvin – Fungistatic. Disrupts mitotic spindle, arrests metaphase. Only works on dermatophytes (ringworm). See Antifungal section.

Guaifensin - Centrally-acting muscle relaxant. Induces muscle relaxation and restraint as an adjunct to anesthesia for short procedures.

Guinea Pigs –
· Nutrition – Water, PU (120ml/kg); reflux food in spout. Have absolute requirement for vita C, must provide in diet. Cabbage, green peppers. If not, get scurvy, hemorrhage into joints, etc.
· Repro – Gestation 68d. Litters 1-13, 2-4 avg, precocious young (fully haired, eyes open). If not bred by 8 mos, pelvic symphisis fuses resulting in dystocia. Ovarian cysts common, OHE.
· Infectious Diz – Strangles, *Staph* abscess under jaw. *Bordetella bronchiseptica*, resp diz w/ hx of contact w/ rabbit.

Gutteral Pouch Empyema - Pus in the guttural pouch. Inspisated pus = chondroids. Usually culture *S. zooepidemicus*. Develops 2° to upper respiratory infection in horses, can also develop 2° to congenital tympany. Affects horses of any age. See chondroids on rads. Endoscopy. Nonsx if no chondroids, place indwelling cath, flush, lavage. Surg via viborg's triangle, get chondroids out, leave drainage.

Gutteral Pouch Mycosis - Caused by a fungal infection of the gutteral pouch, usually *Aspergillus*. Unilateral epistaxis due to fungal erosion of the internal or external carotid. Hemorrhage may be fatal. Treat as an emergency, is life threatening. Clinical signs 2° to damage to cranial nerves and arteries within gutteral pouch mucosa. Dysphagia, Horner's syndrome, laryngeal hemiplegia, dorsal displacement of the soft palate. Endoscopy, check both pouches. Treatment is surgical, hyovertebrotomy. Occlude blood blow on both sides of lesion so no retrograde flow using balloon-tipped catheter. Ddx – ethmoid hematoma.

Gutteral Pouch Tympany - Distention of the guttural pouch with air in young horses (days to 1 y.o). Nonpainful swelling, may cause dyspnea, dysphagia, aspiration. Rads or needle decompression to dx. Sx – viborg's triangle, excise medial lamina of eustachian tube, fenestrate median septum between pouches. Good px if no aspiration.

Habronema - Stomach worm of horses. *H. muscae, H. microstoma,* and *Draschia megastroma*. Causes catarrhal gastritis.

Cutaneous Habronemiasis – summer sores in horses. The stomach worm larvae emerge from flies feeding on genitalia, eye or wound. Invade skin and irritate tissue, which causes a chronic granulomatous reaction. Treat with insect repellents, topical organophosphates (to kill larvae). Surgical removal of excessive granulation tissue.

Haemonchus contortus – Ruminants. Blood-sucking abomasal worm. Causes severe anemia and generalized edema. "Haemonchus contortus the barber-pole worm, gives you edema and the bottle jaw term."

Haemophilus pleuropneumoniae - Porcine pleuropneumonia. Severe and contagious respiratory diz of young pigs. Aerosol transmission. Many carrier pigs. Clinical findings include sudden onset respiratory distress, fibrinous pleurisy, and pericarditis. Dx by hx and clinical sx, isolation and ID of organism. Tx difficult because of acute onset. Various antibiotics may be used.

Haemophilus parasuis - Glässer's disease. Porcine polyserositis. Infectious polyarthritis. A fibrinous, sometimes fatal polyserositis, polyarthritis and meningitis of pigs. Clinical findings in young pigs (wean - 4 mo) include high fever, anorexia, depression, dyspnea, lameness. Classic lesion is serofibrinous pleurisy, pericarditis, peritonitis. Turbid joint fluid. Dx by culture. Tx w/ penicillin, tetracycline; remove stressors.

Haemophilus somnus – Thomboembolic encephalomyelitis. "Sleepers."

Heartworms - *Dirofilaria immitis.* Transmitted by mosquitoes. Larvae deposited on skin, migrate through bite wound into SQ tissues, develop for 2 months. Begin 2-4 mos migration into right ventricle. Appear in peripheral circulation 6 mos after infection. Adult worms found w/in pulmonary arteries, right ventricle. Worms impede blood flow and cause endarteritis, endothelial proliferation, thrombosis. Circulating microfilariae can form immune complexes in the kidneys. Cats are aberrant host, more severe infections.

· Clinical signs - Present for coughing, exercise intolerance, weight loss. Cats usually present w/ vomiting.

· Diagnose – Rads, reverse D appearance dt enlgd R heart. ELISA test for adult antigens (female worm repro tract). Antibody test available as well.

· Treatment – Thiacetarsamide adulticide, then ivermectin microfilaricidal within 3-6 weeks. Treat longterm with Heartgard (slow kill in sick patients), immiticide injections – 2, 30d apart, or 2 days apart. Canine treatment will kill cats (can offer heartguard for rest of life). Surgical removal of worms an option in some.

Heinz Body Anemia – Clumps of denatured hemoglobin dt oxidative injuries. Change RBC shape, make more rigid leading to EV and IV hemolysis. Mild oxidants create methemoglobinemia, strong oxidants induce Hz body. Felines prone. Dt onion toxicosis (onion powder in baby food), acetominophen, zinc tox, propofol daily in cats, methylene blue, phenothiazine toxicity in horses. See anemia, cyanosis, facial edema (tylenol), high #'s of hz bodies on blood smear, brown blood. Tx is suppotive care, oxygen, transfusion. Acetylcystein (Mucomyst) effective if used early.

Hemangiosarcoma – Most aggressive soft tissue tumors. Aged dogs, esp GSD, irish wolfhounds, vizsla, golden retriever. Red nodules, bruises, hemoabdomen. Hemangiosarcoma of R ventricle is common cause of pericardial effusion in GSD. Metastasis is common. Wide excision and adjuvant chemotherapy (vincristine, doxorubicin, cyclophosphamide

Hemobartonellosis – *H. felis, H. canis.* Infectious anemia, esp in young, male cats (concurrent FeLV/FIV) and splenectomized dogs. Small round dots in chains on top of RBC. Transmitted by ticks, fleas, transfusions, from queen. Results in extravascular hemolysis w/ most cells removed by spleen.

· Clinical signs – Fever, icterus, anorexia, splenomegaly, wt loss, regenerative anemia.

· Diagnosis – ID organism on blood smear (refractile), cyclic parasitemia. Coombs + for 2 wks after 1st appearance of parasite.

· Treatment – Doxycycline. ± Blood transfusion. ± Corticosteroids.

Hemoproteus – Blood parasite of wild birds. Common, inside RBC, non pathogenic, don't treat.

Hemorrhagic Gastroenteritis – Hallmark is marked hemoconcentration (PCV>70%).

Hepatic Encephalopathy – Acute or severe. Associated w/ variety of diz. Do not admin LRS as ↑ pH will exacerbate. See depression, circling, head pressing, aimless wandering, coma. May see seizures late in diz (not common). Tx is NPO, warm water enemas, IV ½ saline w/ K_+ and dextrose.

Hepatic Lipidosis - Cats. Starvation leads to mobilization of fat stores, overwhelms hepatocytes. No protein available to form lipoproteins which liver needs to get fat out. Obese cat that stops eating for any reason. Ill, anorectic, icteric. Hyperbilirubinemia, ↑ SAP w/ normal ALT. Biopsy to be sure. Supply calories and protein.

Hepatozoonosis – *Hepatozoon canis.* Muscle, severe pain, extreme leukocytosis (>100,000), bony proliferation on ventral surface of ileum and spinal column.

Hiatal Hernia – Abdominal esophagus, gastroesophageal junction and or portion of stomach protrude through esophageal hiatus of diaphragm into thoracic cavity. May be "sliding". Cause of gastroesophageal reflux, intermittent anorexia, salivation, vomition. Sharpeis are prone. Dx via rads, endoscopy. Medical therapy may control mild signs, usu sx correction required.

Histiocytic Ulcerative Colitis – "Boxer Colitis". Young to middle aged boxers. LI diarrhea.

Histiocytoma – Histiocyte is tissue macrophage. Typically occurs in dogs < 3 y.o. Solitary, raised, ulcerated, freely movable cutaneous mass. Benign, most resolve in 2-3 mos w/out tx. Cutaneous histiocytosis occurs in Sharpeis and GSD. Histiocytoses of Bernese Mountain Dogs are systemic, familial disorders of unknown etiology. 2 forms, systemic histiocytosis which is generally cutaneous and malignant histiocytosis which occurs in males, usu involves lungs, ln, liver. Both are fatal, the malignant form is more aggressive.

Histoplasmosis - *Histoplasma capsulatum.* Dimorphic fungus found in nitrogen rich organic material (bat poop). Not a parasite. Small intracellular yeast, usu w/in macrophages; can be extracellular. Small cluster of grapes inside M∅. Inhalation of spores. Most common in Midwest.

· Clinical signs - 1° lung infection. GIT see LI diarrhea. Can spreads to eye and bone. Hepatomegaly, lymphadenopathy, anasarca, and emaciation. Cats – lungs, then disseminate. Dogs – gut, then disseminate.

· Diagnosis – Rectal scraping and cytologic eval of mucosa. If negative, still have to biopsy colonic mucosa and submit for histopath.

· Treatment - Ketaconazole. Amphotericin B. Itraconazole.

Hog Cholera – Pestivirus. Highly contagious viral disease of pigs. Sudden onset, high morbidity and mortality. Eradicated from US. Common antigens with BVD.

· Transmission - Direct contact. Infected pigs shed virus in all body secretions. Ingestion is the most common route of entry. Tonsil is primary site of replication.

· Clinical findings - High fever, lassitude, purple discoloration of abdominal skin, conjunctivitis. Nervous signs include circling, incoordination, tremors and convulsions. Pigs die 5-7 days w/ characteristic petechiation under kidney capsule (turkey egg kidney). Lesions result from viral damage to blood vessel endothelium. Bone marrow depression, leukopenia, thrombocytopenia.

· Diagnosis - History, clinical signs. IFA of tonsils, lymph nodes.

· Treatment – Cull.

Hookworms – *Ancylostoma caninum* in dogs, *A. tubaeforme* in cats, *A. braziliense* in both. *Uncinaria stenocephala* in northern US, Canada. 12-15mm long worms. Transmission via ingestion, transmammary, skin penetration. Larvae migrate through blood to lungs, coughed up, swallowed and mature in small intestine. In older dogs, arrest in somatic tissue, activated during pregnancy, accumulate in mammary glands.

· Cutaneous larvae migrans - **ZOONOTIC**. L3 larvae penetrate skin. Greatest risk to people who go barefooted, people working in dirt, children playing/eating dirt. *A. braziliense* in cats major source of eggs in US and Caribbean.

· Clinical signs – Asymptomatic. Normocytic, normochromic anemia, then Fe deficiency anemia. Ill thrift, diarrhea Dermatitis dt larval invasion of skin (*U. stenocephala* common in interdigital spaces). Death in young pups.

· Diagnosis – Thick shelled, oval eggs seen on fecal flotation.

· Treatment and Control – Pyrantel pomoate (Strongid) w/ ivermectin. Milbemycin. Diethylcarbamazine w/

oxibendazole. Fenbendazole (Panacure) in divided doses. Worm bitches before breeding.

Horner's syndrome – Failure of sympathetic innervation. Mitosis, ptosis (droopy lid), enophthalmos (sunken eye), prolapsed nictitans.

Hydralazine - Alters calcium metabolism in smooth muscle, preventing initiation and maintenance of the contractile state. Arterioles > veins. Used as an afterload reducer for treatment of CHF, especially mitral insufficiency, and systemic hypertension.

Hydronephrosis – Dilated pelvis, loss of medulla.

Hypercalcemia – Always correct for albumin. Corrected Ca^{++} = Msrd Ca^{++} + 3.5 – Albumin. Most common cause in small animals is Hypercalcemia of Malignancy, usu dt lymphoma or apocrine gland adenocarcinomas of the anal sac. Other r/o are renal 2° hyperparathyroidism which is most common cause in horse, nutritional 2° hyperparathyroidism, Addison's diz (late in diz), 1° hyperparathyroidism, hypervitaminosis D, granulomatous diz, Quintox intoxication, and lab error. Tx fluid therapy, saline diuresis, loop diuretics (max Na^+ excretion and thus Ca^{++} excretion), bicarbonate to reduce the ionized fraction of serum Ca^{++}.

Hyperestrogenism – Only pruritic endocrine disorder, often neoplasia. Intense pruritis in young, female dogs, immature mammae and genitalia, alopecia. Bone marrow suppression. Dx w/ ACTH stim and sex hormone panel, biopsy. Tx w/ low dosages of lysodren.

Hyperkalemia - ECG changes include bradycardia, tall tented T waves, loss of P waves, wide QRS complexes. Treatment
- sodium bicarbonate to send K^+ into cell and regular insulin/glucose. Volume expansion.

Hyperkalemic Periodic Paralysis – HYPP. Autosomal dominant heriditary condition of QH (also appaloosas, paints). Descendants of American Quarter Horse sire "Impressive". Mutation in skeletal muscle Na^+ channel gene. Excess potassium. Most are heterozygotes, homozygotes also affected (may be more severely). See mm fasciculation, spasm, weakness, collapse, difficulty breathing. Genetic DNA test. Tx w/ dextrose, bicarb (to lower K^+). Long term w/ K^+ wasting diuretic (acetazolamide).

Hyperparathyroidism – PTH acts on renal tubules to promote excretion of PO_4 and retention of Ca^{++}. Excess PTH dt primary disorder of parathyroid gland or secondary to renal disease.
· **1° Hyperparathyroidism** – Fibrous osteodystrophy. Rubber jaw syndrome. Excess production of PTH by functional ademona in parathyroid gland despite ↑ levels of blood Ca^{++}. Usu older dog, GSH, arctic breed may have ↑ incidence. Prolonged ↑ of PTH results in accelerated osteocytic and osteoclastic bone resorption; mineral is removed and replaced w/ fibrous CT, esp in cancellous bone. Also, renal tubular resorption of PO_4 is inhibited.
- Clinical signs - Lameness, frx in long bones, compression frxs, obliteration of nasal cavity, tooth loss/loosening. Moth eaten rad appearance to bone.
- Diagnosis - ↑ Ca^{++} (correct for albumin), ↓ or normal PO_4. Excretion of both in urine is often ↑, PTH assays ↑, SAP may be ↑. BUN, Cr may be ↑. Ddx other hypercalcemia causes.
- Treatment - Excision of abnormal parathyroid tissue, always take nearby ln as well (to r/o lsa). Then post op tx of hypocalcemia w/ vita D and calcium. Withdraw supplementation after PTH and parathyroid resume normal activity. Px is good if severe renal dysfxn has not occurred by the time dx.
· **Renal 2° Hyperparathyroidism** – More common than 1° PT, occurs frequently in dogs, occasionally in cats. Complication of CRF. ↑ PO_4 dt ↓ GFR. Hyperphosphatemia leads to lower serum [ ] of ionized Ca^{++}. Renal synthesis of calcitriol ↓, and w/ ↓ ionized Ca^{++} causes an ↑ PTH. See signs above.
- Diagnosis - Signs of renal insufficiency + ↑ PTH assays.
- Treament - Dietary modification, calcitriol suppl, phosphate binders and tx of underlying renal diz.

Hypersensitivity – Immune-mediated injury.
· Type I – Immediate. Acute, severe, allergic reactions. Anaphylaxis. Evident in seconds to minutes. Drug reaction.
· Type II – Antibody-mediated cytotoxicity. Actives complement cascade. Autoimmune disease.

· Type III – Antigen+Antibody complexes. Arthus reaction. Deposited in tissues, leads to inflammation and necrosis. Serum Sickness in equine dt IV tetanus toxoid.
· Type IV – Delayed HPS. Cell mediated cytotoxicity. Lymphocyte and macrophage mediated. Tissue graft rejections. + TB skin test.

Hyperthyroidism - Most common endocrine disorder of cats. Thyroid follicular cell adenoma or multinodular hyperplasia. Bilateral asymmetric thyroid hyperplasia most common. Secrete excess thyroxin and triiodothyronine.
· Clinical signs - ↑ metabolic rate. Weight loss despite polyphagia, nervousness, tachycardia, palpable thyroid mass, poor hair coat, PU, PD, systolic murmur, reversible left ventricular hypertrophy.
· Diagnosis - Elevated T4. Positive thyroid scan.
· Treatment - Surgical thyroidectomy; radioactive iodine. Methimazole.

Hypertrophic Cardiomyopathy – HCM. Diz of cats. Heart enlarges at expense of lumen. Heart murmur, LV enlgmnt pulmonary venous congestion. Acute dyspnea, posterior paralysis and death dt thromboembolism. Tx w/ diuretics if congested, beta blockers, Ca_+ channel blockers. Want to slow heart and allow it to fill. Digoxin is contraindicated b/c positive inotrope.

Hypertrophic Osteodystrophy –Young (2-7mos) large and giant breed dogs. Extensive soft tissue swelling of distal metaphyses of radius, ulna, and tibia, all 4 legs usu effected, very lame. On rads, see thin radiolucent line in metaphysic parallel to epiphyseal plate (extra physeal lines). Extraperiosteal cuffing along metaphysis. Treat with analgesia, selflimiting.

Hypertropic Osteopathy – Related to increased blood flow to extemities. Massive limb swelling (firm) in all 4 limbs w/ sudden demarcation proximally. Not hot to touch. Lameness, reluctance to move. Assoc w/ thoracic mass. On rads, see irregular surfaced periosteal new bone down entire length of long bones, palisade-like. Limbs are 3-4x normal size. Treat by removal of the thoracic mass.

Hypervitaminosis A – Most commonly in cats. Extensive ankylosing reactive tissue especially in lower cervical vertebrae, may also affect long bones. Correct the diet, will subside.

Hypoderma – *H. bovis* (spinal cord), *H. lineatum* (esophagus). Cattle grubs. Ox warbles. Heel flies which parasitize cattle and (rarely) horses. Larvae migrate to arrive in subdermal tissue of back. Cause warbles under skin and ruin hide w/ puncture wounds (breathing holes). Tx w/ insecticides.

Hypokalemic Polymyopathy – Neuromuscular diz of cats related to ↓ intake and ↑ renal wasting of K_+. See NM weakness and muscular pain (ventroflexion of neck). CPK elevated as a result of leakage from damaged mm.

Hypoparathyroidism – PTH deficiency. Uncommon. Acute onset of CNS signs, nervousness, cramping, mm fasciculations, weakness, "tetanic" activity. Severe hypocalcemia (remember to correct). Hyperphosphatemia. Hypocalcemia prolongs potential of myocardial cells (prolonged ST and QT). PTH levels low. Emergency tx involves calcium gluconate 10% IV slowly while monitoring heart. Maintenance w/ vita D (Rocaltrol) and calcium.

Hypothyroidism – Usu 1° and dt idiopathic thyroid gland atrophy. Middle-aged dogs .
· Clinical signs - Mental dullness, lethargy, exercise intolerance, obesity, dry hair coat, heat seeking. ↓ metabolic rate. Dry, scaly skin, hair falls out, rat tail, pyoderma. Megaesophagus, eye problems, etc. Often see hypercholesterolemia.
· Diagnosis - Basal total T_4 levels, which may be affected by concurrent diz (Euthyroid Sick Syndrome). If concurrent signs of illness, perform free T_4 along w/ TSH msmt. TSH will be ↑ in 1° hypothyroidism. If ETSS, total T_4 will be ↓ while free T_4 and TSH will be normal. 2° hypothyroidism will have ↓ TSH and ↓ T_4.
· Treatment - Lifelong. Sodium levothyroxine (T_4), begin and reassess T_3 and T_4 at 4 and 12 weeks. Should be normal at 12 wks. Poor response to tx is dt improper dose, poor O compliance, poor absorption, or incorrect dx.

Hypovitaminosis A – Lack of green feed. Liver is storage organ. Colustrum is calf source. Blindness, ill thrift, repro probs. Dx by history, clin signs, necropsy, [vitaA], [beta carotene]. Tx w/ vita A injection or oral prep.

In Avian – Deficiency turns mucous membranes into skin, multiple "abscess looking" lesions in oral cavity, respiratory signs such as mucopurulent nasal dischg, exopthalmia. Due to all seed diet. Supplement vita A.

Hypovitaminosis D – Osteomalacia in reptiles. Hypo or normocalcemic.

Ich - *Ichthyophthirius multifiliis*. Protozoan which causes fatal infection of skin and gills in freshwater fish. White spots on surfaces of fish, sudden death if gills involved. Tx by raising water temp to 86ºF which makes more susceptible to chloramine and quinine; formalin. *Cryptocaryon irritans* is the Ich of marine water fish.

Immune Response

· Cell-mediated immune response - Macrophages and T-lymphocytes. Secrete lymphokines that regulate T and B lymphocyte function, attract macrophages, activate complement, help host defense.

· Humoral immune response – Mediated by antibodies formed by B-lymphocytes.

· Immunoglobulins – IgG - Major immunoglobulin (70%). Immunity against bacteria, viruses, fungi, toxins. Distributed evenly between blood and extravascular fluids. IgA - Principal antibodies found in secretions. Provide defense against pathogens that contact the body surface, are ingested or inhaled. IgM - In blood and work in bacterial defense, 1st immunoglobulin to appear. IgD - Development of plasma cells and memory cells from B-lymphocytes. Very low distribution. IgE - Found on surface of basophils and most cells. Stimulate release of histamine to mediate allergic responses.

MHA – Autoantibodies against RBCs, often 2° to drugs, vax, infectious diz, neoplasia. Cockers, poodles predisposed; little middle aged female dogs.

· Clinical signs - Vomiting, diarrhea, icterus, labored respirations. Varying degress of signs based on degree of anemia. · Diagnosis - ↓ PCV, thrombocytopenia, proteinuria. Mod to severe regenerative anemia, spherocytes, autoagglutination. Leukocytosis, neutrophilia. Coombs test if haven't already seen autoagglutination. Osmotic fragility, bilirubinemia, hgburia, organomegaly.

· Treatment – Tx underlying condition if can ID. Corticosteroids (pred). Immunosuppressives such as Azathioprine (Imuran), Cyclophosphamide (Cytoxan), Cyclosporin (Neoral), Danozol. Transfusions (temp relief). ± Heparin. Recheck PCVs Q8-12 hrs. EV IMHA (see spherocytes) – splenectomy if anemia nonresp to immunosuppressives. IV IMHA - splenectomy not indicated; more aggressive tx reqd.

· Complications - Renal failure dt poor perfusion, DIC, pulmonary thromboembolism, concurrent IMT (Evan's Syndrome). Note: Rouleaux disperses w/ saline, hemagglutination does not.

Impetigo – Staph skin infection marked by vesicles or bullae that become pustular, rupture and form yellow crusts. Occurs as superficial infection of face of newborn piglets, abdominal skin of puppies.

Infectious Bovine Keratoconjunctivitis – Pinkeye. *Moraxella bovis* most common cause, also IBR and mycoplasma. Dry, dusty environment, irritants predispose.

· Clinical findings - Initial signs photophobia, blepharospasm, excessive lacrimation. Later, ocular discharge becomes purulent. Conjunctivitis ± keratitis. Lesions begin in center of cornea, then cornea becomes opaque. Blood vessels invade from limbus toward ulcer.

· Diagnosis – Clinical signs.

· Treatment and control – Immunization.

Infectious Bovine Rhinotracheitis – IBR. Bovine Herpesvirus I (BHV-1). Seen in cattle of all ages in crowded situations. URT infections and late term abortions.

· Clinical signs - Nasal discharge, red nose, ulcers of nasal mucosa, dyspnea, conjunctivitis. Abortions late term. Genital infections. Lesions in upper respiratory tract and trachea. Serofibrinous exudate.

· Diagnose - Clinical signs and IFA.

· Treatment and control - Immunization.

Infectious Bronchitis – Coronavirus. Chickens. Respiratory, urogenital and GIT involvement, decreased lay, misshapen eggs. Control by vax.

Infectious Bursal Disease - Viral disease of chickens. Causes immunosuppression. Prostration, diarrhea. Depopulate. Vaccinate.

Infectious Canine Hepatitis – Canine adenovirus 1 (CAV1). Contagious, infectious diz of dogs. Also occurs in foxes, wolves, coyotes, and bears. Does not infect racoons. Via ingestion of urine, feces, saliva of infected dogs. Shed virus in urine for ≥ 6 mos. Main targets are liver, kidneys, spleen and lungs. Immune complex reactions after recovery lead to chronic kidney lesion and corneal clouding known as "Blue Eye".

· Clinical signs - Vary from sl fever and congestion of mm to severe depression, marked leukopenia, and prolonged bleeding time.

· Diagnosis – Abrupt onset and bleeding suggest. Ddx distemper. Virus isolation. Intranuclear inclusion bodies in liver are characteristic.

· Treatment – Blood transfusion, IV isotonic saline + dextrose. Broad spectrum antibiotic. Atropine if corneal opacity.

· Prevention – MLV vax. Attenuated CAV1 vax also assoc w/ blue eye and shed virus in urine; use CAV2 vax instead as cross protection w/out those effects. Puppies > 9-12 wks, so maternal Abs don't interfere.

Inflammatory Bowel Disease – Idiopathic inflammation. More common in cats. Unlikely in dog colon. #1 cause is lympoplasmacytic enteritis. Weight loss in older cats, ddx hyperthyroidism, IBD, and alimentary LSA. Must eliminate all other causes. Biopsy req'd to dx. Tx w/ elimination or high fiber diet, antiinflammatory (pred, imuran, azulfidine).

Insulin – Note: glucocorticoids antagonize insulin, as do growth hormones.

· Regular – Immediate onset, 2-4 hour duration of effect. Use in emergency.

· PZI – 1-4 hours onset, 5-20 hour duration of effect.

· NPH – Immediate or 3 hr onset, 24 hour duration of effect.

Insulinoma – Functional islet cell tumor of pancreas. Usu carcinoma derived from insulin secreting β-cells resulting in hypoglycemia. Dogs 5-12 yrs old; ferrets.

· Clinical signs - Posterior weakness, fatigue after exercise, mm twitching, ataxia, confusion, temperament changes, seizures, collapse.

· Diagnosis - Blood glucose (≤ 60 mg/dL), serum insulin [ ] will be normal to ↑. Ddx include hypoadrenocorticism, hepatic failure.

· Treatment - Complete excision of tumor will buy approx 1 year. Malignancy potential is high. Can manage w/ multiple feedings/day and glucocorticoid admin.

Intervertebral Disc Disease –Degeneration and protrusion of IVD resulting in compression on spinal cord or spinal nerves. W/ cervical diz, see pain; w/ thoracic diz see gait deficits. Type I is chondroid degeneration, extrusion of calcified nucleus pulposus. Common in chrondrodystrophoid breeds (dachsund), show acute, severe clin signs, as young as 1-2 yo. Type II is fibroid degeneration and annular protrusion which is slowly progressive and usu seen in lg breed dogs > 5yo. Dx w/ rads, myelogram. Deep pain perception is important prognosticator, as well as degree of neuro signs. Tx less severe cases w/ pred, cage rest, anal/antiinfl. If severe, methylpred w/in 8 hrs, surgery w/in 24 hrs.

Intussusception – Acute see painful abdomen, scant bloody feces, vomiting. Chronic see diarrhea, diarrhea, diarrhea. Often palpable, U/S is best way to dx. Usu ileocolic. Can perform enema contrast (not oral). Parvo is a major cause of intussusception. Ddx is rectal prolapse. If fornix is present on rectal palpation, then prolapse.

Iodine Deficiency – Goiter. Budgies w/ big thyroids, not palpable b/c in thoracic cavity. If budgie is squeaking or clicking, do not handle (will kill!). Supplement I and will get better. Midwest millet is I poor.

Iodine Toxicity - Foals of dams fed excess iodine may develop extreme thyroid enlargement (goiter) and may die before birth or shortly thereafter. Clinical signs are generalized weakness, long hair, marked limb abnormalities.

Iron Deficiency – Microcytic, hypochromic anemia. Non-regenerative anemia. Dt chronic external blood loss. Internal blood loss reuses iron.

Ivermectin - Enhances release of GABA which acts as inhibitory neurotransmitter in nematodes and arthropods. Causes paralysis and eventual death of parasite. Ineffective against flukes and tapeworms because do not use GABA as peripheral nerve transmitter. Mammals also do not use GABA as peripheral nerve transmitter. Does not cross BBB. Contraindications: do not use in collie breeds.

Johne's disease – *Mycobacterium paratuberculosis*. Acid fast rod. Infiltrative intestinal diz. Chronic, contagious, granulomatous enteritis of ruminants. Organism very resistant, see long term environmental contamination. Bacteria localize in lower small intestine and associated lymph nodes.

· Transmission: Fecal-oral, colostrum, milk, in utero. Cow to calf after birth most commonly. Ingestion of contaminated feed and water. In utero and transmammary infection. Cow to cow in confinement situations. Long term incubation – cases show up 3-5 years later. Brahmans tend to be older when show clinical signs.

· Clinical findings: Weight loss, muscle wasting, chronic diarrhea, dehabilitation. Appetite stays good. Terminates in emaciation and death. Small ruminants usually do not have diarrhea.

· Lab findings – Anemia, hypoproteinemia, hypokalemia.

· Lesion - Granulomatous response characterized by progressive accumulation of epithelioid cells in mucosa and submucosa of lower small intestine. Diffuse hypertrophy of lower jejunum, ileum, ileocecal valve, cecum.

· Diagnosis and Control - Fecal culture (very difficult), serologic tests (less than ideal). Positive test is meaningful, negative test is not. No sure way to prove a living cow is free of infection. Sheep have different strain, different culture. Goats have same strain.

· Treatment – None! Cull. Vaccination reduces disease incidence, does not eliminate.

· Prevention – Remove calf immediately after birth, feed negative cow colustrum, don't pool.

· Public Health - Crohne's disease? Organism not killed in pasteurization process. Theory of humans infected via milk.

Johnson Grass – Sorghum. Sudan. Red top. Causes 3 problems.

· Cystitis – Horses, lose mare. Bladder thickens, dribble urine, uncomfortable.

· Nitrate toxicity if fertilized johnson grass. Chocolate brown blood. Methylene blue tx.

· Cyanide poisoning if damaged, prussic acid. Respiratory distress, cherry red blood. Emergency. Give 100cc sodium thionitrosol gets up and walks away.

Joint Fluid Analysis - Normal 1-3 cells per HPF. <10% PMNs.

Juvenile Pyoderma - Puppy strangles. Pustular skin diz on face and head of puppies at weaning age, 3wks to 4 mos. See fever, anorexia, submandibular lymphadenopathy. Pustules and lymphadenopathy (huge ln) on face and head. May not see pustules if already eroded. Tx w/ steriods, see fast response. One of rare times ever put young animals on steroids.

Keratoconjunctivitis Sicca – KCS. Immune-mediated destruction of lacrimal glands. Bulldogs, WHWT, lhasa apso, cockers are prone. Acute cases – ulceration. Chronic cases – conjunctivitis. Can be 2° to sulfa drugs and Canine Distemper. Dx w/ Schirmer tear test <10mm/min is suspicious, <5mm/min is diagnostic. Always check for ulcers. Tx / cyclosporine (Optimmune) eyedrops. Will only works if some tearing function remains. If severe, parotid duct transposition.

Ketamine – See Anesthesia. Rapid-acting general anesthetic. Significant somatic analgesia, poor visceral analgesia. Lack of cardiopulmonary depressant effects. Get ↑ CO, HR, BP. Don't use w/ trauma, glaucoma dt ↑ CSF. Epileptogenic, do not use w/ myelography or seizure disorders.

Ketoconazole – Fungistatic. See Antifungals. ↑ cellular membrane permeability and blocks P-450s, inhibiting steroid synthesis. Activity against most pathogenic fungi. Med tx for hyperadrenocorticism.

Knemidokoptes Mites – "Scaley leg and face mites" of budgerigars. Skin scrape in mineral oil, see lots of mites. Tx w/ 1/10,000 ivermec orally and repeat in 2 weeks.

Lactic Acidosis - Grain overload. Acute disease of ruminants. Ingestion of excessive amounts of grain results in change of microbial population in rumen, ↑ gram+ bacteria, which produce lactic acid. Rumen pH falls to <5, destroys rumen microbes and impairs rumen motility. Presence of lactic acid in rumen increases osmotic pressure, fluid drawn in causing dehydration. Absorption of the rumen lactic acid causes lactic acidosis, resulting in hemoconcentration, CV collapse, renal failure, muscle weakness, shock, death.

· Clinical findings - Abdominal pain, indigestion, rumen stasis, dehydration, acidosis, toxemia, incoordination, collapse and frequently death. Downer cow, subnormal temp, diarrhea, laminitis, anuria. Abortion may follow 2 wks later.

· Diagnosis - History, clinical signs, rumen pH, gram stain of rumen fluid.

· Treatment - Restrict water intake, slaughter if overload serious. If downer, support and shift weight. Empty rumen, supportive care.

Laminitis in Cows - Usually dt grain overload. Lactic acidosis causes vasoactive endotoxins to be released which cause pathologic changes in microcirculation of corium. Dairy cows show signs of laminitis immediately after calving. Clinical signs include lameness, walking on knees, etc.

Larkspur – *Delphinine*. Contains toxic alkaloids causing respiratory and cardiac failure. Uneasiness, stiff gait, straddled posture, sudden collapse. Animals die from respiratory paralysis or inhalation of regurgitated rumenal contents.

Laryngeal Hemiplegia and Paralysis – Equine, usu young. Exercise intolerance, roaring. Left recurrent laryngeal nerve affected, cricoarytenoideus dorsalis muscle. Grade 1 = normal, G2 = asynchronous movement but can maintain full abduction, G3 = asynchronous but unable to maintain full abduction, G4 = paralysis. Dx via treadmill endoscopy, hx. Tx with laryngeoplasty or "tie back" with incision ventral to linguofacial vein. Ventriculocordectomy and vocal folds via laryngotomy (through cricothyroid ligament).

Lead Toxicity – GI and neuro signs. Effects brain, nervous system, blood and digestive system. Horses – may cause laryngeal hemiplegia. Cattle - severe depression, aimless walking, blindness, complete rumenal stasis, diarrhea. Dogs, Cats - abdominal pain, vomiting, diarrhea, seizures. Megaesophagus. Avian – extremely common; hematuria and CNS diz. Rads show heavy metal in ventriculus (Zn tox gives similar findings). Waterfowl – porphyrin metabolism is blocked, can dx w/ UV light. Exaggerated response to mild anemia, see polychromasia, basophilic stippling of RBCs, nucleated RBCs. Treatment is Calcium EDTA; D-penicillamine, thiamine.

Legumes - High in calcium, low in phosphorus. (Barley/grain - low calcium, high phosphorus).

Leishmania – Western hemisphere. *Leishmania chagias, L. braziliensis,* and *L. mexicana*. Protozoal disease transmitted by sand flies mainly infecting man (**ZOONOTIC**), dogs (reservoir), and rodents. Mostly outside US, but small foci of infection in Oklahoma, Texas, Ohio. Chronic, fatal disease.

· Clinical signs – Incubation period from 3mos to several yrs. Cutaneous or mucocutaneous lesions, lympadenopathy, wt loss, cachexia, anemia, lameness, renal failure, and occasionally epistaxis or ocular lesions. Intermittent fever. Also alopecia, onychogryposis, hepato/splenomegaly, lymphopenia, hypergammaglobulinemia, interstitial pneumonia, amyloidosis. Severe crusting/exfoliating dermatitis.

· Diagnosis – See parasite in bone marrow or lymph node smears. Amastigotes in macrophages (oval basophilic bodies). ELISA, IFA.

· Treatment – Pentavalent antimonial compounds (not approved in dogs) and allopurinol. Relapses common.

· Control – Rapid treatment, control strays, control insect vectors.

Lentigo Simplex – Orange cats. Benign hyperpigmented macules.

Leptospirosis - **ZOONOTIC**. Contagious disease of animals and man. May be asymptomatic or cause fever, renal failure, liver failure, infertility, abortion and death. Hemolysis, icterus, hemoglobinuria. Leptospires can localize in kidneys and reproductive organs and shed in urine. Often waterborne, wet weather, ponds. Contact w/ infected urine.

· Cattle - Redwater disease of calves. Abortion. Cattle natural hosts for *L. hardjo* (4 mos-term) and *L. pomona* (3rd trimester). Acute hemolytic syndrome is seen with *L. pomona* and *L. icterohaemorrhagiae*. Dx w/ paired serum samples (or titer>100 suspicious), IFA, culture. Tx w/ chlortetracycline, oxytetracycline. Vax is short term. Sheep similar, though less prevalent.
· Dogs – *L. pomona* and *L. grippotyphosa* most commonly (used to be *canicola* and *icterohaemorrhagiae* – have vax for, but no cross-immunity). Signs as above w/ vasculitis, thrombocytopenia, coagulopathy. Dx via leptospires in urine and serology. Can also do cytology of bile aspirate. Tx renal and liver failure supportively. Aggressive antibiotic tx - Penicillin, tetracycline (careful if azotemic), doxycycline long term. If not better, cut gall bladder out. Vax Q6 mos; most reactive vax.
· Horses – *L. pomona*. Recurrent uveitis or abortions.
· Pigs – *L. bratislava* more widespread (*L. pomona* before). Abortions 2-4 wks before term.

Leukocytozoon - Blood parasite of wild birds. Common, inside RBC, non pathogenic, don't treat.

Lidocaine Toxicity – 1st see CNS signs such as tremors, seizures. Then cardiopulmonary depression.

Lime Sulfur – Safe dip for many derm diz. Notoedres, scabies, dermatophytosis. Don't let cats lick when wet.

Linear Foreign Bodies – Under the tongue in cats and in pylorus of dogs and cats. Dx via palpation and rads (tear drop bubbles, not dilatation; plication). Contrast rads w/ iodine (not barium). Tx by releasing attachment. If not better in 18-24 hours, sx.

Listeria - *Listeria monocytogenes*. Found in soil, mammalian GI tracts. Localized in intestinal wall, medulla oblongata, and placenta.
· Clinical signs - Causes encephalitis or meningoencepholitis in adult ruminants, late abortion, septicemia, placentitis, and autolyzed fetuses.
· Diagnosis - Isolation and identification. Submit brain stem.
· Treatment - Penicillin.

Lipemia – Fast 12-18 hours, should be no lipemia. If present after fast, likely eating, hypothyroidism, or idiopathic hyperlipidemia of schnauzers. ↑ risk for pancreatitis. Often see complications in eye.

Liver in Large Animals – Biliary – GGT, STH. Hepatocellular – AST (no ALT). Function test – bile acids, do not have to fast. No gallbladder in horses. Albumin has long $t_{1/2}$ in horses, don't use. Bilirubin. Ammonia.

Lumpy Jaw – *Actinomyces bovis*. Gram+ filamentous anaerobe. Cows and wallabees. Damage to mucosa 1st. Painless rarefying osteomyelitis of mandible/maxilla, hard nonmoveable swelling. Difficult to culture. Dx with clin signs, exudates smears, rads, biopsy. Salvage less valuable. NaI for 3 separate treatments. Oxytet, penicillin parenterally.

Lungworms – Cow and deer, *Dictyocaulus viviparus.* Horse/donkey*, Dictyocaulus arnfeldi.* Sheep/goat, *D. filaria, Protostrongulus rufescens, Mullerius capillaris.* Pigs, *Metastrongylus apri*. Dog – *Filaroides osleri*. Cat - *Aelurostrongylus abstrusus* and *Capillaria aerophila*. Lower respiratory tract infection, coughing, respiratory distress. Dx larvae in fecal. Tx w/ levamisole, ivermectin, fenbendazole. Thiabendazole not effective. Some vax.

Lupine Toxicity - Ingestion of lupine plants between days 40-70 of gestation causes crooked calf disease. Joint contracture, torticollis, scoliosis, kyphosis, cleft palate.

Lyme Disease – *Borrelia burgdorferi*. Bacterial disease transmitted by *Ixodes* ticks. Tick must be on animal for > 12 hrs.

ZOONOTIC, skin lesions in people. Incidence ↑ in spring and fall. See lameness, intermittent and nonerosive arthritis, fever, lymphadenopathy. Neurological, cardiac, and renal abnormalities (no thrombocytopenia!). Dx by serologic tests - IFA, ELISA, Western blot. Titers can be ↑ w/ no diz. Tx w/ doxycycline. Control via tick avoidance/treatment (permethrin, amitraz, fipronil).

Lymphoid Leukosis – Retrovirus of chickens. Neoplasms. Difficult to ddx from Marek's Disease. Look for tumor in bursa = pathognomonic.

Macaw Wasting Disease – Psittacine Proventricular Dilatation Syndrome (PPD). Unknown etiology, virus likely. Dilation of proventriculus and ventriculus ceases digestion. Wasting disease of macaws, see whole seeds in droppings. Death. Dx via clin signs and rads (dilation, ↓ barium passage).

Malasezzia - Yeast involved in otitis externa. Moist, greasy, malodorous and highly pruritic. Normal flora in ↓ #'s in dogs, rare in cats. Dx via ear smear. 1º or 2º bacterial infection common. Tx w/ miconazole, ketaconazole, conofite topical lotion.

Malignant Catarrhal Fever – Gammaherpes virus. Acute, sporadic, infectious and highly fatal diz of cattle near lambing sheep. Little to no cow to cow transmission. Also see in farmed deer, wildebeests. Low morbidity, high mortality (lethal).

· Clinical signs - Extensive erosion and edema of GIT and URT. Keratoconjuctivitis, photophobia, corneal opacity, blindness, pytalism, encephalitis, and lymphadenopathy. Also interstitial infiltration of organs by lymphocytes. Kidney - evident as white, raised foci under capsule.

· Diagnosis – Virus isolation, ELISA, IFA. Cross reacts with other herpesviruses.

· Treatment and control – Survival rare, if so, carriers. Separate from source.

Malignant Edema - *Clostridium septicum*. (Also *C. chauvoei, C. perfringen, C. sordelli,* and *C. novyi*). Acute fatal toxemia of cattle, horses, sheep, goats, pigs caused by contamination of wounds. Clinical findings include anorexia, intoxication, high fever. Wounds edematous. Muscle in area dark brown to black. Dx by IFA. Tx w/ penicillin or broadspectrum antibiotics early in diz. Bacterins for immunization. Blackleg/Malignant Edema vax.

Malignant Hyperthermia – Porcine Stress Syndrome. Hypermetabolic syndrome involving skeletal muscle. Genetically transmitted myopathy most prevalent in lean, heavily muscled meat pigs - Pietrain, Landrace, Poland China, Duroc. Also occurs in the wallaby. Abnormality in skeletal mm Ca^{++} kinetics. Stressor or drug (inhalation anesthestics like halothane, methoxyflurane) stimulates sustained release of Ca^{++} resulting in ↑ glycogenolysis and heat production. Lactic acid production leads to acidosis. Hyperthermia + acidosis + ATP depletion = rhabdomyolysis. ↑ K^{+} causes cardiac dysrhythmia and arrest.

· Clinical findings – Fine muscle tremors in sk mm progress to muscle rigor, then blanching and cyanosis. Tachycardia, dyspnea, dysrhythmias. Extreme fever (113ºF). Rapid rigor mortis. Affected muscles pale and wet in animals that die.

· Diagnosis - History of stress, exposure to stressor drugs. DNA test.

· Treatment – Genetics, test and cull. Dantrolene (muscle relaxant) given early before blood flow is reduced inhibits and controls episodes. Fluid tx, control acidosis, surface cooling.

Marek's disease - Herpesvirus of chickens. Ubiquitous and highly contagious. Neurotropic disease, see thickened sciatic nerves and tumor in the eyes. Transmitted via aerosol if stable in environment. Three forms: productive infection (virion formation in feather follicles); latent infection (carrier state); neoplastic transformation (lymphoid neoplasms). Ddx from lymphoid leukosis.

· Clinical findings – Depression than death. Enlarged nerves dt lymphoid proliferation in peripheral nerves and CNS inflammation causing ataxia and transient paralysis. Diffuse nodular lymphoid tumors in various organs. Enlarged feather follicles (skin leukosis).

· Diagnosis - Based on enlarged, thickened nerves and lymphoid tumors upon necropsy.

· Control – Vaccinate chicks at hatching. Strict sanitation. Breed resistance.

Mast Cell Tumor – Most frequently recognized malignant neoplasms of dogs and cats (cutaneous, leukemic and visceral forms). Dogs - local aggregation of mast cells in skin of dogs; cutaneous mast cell tumors more aggressive in dogs. Cats - visceral mast cell tumors much more common (ddx for splenomegaly). Release of histamine or other vasoactive substances may be associated with GI ulceration. May become malignant. Metastasis occurs most frequently in mesenteric lymph nodes, liver, and spleen.

Mastitis – In cows, multiple bacterial etiologies (staph, strep, coliform, pseudomonas, actinomyces). Control and eradication. Segregate and treat based on C&S. Sanitation. Similar in other species.

Megacolon – In dog, dt stricture or tumor; DON'T cut out colon. In cat, idiopathic. If nothing else works, colonectomy (takes weeks before start solidifying feces).

Megaesophagus - 2º aspiration pneumonia can kill. Barium series, fluoroscopy to dx. Patient that deteriorates very fast likely has gastroesophageal intussusception.

· Congenital – Schnauzer, GSD. Feed from elevated platform.
· Acquired – Myesthenia gravis, lead toxicity, hypoadrenocorticism, dysautonomia in cats, esophagitis.

Meningioma – Most common primary brain tumor in cats.

Mesquite Bean Toxicity – *Prosopis spp.* Must eat large amounts, get addicted if no other food source. Get CHO overload, acidosis. Drool, dysphagia, wt loss, tongue protrusion, intermandibular swelling. Difficult to treat, rumenotomy, B vitamins, fluids w/ bicarb. Get them to start eating something else (even if have to tube).

Metabolic Bone Disease – Reptiles. Ca:P ratio should be 1.2:1 (significantly diff than carnivore diet). Gut loaded insects. Vita D and UV light. Abnormalities reflect nutritional 2° hyperparathyroidism.

Metaclopramide – Central and peripheral antiemetic and prokinetic from esophagus to duodenum. ↑ lower esophageal sphincter tone, force of gastric contractions (moves the right direction).

Metaldehyde – Mulluscicide. "Shake and Bake." Nervous signs include tremor, incoordination, tonic convulsions, salivation, dyspnea, unconsciousness, death dt respiratory failure. Resembles strychnine poisoning. Tx convulsions w/ diazepam. Tx hyperthermia.

Methotrexate - Folic acid antagonist used as an antineoplastic.

Milk Fever – Parturient paresis in cows. Hypocalcemia. Dairy > beef. Due to excess Ca^{++} fed during dry period (like alfalfa). Body has stored and expects more, can't free in time of need. More common in mature cattle at or soon after parturition.

· Clinical signs – Afebrile. Prodromal see restlessness, tremor, staggering. Then see recumbent, sternal w/ head turned against back, dry muzzle, dull eyes, ↓ muscle tone, flaccid paralysis. Final stage is comatose.
· Treatment – IV calcium gluconate. Administer slowly w/ cardiac ausculation dt cardiotoxicity of calcium. If dysrhythmias heard, stop until rates return to normal.

Milking Machine – Regular vacuum fluctuation. Pressure should be 13 inches Hg, pulsation rate 40-60/min, ratio 40-50 rest:50-60 vacuum. Pressures above or below associated with mastitis.

Moldy Corn Poisoning - *Fusarium multiforme* fungus. Mycotoxin. Assoc w/ aflatoxicosis, estrogenism, ochratoxicosis, trichothecene toxicosis, and equine leukoencephalomalacia. Equine leukoencephalomalacia see apathy, drowsiness, pharyngeal paralysis, blindness, circling, staggering, recumbency. Lesion is liquefactive necrosis of the white matter of the cerebrum.

Molybdiosis – ↑ molybdenum ↓ availability of dietary copper, impedes metabolism of tissue Cu, inhibits Cu enzymes, and promotes Cu excretion. Clinical signs include scours, depigmentation, unthriftiness. Tx w/ copper sulfate supplementation. Want Cu:Mo ratio of 6:1.

Monensin poisoning - Poultry coccidiostat. Also used in ruminants feed as a growth promotant. Not used in horses dt toxicity. Toxicity requires a large dose in cattle, a normal dose in horses, and causes death due to heart failure.

Morphine – See Anesthesia. Mu-agonist opiate. Analgesia, antitussive, sedation. Resp depression, emesis, physical

dependence, constipation. 2° effects include euphoria, confusion, bradycardia dt central vagal stimulation, peripheral vasodilation, ↑ bladder sphincter tone. Causes vasoconstriction in dogs.

Motor Unit - Includes motor neuron, neuromuscular junction and the myofibrils innervated by neuron.

Multiple Myeloma - Malignant neoplasm of plasma cells. Proliferate and invade BM causing destruction of bone. Results in bone pain and pathologic frxs, produces Bence-Jones protein. Clinical signs include bone pain, SC compression, serum hyperviscosity, hyperglobulinemia, hypercalcemia. Tx by ↓ serum viscosity. Melpholan is the antineoplastic of choice.

Myasthenia Gravis - Autoantibodies to acetylcholine receptors which bind to the receptor and ↓ Ach. Dogs. Clinical signs include extreme generalized muscle weakness accentuated by mild exercise, megaesophagus. Can be acute,
fulminant repisodic. Mimics curare. Dx by measuring serum anti-ACHR antibodies. Tensilon test - short acting anticholinesterase (Edrophonium Cl) see dramatic ↑ in strength. Tx is Pyridostigmine (mestinon) which inhibits acetylcholinesterase. LT immunosuppressive therapy.

Mycetoma – Mold pathogens that cause grains, tumefaction, draining tracts. Pseudomycetoma is chronic granuloma usu dt staph.

Mycobacterium avium – Avian TB. Chronic, slowly progessive wasting disease in birds (not respiratory). Dx w/ acid-fast stain of organisms from feces, blood, biopsy. *M. tuberculosis* in humans is respiratory; dogs also contract repiratory form and should be euthanized dt **HUMAN** health risk. Cats are usu infected w/ *M. bovis* and show GI signs.

Mycoplasma - Heavy area of research. *Mycoplasma bovis* (50%) and others causes nonresponsive clinical mastitis in dairy cows; ↓ production. Rapid spread via nasal and vaginal discharge, resistant to antibiotics. Surface protein of bacteria can change, allows host immune system resistance and resistance to abs. Asyptomatic carrier animals. Feedlot cattle get respiratory disease. Lameness and arthritis in bulls off feed testing. *M. mycoides* causes lameness in goats. Multiple hot swollen joints, weight loss, pyrexia, poor coats.

Myelophthisic Disease – Physical replacement of bone marrow by abnormal proliferation of cells (fibrous, neoplastic).
Causes anemia.

Navicular Disease - Chronic degenerative condition of navicular bone and navicular bursa. Unknown etiology, conformational, ischemic. Insidious onset. Hx of intermittent lameness and pointing of affected foot. Flexion test exacerbates lameness. Dx using palmar digital nerve block (eliminates lameness). On rads see degenerative bony changes, synovial invaginations w/ stalks or on abaxial sides of navicular bone, cysts. Tx w/ NSAIDs. PD neurectomy (severe complications possible).

Necrotic Laryngitis – Calf Diptheria. *F. necrophorum* and *H. somnus* invade laryngeal ulcers or openings. Diz of young cattle w/ fever, severe inspiratory dyspnea, stertorous breathing. Inflammation of laryngeal mucosa and cartilage. Dirty environments or feedlots. Dx via clin signs, laryngoscopy, endoscopy, rads. ± tracheostomy. Ddx trauma, IBR, actinobacillosis. Tx w/ sulfonamides or PPG, NSAIDs. Px good for early cases treated aggressively, chronic cases require sx (60% success).

Neonatal Isoerythrolysis – Maternal antibodies produced against RBC antigens of newborn or fetus. Newborn inherits antigen from sire that is not present on dam's RBC. 1st pregnancy ok, maternal abs from as result of exposure to fetal RBCs in previous pregnancy (or blood tranfusion). Most common in horse and human. Horses, neonate born healthy but show signs of hemolytic anemia w/in hrs, days of birth after ingestion of colostrum.
Neospora caninum - Obligate intracellular parasite of dogs. Found in myocytes, neural cells, dermal cells, macrophages, etc. See polyradiculoneuromyositis, hindlimb paralysis w/ rigid contracture of muscles, ulcerative dermatitis, hepatitis, pneumonia, encephalitis. Dx w/ IFA. Tx unknown.

Neonatal Calf Diarrhea Syndrome – Viruses, *Cryptosporidia*, enterotoxic *E. coli*, *Salmonella*. Major cause of calf loss. Fecal-oral.

Neoplasia – Malignancy criteria include cells in abnormal locations, monomorphic cells that are pleomorphic, macrocytosis, ↑ basophilia, abnormal vacuolization, macrokaryosis, anisokaryosis, ↑ N:C ratio, multinucleation, ↑ mitotic figures, abnormal mitotic figures, variation in nucleoli.
· Epithelial – Benign, carcinoma, or adenocarcinoma. Large cells, round to polygonal, highly cellular, frequent clustering.
· Mesenchymal – Benign or sarcoma, melanoma. Small to medium; do not cluster, tend to be individualized. Spindle, stellate, flag-shaped cells. Low cellularity on aspirates and impression smears, good w/ scrapings.
· Round Cell – LSA, mast cell tumor, TVT, histiocytoma, plasma cell tumor. Small to medium cells, round, highly cellular, no clustering. ↑ N:C ratio w/ LSA; purple granules w/ mast cell tumor; peripherally located vacuolization w/ TVT.

Nephrotoxicities – Amikacin, amphotericin B, cis-platinum, ethylene glycol, others.

Neuroleptanalgesia – Profound sedation and analgesia. Achieved w/ combo of tranquilizer like acepromazine and opiod analgesic like fentanyl.

Neurology Notes:
· **Lower Motor Neuron signs** – Motor neuron, nerve, NMJ, muscle. Paresis/paralysis, hyporeflexia, hypotonia, denervation atrophy, sensory disturbance.
· **Upper Moton Neuron signs** – Brain and SC. Paresis, Ataxia, Dysmetria, Spasticity (PADS). Hyperreflexia, hypertonia, disuse atrophy. Appearance of abnormal reflexes (crossed extensor reflex).
· **Localizing Lesions** – Only reflexes localize (reactions go to brain cortex, like menace). Prognosis = deep pain. Cervical (Cl-C5); Cervicothoracic (C6-T2); Thoracolumbar (T3-L3); Caudal lumbar (L4-S2); Sacral (S1-S3). Cauda equina - anus, bladder. Coccygeal. Order of fiber loss vs fxn (PMS-D) = Proprioception > Motor > Superficial pain/Bladder fxn > Deep pain.
- Normal front limbs; normal back limbs - no lesion.
- Tetraparesis – C1-C5 or C6-T2
- Tetraparesis and UMN back – C6-T2
- LMN front; normal back - C5-Tl; brachial plexus.
- LMN front; UMN back - C5-Tl; brachial plexus.
- UMN front; normal back - Brain; Cl-C5.
- UMN front; UMN back - Brain, Cl-C5.
- Normal front; LMN back - L4-S2.
- Normal front, UMN back - T2-L3.
- LMN front; LMN back - 2 lesions - C6-T2 and L4-S2.
- UMN front; UMN back - 2 lesions - Brain/Cl-C5 and L4-S2.
· **Intracranial** – Mental status abnormal w/ parenchymal disease. Require bigger lesion in forebrain than hindbrain to see signs. Circle to side of lesions.
- Forebrain – contralateral deficits w/ circling; normal to mild ataxic gait
- Hindbrain – ipsilateral deficits w/ circling; moderate to severe paresis seen in gait.
- Vestibular – Central (postural reaction deficits, CN deficits in addition to VII and VIII) vs. Peripheral (strength in post rxn defs, +/- CN defs, clumsy)
· **Acute Progressive LMN disorders:**
- Tick Paralysis – *Dermacentor* in N. America. Neurotoxin inhibits release of Ach from NMJ resulting in acute ascending flaccid tetraparesis w/ intact sensation. Non febrile. Resolves after tick removal.
- Botulism – *Clostridium botulinum* type C. Carrion exposure. Inhibits release of Ach from NMJ resulting in flaccid tetraparesis and CN signs (lack of jaw tone, no swallowing).
- Polyradiculoneuritis – Coonhound Paralysis. Acute flaccid tetraparesis dt inflammation of ventral nerve roots. Resolves in days to weeks.
- Myasthenia gravis - Acute, fulminant. Autoantibodies to Ach receptors. Extreme muscle weakness.
· **Noninfectious Inflammatory CNS Disease:**

· Granulomatous Meningoencephalomyelitis – Brain signs, multifocal, seizures
· Steroid Responsive Meningoencephalomyelitis – Stilted gait, painful, young
· Breed Specific Meningitis – Pug, Yorkie
· **Toxicities affecting NS** – organophosphates (mm fasciculations), carbamates (mm fasc), pyrethrins (Na+ channels), metaldehyde (seizures), strychnine (extensor rigidity, inhibits inhibitory neurotransmitter – glycine, from binding to receptor), ANTU, warfarin, bromethalin, lead (poliomalacia, grey matter), narcotics, amphetamines, marijuana, ivermectin, metronidazole (central vestibular disease in high doses), hexachlorphene, ethylen glycol (ataxia, seizures, coma).
· **Seizure Disorders** – Generalized motor (tonic-clonic) more common than partial motor. <1yr, congenital or inflammatory; 1 to 3-5 yrs – idiopathic; >5yrs – neoplasia. Any age, inflammatory, metabolic (Hepatic Encephalopathy w/ ↓ BUN, ↓ Alb, ↑ bile acids), or toxic.
- Status Epilepsy – treat w/ diaepam first, then phenobarbital, ± pentobarbital. Maintain with phenobarbital. Use potassium bromide (longer t½, tx toxicity w/ NaCl) for refractory cases. Assess tx according to blood levels and seizure control.
· **Bladder Function Disorders** – Bladder vs. urethra and storage vs. emptying. Sympathetic: α in trigone, β in outside bladder wall. LMN bladder is dribbline urine, assess tail and anal tone as well. UMN bladder is very tight. Detrusor- Sphincter dyssynergia usually indicates SC diz. Treatments: to decrease urethral tone – phenoxybenzamine (sympatholytic), then for bladder emptying - bethanechol (parasympathomimetic).
- Hypogastric n. – sympathetic; bladder wall (storage) and proximal urethra
- Pelvic n. – parasympathetic; S1-3, contracts detrusor muscle.
- Pudendal n. – somatic; S1-3, external urethral sphincter.
Newcastle disease – Paramyxovirus (PMV-1). Aka Exotic Newcastle Disease, Avian Pneumoencephalitis. Virulent strain in chickens, also effects turkeys, wild and caged birds. Not currently in US, but why 30day quarantine in USDA facility reqd for imported birds. **REPORTABLE**. People can carry in conjuctiva and mm for 48 hours. Why vets can't go into quarantine stations. Varies in pathogenicity: high (velogenic), moderate (mesogenic), low (lentogenic). Highly transmissible via aerosol, feed, water, fomites. Young more susceptible than older birds.
· Clinical findings - CNS & Respiratory. Gasping, coughing, drooping wings, torticollis, circling, paralysis. Viscerotropic; peracute form; watery diarrhea.
· Diagnosis - History, clinical signs, paired serum samples, virus isolation.
· Treatment - Live virus vaccine.

Nitrate/Nitrite Toxicity – Cattle affected most frequently. Rumenal flora reduces nitrate to ammonia and nitrite (10X more toxic). Brown blood. Sudden death.
· Clinical signs – Form methemoglobin w/ resulting anoxia. Chocolate-brown blood. Abdominal pain, diarrhea.
· Diagnosis – Plasma nitrate/nitrite concentrations.
· Treatment – Methylene blue.

Nitrogenous Waste Products – Excreted as ammonia (fish), urea (mammals) or uric acid (birds and reptiles).

Nigrapalladia Encephalomalacia – Yellow Star Thistle (CA) and Russian Knapweek (TX). Causes softening of nigra pallidus, extrapyramidal area of brain. Can't eat.

Nocardiosis – *Nocardia* spp. Chronic, noncontagious diz caused by gram+, branching, acid-fast rods found in soil. Transmitted via inhalation, wound contamination, contaminated instruments. Young hunting dogs. Granulomatous abscesses on extremities, suppurative pyothorax, pulmonary granulomas. Tx w/ sx debridement and TMPS.

Oak Bud Toxicity - *Quercus* poisoning. Consumption of large quantities of young oak leaves or green acorns causes GI and renal dysfunction. Causes pale swollen kidneys, perirenal edema, anorexia, depression, emaciation, rumen stasis, serous nasal discharge.

Old Dog Vestibular Disease - Canine idiopathic vestibular syndrome. Geriatric vestibular syndrome. "Stroke" seen in aged dogs. Cause unknown, peripheral vestibular lesions suspected. Sudden onset of head tilt, nystagmus, rolling, falling, circling. Signs usu regress w/in few days.

Oleander – Digitoxin glycoside. Popular ornamental. Very toxic, 1 leaf will kill 200lb calf. Death dt ventricular fibrillation. Bradycardia, GI upset. Tx w/ atropine for bradycardia, antiarrhythmics (lidocaine, phenytoin, propranolol) for ventricular fibrillation. Supportive for GI upset, including K_+ supplementation, activated charcoal, cathartic. Don't stand near smoke if burning.

Ollulanus tricuspis – Stomach worm. Small nematode. Causes vomiting in cats.

Onchocerca cervicalis - Fistulous withers, dermatitis in horses. Culicoides is vector.

· Clinical signs - Adults reside in nuchael ligament and induce inflammatory rxns. Mineralized nodules. Microfilariae [ ] in skin of ventral midline. Cause scales, crusts, ulceration, alopecia, depigmentation, pruritus.

· Diagnose - Full thickness skin biopsy. Intradermal skin testing for culicoides HPS.

· Treatment – vermectin against microfilaria. No tx effective against adults. Fly avoidance and fly control. Stable at dusk and dawn, pyrethrin sprays.

Onion Toxicity - Heinz body anemia. Baby food may have amounts.

Ophthalmology – 70% of tear production occurs in lacrimal gland, 30% in nictitating membrane. Excretion via nasolacrimal puncta and nasolacrimal duct. Aqueous secreted by ciliary body and exits via iridocorneal angle and uveoscleral outflow. Schirmer Tear Test to measure (10-25 mm/min normal).

· Baytril⇕ – Assoc w/ idiosyncratic blindness in cats. Avoid or use low dose.

· Coloboma – Congenital eyelid agenesis. Cats, temporal upper lid. Repair w/ pedical flap.

· Dermoid – Congenital, normal tissue in abn location. GSD, St.B, Dachs, Persians. Sx excision.

· Ankyloblepharon – Congenital. Fusion of upper and lower eyelids; physiological until 10-14 days; assoc w/ ophthalmia neonatorum cats w/ neonatal herpes infection.

· Distichiasis – Addl cilia from Meibomian glands (grey line); fine hairs not a problem, cockers esp.; bristle-like hairs (pekingese) require electrolysis or cryosurgery.

· Trichiasis – Normal cilia misdirected to cornea; older goldens and cockers; correct lid deviation.

· Ectopic cilia – Cilia from meibomian glands directed straight at cornea; cause pathology; surgical coring.

· Prolapsed nictitans gland – Cherry eye; young dogs; replace (not remove!) gland.

· KCS – Immune mediated disease of dogs. Aqueous layer deficiency of precorneal tear film. Genetic predispositions (cocker, bull dog, lhasa). Drug related (atropine, sulfas, anesthetics), also canine distemper, CNVII trauma, iatrogenic. Mucopurulent dischg, conjunctivitis, dry eye, red eye, ulcers. Acute or chronic. Dx via STT < 5 mm/min. Medical tx w/ cyclosporine (optimmune) as long as still have some normal fxning gland tissue. Sx tx w/ conjunctival flap, corneoscleral transposition, parotid duct transposition (salive imperfect substitute). No cure.

· CSK – Chronic superficial keratoconjunctivitis. Pannus. Immune mediated disease of GSD, greyhounds. Corneal epithelial cells proliferate and plasma cells infiltrate superficial stroma. Later melanocytes, hisitiocytes and fibroblasts enter cornea, nictitans. Starts in temporal quadrant of cornea. No cure. Tx w/ topical corticosteroids.

· Corneal ulcer – Usually trauma. Pain, red eye, edema, 2° anterior uveitis (neural reflex arc w/ CNV, spasm of ciliary mm). Do STT every time to r/o KCS, fluorescein stain (not solution). Tx underlying cause; topical broad spectrum abs q4-6hrs; neosporin in SA; gentamicin in horses. Corticosteroids contraindicated. Topical atropine as needed for 2° anterior uveitis. Should heal quickly (3-5 days) else re-evaluate.

· Refractory ulcer – Stain under necrotic epithelium; non healing. Debride and tx.

· Dendritic ulcer – Pathognomonic for feline herpes keratitis.

· Descemetocele – Deep ulcer w/ only descemet's membrane (and endothelium) remain. May have clear bulge. Descemet's membrane does not stain w/ fluorescein, edges of stroma will take it up. Guarded px, emergency, refer. Can easily result in perforation.

· Uveitis – Uvea includes iris, ciliary body, and choroid. Very vascular. Dt neoplasia, infection (ehrilichia in dogs), FeLV, FIP, FIV, autoimmune diz; horse moon blindness = equine recurrent uveitis, butterfly around optic n. Prostaglandins involved to considerable extent. Pain, BLP, miosis. Tx w/ mydriatic (stropine), topical and systemic corticosteroids,, topical NSAIDs.

· Cataracts – Opacity in the lens. Ddx from nuclear sclerosis which is a normal aging change w/ no effect on vision. Can't see retina through a cataract. 1° cause in dogs is autosomal recessive inheritance, 2^{nd} most common cause is diabetes mellitus. In cats and horse, 1° cause is uveitis. Only tx is sx removal.

· Lens luxation – Heriditary in terrier breeds, problem w/ zonular fibres. Anterior or posterior. Can cause glaucoma or be 2° to glaucoma. Emergency referral.
· Glaucoma – Incrase in IOP. Acute or chronic, resulting in buphthalmos. Primary glaucoma is hereditary, open angle in beagles and narrow angle (physical obstruction) in cockers. Secondary glaucoma dt other eye conditions such as lens luxation, iris bombé, uveitis, neoplasia. Dx w/ tonometer, normal is 15-28 mmHg. Tx w/ hyperosmotics (20% mannitol), carbonic-anhydrase inhibitors (acetazolamide), parasympathomimetics (pilocarpine), and adrenergic antagonists. Parasympatholytics are contraindicated (atropine reduces outflow). Sx tx available but suboptimal – do not stick needles in the eye! Enucleation.
· Progressive retinal atrophy - 1° affecting photoreceptors, wasting of retina. Early or late onset. Breed predispositions, autosomal recessive. Night blindness progressing to total blindness, slow PLR, bilaterally symmetric lesions (tapetal hyperreflectivity, optic nerve atrophy, cataracts). Maze test, ERG, blood genetic test. No treatment, will go blind.
· Collie Eye Anomaly – Congenital, inherited simple autosomal recessive, nonprogressive, bilateral asymmetry. Choroidal hypoplasia, coloboma of the optic nerve, retinal detachment and microphthalmia. Seen almost exclusively in collies and shetland sheepdogs.

Organochlorine - Chlorinated hydrocarbon. Insecticides include chlordane, DDT, heptachlor, lindane. CNS stimulants. Seizures. Toxicity manifested by nervous excitement, tremor, convulsions, death.

Organophosphates – Antiacetylcholinesterase resulting in cholinergic over stimulation of parasympathetic nervous system. Too much Ach.
· Clinical findings - Salivation, lacrimation, urination, defecation (SLUD). Muscarinic signs - hypersalivation, miosis, urination, diarrhea, vomiting, colic, dyspnea. Nicotinic signs - muscle fasciculations, weakness. CNS signs - nervousness, ataxia, apprehension, seizure (uncommon).
· Diagnosis - Cholinesterase activity in blood and brain.
· Treatment - Atropine, 2-PAM. MOA of 2-PAM: reactivates cholinesterase that has been inactivated by phosphorylation 2° to organophosphates. Removes and binds offending phosphoryl group attached to enzyme and is then excreted. Does not work in carbamate poisoning.

Osteochondrosis Dessicans (OCD) - Disturbance in endochondral ossification. Can result in flap of immature cartilage breaking away from underlying epiphyseal bone. Exposure of subchondral bone to joint fluid is painful and causes lameness. Clinical findings include lameness and 2° DJD. Location of lesions:
· Horse –
- Top 2 jts of tarsus. Distal intermediate ridge of the tibia (DIRT) and lateral trochlear ridge, then medial trochlear ridge of tarsus. Usu bilat and in horses < 1 y.o, biggest, fastest growing. Not lame because not weight bearing structure. See Bog Spavin, increased joint fluid in the tarsocrural joint. Needle stick is contraindicated, not lame, not septic. Tx is arthroscopic sx – have to remove the piece.
- OCD of stifle usu lateral trochlear ridge of the femur (LATR), then medial trochlear ridge of femur, and rarely distal patella. Lame, bunny hop gait. Effusion in weanlings. Dx w/ rads, make lame w/ stifle or hock flexion. Arthroscopic sx.
- Old horse, subchondral bone cyst of medial femoral condyle. OC, not D.
· Pig - Distal ulna, proximal and distal femur.
· Dog - Caudal humeral head. Also lateral and medial femoral condyles; medial humeral condyle.

Ostertagia ostertagi – Medium or brown stomach worm. GI parasite of ruminants. Abomasal invaders.
· Type I ostertagiases – Recent infection. Lambs, calves. Large #'s of adult worms in abomasum. Causes persistent, profuse watery diarrhea. Response to anthelmintics is good.
· Type II ostertagiases - Adult cattle. Large #'s of dormant larvae erupt from abomasal mucosa. Chronic diarrhea, emaciation, high death rate, moroccon leather abomasum.

Otobius megnini – Spinous ear tick of large animals.

Otodectes cyonotis - Ear mite of dogs and cats. Sexual dimorphism as adults. Signs of otitis externa. Thick, brownish-red crusts in ear canal, may have pruritic dermatitis. Dx by microscopic (10x) exam of ear exudate. Tx w/ selemectin (ok in all breeds, don't use in < 6 wks).

Ovine Progressive Pneumonia – Retrovirus. ↑ prevalence in US. Contact w/ fluids. Chronic pneumonia and mastitis. Tx and cull.

Oxyuriasis – *Oxyuris equi.* Pinworm in horses. Usu < 18mos old, found 1° in terminal end of LI. Gravid females lay eggs in perineum around anus which are irritating. See rubbin of tail and anal regions, broken tail hairs, excoriations, bare patches on buttocks. Scotch tape, look under microscope. Ddx w/ culicoides hypersensitivity.

Pacheco's Disease – Herpesvirus. Highly contagious acute diz of parrots. Spread by direct contact, aerosol, fecal-oral.
Conures are asymptomatic carriers.
· Clinical signs - Weakness, diarrhea, focal necrosis of liver, spleen. Fatal, sudden death in high #s.
· Diagnosis - Intranuclear inclusion bodies in hepatocytes and spleen. PCR.
· Treatment – If caught early, acyclovir. Tx entire aviary.
· Prevention – Vaccine.

Pancreatitis - #1 cause of biliary tract obstruction in dogs. Dogs from fat, cats from many causes. Schnauzers predisposed dt hyperlipidemia.
· Diagnosis - U/S, rads (if duodenum pushed craniolaterally, pancreatic mass), amylase/lipase.
· DiffDx - Tumor, focal peritonitis.
· Treatment - Fluids and NPO. Avoid sx if possible.

Panosteitis – Young, large breed dogs. Shifting leg lameness, pain on deep, firm palpation. On rads, see ↑ intramedullary opacities often near nutrient foramina, transient periosteal new bone formation, cortical thickening. Stress response, bone changes resolve with time.

Papillomatosis – Common in birds. Mucosal warts of oral cavity and vent. "Raspberry" out of butt. Dripping blood in cage. No treatment, waxes and wanes (likely herpesvirus).

Paragonimus kellicotti – Lung fluke. Ova have characteristic flattened operculum at one end. Rads, see signet ring lesions.

Parvovirus in Canines - Viral gastroenteritis, paralysis and ileus of intestines. Wipes out intestinal crypts causing villous atrophy secondarily. Transmission is fecal-oral. Survives in environment for years. Bleach is only effective disinfectant. Salmonella mimics. Major cause of intussusception in dogs.
· Clinical Signs – Most infections clinically inapparent. Vomiting seen 1st, diarrhea later. Leukopenia can be seen.
· Diagnosis – Parvo Site test (can be false- if early in infection). Rads, can appear as obstruction w/ dilated intestines.
· Treatment – IV fluids, antibiotics, antiemetics.

Parvovirus in Pigs - Causes reproductive failure. Early fetal resorption, irregular return to estrus. Reduced litter size, abortion, mummies.

Paspallum Staggers – Dallis grass toxicity, 1° in cattle. *Claviceps paspali*, ergot parasite. Lysergic acid. ↑ in hot, humid weather. Causes cerebellar diz (symmetrical ataxia, head tremor, hypermetria), excitement, beligerant, irritation, exaggerated mvmt. Ears, tail and dew claws slough. Tx w/ supportive care, remove from source. Mow seeds down.

Pasteurellosis – Fowl cholera. Large #'s of water fowl die of systemic diz. Ingestion of *Pasteurella* from GIT builds up in water while roosting. Also killed from *Pasteurella* acquired from cat bites dt septicemia. Tx w/ clavamox.

Pasteurization – Vat milk (farm milk fed) is considered safely pasteurized if heated to 145° F for 30 minutes.

Patent Ductus Arteriosus – Congenital heart defect. Ductus arteriosis in fetal circulation bypasses pulmonary circulation; connects between pulmonary artery and aorta. At birth, constricts, pressure changes, closes becoming ligamentum arteriosum. Usually left to right. Continuous washing machine murmur, loudest at aortic valve, often w/ precordial thrill. Bounding femoral pulses. Asymptomatic or left side heart failure signs (cough, tachypnea, exer intol, wt loss). Ligate duct or coils inserted through femoral arterial catheter (less invasive).
· Right to left – lethargy, exer intol, collapse, blue butt syndrome (hind cyanosis, normal front). No continuous murmur. Ligation is contraindicated. Control polycythemia. Long term px is poor.

Penicillin – Bactericidal. G+, some G-. Disrupts cell wall synthesis. See Antibiotics.

Penis – Definitions:
· Paraphymosis – Inability to retract penis. Ace and other phenothiazines can cause in stallions.
· Phymosis – Inability to extend penis.
· Priapism – Persistent erection.

Perianal Fistula – Down sloping of tailhead. GSD, Labs. Medical diz, not sx. Tx w/ antibiotics (metronidazole and baytril) and immunosuppresives (cyclosporine).

Perineal Hernia - Protrusion of hernial sac laterally b/w levator ani and either external anal sphincter or coccygeus muscles. Seen in intact male dogs. Risk for encarcerated bladder (emergency – postrenal azotemia; drain out) or intestine. Tx is sx correction w/ concurrent castration.

Peridontium - Periodontal ligament, alveolar bone, gingiva, cementum.

$PGF_{2\alpha}$ - Lutalyse. Stimulates myometrial activity, relaxation of cervix, inhibition of steroidogenesis by corpora lutea, lyse corpora lutea. $t_{1/2}$ is minutes. Used in cattle as luteolytic agent for estrous synchronization, pyometra, abortifacient. In swine to induce parturition. Horse for luteolysis and estrus induction. Small animal as an abortifacient, pyometra, cystic endometrial hyperplasia.

Phenothiazine Toxicity – Horses. Heinz bodies in RBCs. In past, commonly used anthelmintic.

Phenoxybenzamine - Alpha-adrenergic blocker, α_1 and α_2, via competitive inhibition of norepinephrine. ↓ internal urethral sphincter tone. Treats hypertension. Contraindicated w/ CHF.

Phenylephrine - Alpha-adrenergic sympathomimetic. Used to tx hypotension, ophthalmic to ↓ posterior synechia formation, relieve pain associated w/ uveitis.

Phenylpropanolamine - Sympathomimetic. Used for tx of urethral sphincter hypotonus and resulting incontinence in dogs and cats.

Pheochromocytoma – Tumor of adrenal medulla, most common in dog. Secrete excess norepinephrine and epinephrine.
See hypertension, hyperglycemia.

Photosensitivity - Lightly pigmented skin hypersensitive to sunlight dt photodynamic agent in skin. Most common cause is hepatogenous photosensitivity, accumulation of phylloerythrin in plasma dt impaired hepatobiliary excretion. See photophobia, skin lesions in exposed areas. To treat, keep inside, corticosteroids.

Physaloptera – Esophageal worm. IH = grasshopper. In dogs, 1° causes vomiting. Patient keeps vomiting until worm is removed with endoscope.

Pig Diarrhea
· Clostridium perfringens, C – Hemorrhagic enteritis in suckling pigs, SI.

· Coccidiosis - Necrosis and villous atrophy of lower SI.
· Cryptosporidium - Causes villous atrophy in lower SI resulting in malabsorptive diarrhea.
· Enteric colibacillosis - Profuse watery diarrhea dt enterotoxin production in nursing and weaners.
· Salmonellosis - Inflammation and necrosis of SI and LI. In pigs, more a septicemic diz. Nursing pigs may get diarrhea, then succumb to septicemia.
· Swine dysentery - *Treponema hypdysenteriae*. LI. Mucoid diarrhea w/ flecks of blood. 1 week piglets. Lincomysin.
· Rotavirus - Nursing, weaners most common. Villous atrophy in middle third of intestine.
· TGE – Coronavirus. Destroys villous epithelial cells in jejunum and ileum. Profuse watery diarrhea, vomiting.

Pigweed Poisoning – *Amaranthus reflexus*. If eaten in large quantities, causes nephrosis and fatal uremia in cattle and pigs. Also has high oxalate content and may cause hypocalcemia.

Pilocarpine – Parasympathomimetic. Cholinergic alkaloid, 1° muscarinic. Stimulates smooth mm and glands at postganglionic, cholinergic nerves. Used as an ophthalmic miotic, lasts hours to days. Can alternate w/ mydriatic to break iris-lens adhesion. Principally used to treat glaucoma, ↑ drainage angle.

Pine Shavings – Aromatic amins from pine and other soft bedding can induce hepatic microsomal enzyme systems. Not advised for rodents.

Piperazine - Anthelmintic used against ascarids. Paralyzes worm, allow to be passed out w/ feces. Blocks acetylcholine at the neuromuscular junction.

Placenta
Bovine = cotyledonary placenta. Fetal membrane slip can be palpated starting at 30 days.
Mares and sows = diffuse placenta
Dogs and cats = zonary placenta
Primates and rodents = discoidal placentas.

Plaque - *Yersinia pestis*. Gram- bipolar coccobacillus. Safety pin appearance. Flea vector = bubonic plaque. In endemic areas, suspect cats w/ fever, pneumonia, lymphadenitis. Dx w/ blood culture, IFA, ln aspirate. Tx is combo of streptomycin and tetracycline.

Plasmodium – Blood parasite of canaries and penguins. Jumps between spp easily. Indoor or fine screen enclosures.

Platelets – Important role in 1° hemostasis and formation of hemostatic plug. Produced by fragmentation of megakaryocytes in BM, lung and spleen. Lifespan 7-10 days w/ 30% of pool transiently sequestered in spleen. Normally 200,000-500,000, spontaneous hemorrhage when < 30,000. Platelet disorders see petechia, ecchymosis, mucosal bleeding, pale mm, epistaxis, hematuria, organomegaly. Careful venipuncture, blood smear, platelet count, coag factor tests (PT, PTT, ACT, ATIII to r/o DIC), BM exam, ANA, Coombs, platelet fxn tests (platelet aggregation, bleeding time, vWD). Thrombocytopenia from ↓ production (BM problem), ↑ destruction (IMT, drug induced, infectious), ↑ utilization (DIC, vasculitis, septicemia), sequestration (milder, spleno/hepatomegaly).

Pneumocystitis - Causes respiratory signs in mice and rats.

Pneumoperitoneum – On rads, see gas on either side of diaphragm. 1) Perforation, 2) bacteria producing gas, 3) laparotomy/scopy. W/ 1st two, peritonitis.

Pneumovagina – Equine pneumovagina. Wind Sucker. Involuntary aspiration of air into vagina, chronic distention. Assoc w/ infertility. Repair w/ Caslick procedure.

Polioencephalomalacia – Dt thiamine deficiency in ruminants. Usu < 2 y.o. Noninfectious neuro diz caused by

thiaminase (vita B1). Thiaminase can be produced by gram+ overgrowth in rumen, bracken fern, moldy feed. Abrupt mgmt changes such as movement from poor to lush pastures, antibiotic changes, low Co in diet. Results in ↓ energy in
brain, neuronal necrosis, astrocyte swelling, worse in cortex.
· Clinical Signs - Sudden onset. Brain signs in small ruminants. Star gazing, opisthotonos, disturbed gait (ataxia), cortical blindness, tremors, salivation, convulsion, coma, death.
· Diagnosis - Blood thiamine levels. At necropsy, black light.
· Treatment – Thiamine (vitamin B1) supplementation in repeated doses, should see dramatic results within 24-48 hrs.
Also, antinflammatories, fluid therapy, nutrition, roughage.
· Prevent – Slow mgmt changes, ↑ % roughage in diet, feed thiamine HCl - Brewer's Yeast.

Polyomavirus – Budgerigar Fledgling Disease Virus. Dead birds in nest box, if survive abnormal flight feathers (French molt), can't fly (ddx B&F diz). In parrots, different clin signs. Healthy, well grown, sudden death w/ hemorrhage all over.

Polysaccharide Storage Myopathy – QH and drafts. Female > Male. Mild mannered horses w/ hx of exer intol and rhabdomyolysis, mm fasciculations, dimpling. Draft horses show gait problems, shivering, muscle atrophy. Familial basis suspected. Dx based on muscle biopsy, accumulation of glycogen and abnormal [ ] of polysaccharides. Prevent w/ consistent exercise, high fat diet, min grain.

Portosystemic Shunt - Congenital or acquired. Blood from intestinal tract diverted around hepatic parenchyma and enters systemic circulation via azygos or caudal vena cava w/out undergoing hepatic metabolism. Most common shunts are single intrahepatic (large breed) or extrahepatic shunts (small breed). Yorkies predisposed.
· Clinical signs - Hepatic encephalopathy. Worse just after meal. Impaired liver function. Slow to wake up from anesthesia.
· Diagnosis - ↑ bile acids (do pre and post), ↑ uric acid. Uric acid calculus in non-dalmation suggestive of liver shunt.
Cranial mesenteric arteriography or splenoportography. Ultrasound.
· Treatment - Surgical correction, unless acquired (then compensating for failed liver – fixing would cause deterioration). Medical mgmt of hepatic encephalopathy includes low-protein diet (to lower protein levels and subsequent metabolic ammonium load), lactulose, enteric antibiotics (to prevent colonic ammonium production and systemic absorption) such as oral neomycine.

Potassium – Maximum rate is 0.5 mEq/kg/hr or see cardiotoxicity (↑ K_+ will slow/stop heart). K_+ shifts intracellularly with increases in insulin, dextrose, or HCO_3.

Potomac Horse Fever - *Ehrlichia risticii*. Equine ehrlichial colitis.
· Clinical signs - Depression, anorexia, monocytic fever, mucous membrane injection, ileus. Diarrhea, colic, laminitis.
Transient leukopenia. *E. equi* in neutrophils, thrombocytopenia, fever.
· Diagnosis - IFA, ELISA, isolation of organism.
· Treatment - Tetracycline.

Poxvirus – DNA virus of birds. Transmitted via mosquitoes or fomite in wound. Dry form – cutaneous diz w/ tumor-like proliferative lesions on face and head. Wet form - oral diz w/ ulcers in oral cavity. Canaries, wild birds, parrots. Host specific. No treatment, nursing care, lesions will go away. Screen in outdoor enclosures.

Praziquantel – Droncit, Drontal. Anthelmintic for tapeworm (cestode) infections. See Anthelmintics.

Pregnancy Ketosis – Cow – Thin or obese lactating dairy cattle w/in days to weeks after calving. Inadequate dietary energy intake during increased requirements of late gestation. CNS, recumbency. Hypoglycemia, ketonemia, ketonuria, inappetence, lethargy or excitability, wt loss, depressed milk production, incoordination. BUN/Crea ↑. Tx w/ glucocorticoids, propylene glycol, grain, and 10-20% glucose IV. Sheep - Diz of preparturient ewes

characterized by impaired nervous function. Hypoglycemic encephalopothy, ketosis, acidosis. Ewe leaves flock, inappetant, blind, dehydrated, rumbent, neurological. Dx by ketonuria and fatty liver. Prevent w/ grain in last 6 wks of gestation and exercise.

Pregnancy Toxemia – Common in obese guinea pigs in last few weeks of gestation. Inappetance, depression, dyspnea, laterally recumbent. Px is guarded.

Prevalence = Incidence x Duration. Over time, incident cases become prevelance cases.

Primidone – Hepatotoxic.

Progressive Retinal Degeneration - Group of degenerative retinopathies. Occurs in Irish Setters, Collies, Miniature Poodles, etc. Night blindness early; total blindness later. Bilateral symmetrical ↑ tapetal reflectivity, ↓ pigmentation of nontapetal fundus, attenuation of retinal vessels, atrophy of optic papilla.

Propantheline – Parasympatholytic, antimuscarinic. Tx of diarrhea, hyperreflexic detrusor, urge incontinence, bradycardia.

Prostatitis – *E.* coli is most common cause, also *Brucella canis.* Infection via urethral ascent of bacteria. May also be hematogenous.
· Clinical signs – Systemic illness, caudal abdominal pain, enlarged prostate. Bacteruria.
· Diagnosis – Clinical signs in intact male. Digital rectal exam. Rads.
· Treatment – Antibiotics. In acute infection, blood-prostatic barrier not intact, can use any sensitive antibiotic. With chronic prostatitis, need long-term therapy with a drug that will cross blood-prostate barrier (doxycycline, chloramphenicol, enrofloxacin; β lactams and aminoglycosides are poor to prostate).

PLE – Chronic small bowel diarrhea w/ ↓ Alb. Panhypoproteinemia = gut. If ↓ Alf, ↑ chol = PLN. If ↓ Alb, ↓ chol = liver. PLE d/t lymphangectasia, mucosal damage that ↑ permeability (IBD, LSA), blood loss (GUE, neoplasia, hooks). Immunoproliferative enteropathy is common cause of PLE in basenjis. Have ↑ serum globulin despite intestinal protein loss. If lymphangectasia, tx w/ ultra low fat diet to prevent dilatiation and rupture of lacteals.
· PLE in adult dog – IBD, lymphoma, lymphangectasia..
· PLE in cat – Uncommon. IBD, lymphoma.
· PLE in juvenile dog – parasites, chronic intussusception.

Prototheca – Saprophytic, achlorphyllic algae. Female collies may be predisposed.

Pseudocowpox – Milker's nodes. Parapoxvirus, related to orf and bovine papular stomatitis. Small, red papules on teats and udders of cows. Scabs, pustules, raised lesions. Infection spreads slowly through herds. Prevent w/ good hygienic measures such as teat dipping. **ZOONOTIC**, painless, itchy, purplish-red nodules on fingers and hands. Little disturbance and disappear after few weeks.

Pseudorabies – Herpesvirus. Affects all farm animals except horse, affects spp differently. Pigs are 1° host and only reservoir. Can be insidious in pigs and go undetected. Secrete virus in saliva and nasal secretions. Virus travels to brain and respiratory system.
· Clinical findings –
- Pigs: In older pigs, URD and repro failure, usu recover and are carriers. Young pigs, see CNS signs. Highly fatal. "Shaker pigs".
- Cows: Undergo excitement phase, aggressiveness. Pruritus causing severe self-mutilation. Convulsions, coma, death.
· Diagnosis - History and clinical signs. VI from tonsil, brain, liver, spleen, lung. Serology. Histopath – intranuclear inclusion bodies.
· Treatment – Test and remove. Monoclonal antibody for swine. No tx for ruminants.
· Control - Vaccination.

Psittacine Beak and Feather Disease - Debilitating disease of psittacines. Abnormal feathers, beak abnormalities, immunosuppression. Dx via feather follicle biopsy showing intracytoplasmic inclusions. Progressive and usu fatal.

Psittacosis – *Chlamydia psittaci*. Diz of birds. **Reportable. ZOONOTIC**. Aerosol transmission.
· Clinical findings - Wt loss, depression, anorexia, diarrhea, lime-green urates, respiratory signs. Hepatomegaly, splenomegaly, air sac changes.
· Diagnosis – ELISA, titers, intracellular elementary bodies on impression smears of air sac, spleen, liver, pericardium.
· Treatment – Doxycycline.

Psoroptes cuniculi – Mite causing otitis externa in rabbits.

Pullorum Disease – *Salmonella pallorum.* Infection in birds.

Purpura Hemorrhagica – Vasculitis. Immune mediated hemorrhagic disease characterized by extravasation of blood into tissues, under skin and through mucous membranes. Produces ecchymoses and petechia on skin. Nonthrombocytopenic diz of horses assoc w/ previous *S. equi* respiratory infection. Mediated by immune complexes of IgA and streptococcal M antigen in vascular basement membranes. Clinical signs include cold, SQ, edematous swellings around head, mucosal petechiation and high heart rate. Affected horses die w/in few days.

Pyoderma - Pyogenic infection of skin, commonly dt *Staphylococcus intermedius.* Metabolic disorders, immune deficiencies, endocrine imbalances, allergies predispose. Tx w/ antibiotics such as clavamox.

Pyloric Stenosis – Benign. Causes gastric outlet obstruction axxoc w/ hypertrophy of circular muscle fibers of pylorus. Young dogs of brachycephalic breeds, boston terrier at ↑ risk.

Pyometra in Large Animals – Cow: Metritis (inflammation of muscular and endometrial layers of uterus) via contamination of uterus during parturition. Tx w/ local and systemic antibiotics. Mare: Uterine lavage, local antibiotics.

Pyometra in Small Animals - Diestral disorder characterized by abnormal uterine endometrium w/ 2° bacterial infection. Progesterone secretion following ovulation promotes endometrial growth, ↓ myometrial activity, inhibits WBC response to bacterial infection. *E coli* is most common cause of pyometra. Exogenous estrogen (mismate shots during diestrus) ↑ effects of progesterone and thereby ↑ chance of developing pyometra.
· Clinical signs – Systemic illness, purulent vaginal discharge (if cervix open). PU, PD, vomiting.
· Diagnosis - History (ill,diestral bitch). Rads – see stucture between rectum and bladder. U/S.
· Treatment - Ovariohysterectomy. Medical management is possible with $PGF_{2\alpha}$, which causes contraction of the myometrium, relaxation of the cervix and expulsion of the uterine exudate. Broad-spectrum antibiotics.

Pyrrolizidine Alkaloid Toxicity – Senecio (ragwort), Crotalaria (rattleweed), Heliotropium. Chronic poisoning from small yellow flowers results in hepatic failure in cattle, horse, pigs, and farmed deer. Sheep and goats more resistant (req 20x more). Animals usually avoid, but eat in drought conditions or when in hay. See loss of condition, dullness, diarrhea, constipation, tenesmus. Jaundice, photosensitization, hepatic encephalopathy w/ excitability, staggering gait, circling, dragging feet. Dx via hx, clin signs, necropsy. Animals showing signs rarely recover, remove plant material.

Pythiosis/Phycomycosis – Aquatic mold/fungi of GIT and skin. Gulf coast. Motile zoospores infect damaged tissue. Usually affects young, large breeds. Pylorus, root of mesentery, anus. See vomiting, diarrhea. Dx via rads, biopsy, histopath. Tx w/ complete sx excision. Ddx = perineal hernias, tumors.

Q-Fever - *Coxiella burnetti,* rickettsial infection. Usu inapparent. Can cause abortion in sheep, goats, cattle. Causes influenza-like diz in man; endocarditis.

Quittor - Chronic suppurative inflammation of lateral cartilage of the third phalanx of the horse. Causes lameness,

discharging sinus at coronet. Surgery to remove diseased tissue and cartilage.

Rabies – Rhabdovirus, bullet shaped virus. Highly fatal viral infection of nervous system which affects all warm-blooded animal spp. **MAJOR ZOONOTIC POTENTIAL**. Incubates for wks to mos. Once present, rapidly progressive causing motor irritation, ascending paralysis, mania/dummy.

· Transmission - Via saliva, usu bite wound. In USA skunk, raccoon, bat and fox are important sources of infection.

· Clinical signs - Once present, rapidly progressive.

· Prodromal stage characterized by change in behavior and highly variable clinical signs.

· Excitative or Furious stage characterized by hyperasthesia, tremors, bellows, tenesmus, yawning, circling, aggressiveness, abnormal sexual activity.

· Paralytic or Dumb Stage – Depression, stupor, paralysis. Ascending ataxia of back legs. Paralysis of muscles of deglutition results in drooling and inability to swallow. Death dt respiratory arrest.

· Diagnosis – IFA staining of brain tissue. Autopsy, see negri inclusion bodies in neuron cell bodies.

· Control – Vax under direct vet supervision. Animal must be > 12 wks but < 16 wks old. Wait until central incisors are present in kitten/puppy strays (know at least 12 wks). In right rear limb as close to stifle as possible, SQ. Rabies vaccine alopecia seen in poodles and poodle-like breeds (common, still vax).

Rabbits – Always support back legs when carry or will kick out and can break back. Bucks and does.
Husbandry – Small wire cage, must have board to rest on or will get sore/injured hocks. Eat grass hay, ¼ to ½ cup pellets and ¼ to ½ cup vegetables.

· Anatomy – Teeth continually grow, 2 pairs of incisors. Require dentistry. If in pain and don't eat, get fatty liver. Can not vomit. Small pylorus, prone to hairballs there. Large cecum. Cecal pellets, B vitamins. Copraphagic. Reach sex maturity at 4-5 mos. Neuter females to prevent litters and uterine adenocarcinoma. Gestation is 30-33 days, rabbits kindle (not whelp) from 4-12 kits. Rabbits feed young SID, not while watching. Venipuncture in marginal ear vein, cephalic, lat saphenous, jugular. Females have double cervix.

· Skin Diz – Mites, ringworm (Trichophyton), barbering (*Psoroptes cuniculi*, *Cheyletiella parsiovarax*). Treponema is rabbit syphilis. Cuterebra in outdoor rabbits on face. Abscesses usu Pastuerella, debride.

· Digestive Diz –

- Teeth – Front and back. Go off feed. Hypersalivate causing moist dermatitis, called "Slobbers".
- Trichobezoars – Hair balls. Not enough fiber such as feeding exclusively pellets.
- Mucoid enteropathy – Antibiotics, penicillin, erythromicin, lincosin, tylosin. Clostridial overgrowth can kill.
- Fatty liver – When off feed. Must force feed.

· Respiratory – In grown teeth. Pasteurellosis, "Snuffles". Diz at birth, colonize cervix. Infected for life. Major cause of abscessation. Tx w/ Baytril, TMPS.

· Repro – Double cervix. Uterine cancer common. Pyometra dt *Pasteurella*. Mastitis dt *Staph* or *E. coli*.

· Urinary – Urolithiasis. Ca oxalate crytstalluria if on pelleted diet.

· CNS – Torticollis from otitis media. Pasteurellosis can cause brain abscess. Encephalitozoon cuniculi. Heavy metal tox.

Recurrent Uveitis - Periodic Ophthalmia. Horse. Most cases dt immune-mediated rxns in uveal tract. Leptospirosis, onchocerca microfilaria, brucella, among others. Tx w/ corticosteroids, iridocycloplegic.

Rectal Tears – Mare. Usually iatrogenic during rectal palpation, blood on sleeve. Classified according to tissue layers penetrated.

· Grade I: submucosa or mucosa

· Grade II: rupture of muscular layers only; uncommon

· Grade III: mucosa, submucosa and muscular layers

· Grade IV: perforate rectum into peritoneal cavity; poop in belly. Grave prognosis.

· Treatment – Immediate confirmation via sedation and bare handed palpation. Must act fast to reduce risk of peritonitis and death. Treat Grade I tears with broad spectrum antibiotics, IV fluids, banamine, mineral oil. Higher grades require immediate sx correction. If detect tear, cotton pack cranial to tear, broad spectrum Abs, NSAIDS, pack and ship.

Red Clover – Ingestion of parasitized red clover pasture or hay results in excessive salivation.

Red Maple Leaf Toxicity – *Acer rubrum.* Horses. Ingestion of wilted leaves, such as after a storm, causes IMHA.
· Clinical signs - Methemoglobinemia, heinz body anemia, intravascular hemolysis. Weakness, polypnea, tachycardia, depression, icterus, cyanosis, brownish discoloration of blood and urine. Kidney problems.
· Treatment – No treatment. Methylene blue does not work.

Renal Failure
· ARF – Acute, good body condition, severe metabolic acidosis, glucosuria in absence of hyperglycemia plus active urine sediment (abnormal prox tubule fxn). Normal to ↑ K^+. Large kidneys. GI disorders.
- Leptospirosis, pyelonephritis, ethylene glycol intox, NSAIDs, aminoglycosides
· CRF – Non regenerative anemia dt ↓ epo. Mild to mod metabolic acidosis. Normal to ↓ K^+. Large kidneys
- Glomerulonephropathy, pyelonephritis, neoplasia, SLE
· Glomerular vs tubular diz - Glucosuria in absence of hyperglycemia plus active urine sediment = Abnormal proximal tubule function. Glomerular diz - Proteinuria w/ inactive urine sediment is hallmark for glomerulonephropathy. With glomerular diz, 1st lose protein, then azotemic, then lose [ ] ability as tubules affected.

Right Dorsal Colitis – Horses dt NSAIDs (Bute). A r/o diagnosis; do not always have diarrhea. Protein losing. Monitor TP when on long term phenylbutazone.

Rhipicephalus sanguineous – Brown dog tick. Transmits babesia, anaplasmosis, ehrlichia.

Rhizoctonia legumincola – Fungus found on clover. Produces alkaloid slaframine (slobber factor). May see only profuse salivation or may include increased lacrimation, urination, defecation. Signs resolve once infected forage is removed.

Rhodococcus equi – Gram+ coccobacillus. Pyogranulomatous pneumonia and lung abscessation in 1 - 6 mo old foals. Transmitted by inhalation or ingestion of contaminated dust. All exposed.
· Clinical signs – Fever, failure to gain, cough, respiratory signs, ± synovial distention in multiple joints w/ no lameness.
· Diagnosis – Rads, see easter basket abscesses in lungs, mediastinal lymphadenopathy. TTW. BAL. Culture. Chinese letters when stain. ↑ ↑ WBC (25,000), ↑ ↑ fibrinogen (900). Ddx from *S. zooepidemicus* pneumonia which usu in mos old foals w/ mild ↑ in WBC (14,000) and mild ↑ in fibrinogen (500).
· Treatment - Combination of erythromycin and rifampin. No vax.

Rocky Mountain Spotted Fever - *Rickettsia rickettsii.* Vector is *Dermacentor* ticks. East coast (*D. variabilis*), Midwest, and Central Plains, West coast (*D. andersoni*).
· Clinical findings - Ticks, fever, anorexia, thrombocytopenia, lymphadenopathy, polyarthritis, coughing, abdominal pain, edema, petechiation. Neurological manifestations are common, CNS vasculitis. Altered mental state, vestibular dysfunction, nuchal rigidity, focal retinal hemorrhage.
· Diagnosis - IFA. Many do not have circulating antibodies when signs are 1st seen.
· Treatment - Tetracycline.

Rodents – Mice and Rats
· Skin Diz – Lice, mits, ringworm. Aggressive mouse barbers, will barber others.
· Porphyrins **–** In tears, looks like blood. Stress of URT problem. Viral, mycoplasma, dirty cage pneumonia, pine and cedar shaving (aromatic oils).
· Mammary tumors – Rats get benign mammary fibroadenoma, mice get malignant mammary adenocarcinoma. Mammary glands are very large, even up and around shoulders.
· Bacillus piliformes – Wet tail. Also see in hamsters. No tx.

Rotavirus – Destroys villous enterocytes of small intestine. Causes diarrhea in piglets.

Rotenone – Insecticide and ascaricide. Heavy doses cause incoordination in pigs, tremors, recumbency, terminal

respiratory paralysis. Used against ear mites and demodectic mange.

Roundworms – Ascariasis. *Toxacara canis* (puppies)*, T. cati* (kittens)*, T. leonina* (adult c/d)*, Baylisascaris*. *Ascaris suum* in pigs. **ZOONOSIS**. Visceral larvae migrans – prolonged internal migration of larval parasite in abnormal host dt ingestion of infective L2 eggs. Usu in children < 4yrs w/ pica. L2 migrate to liver, lung, CNS, etc. Do not own raccoons or handle raccoon feces, *Baylisascaris* causes neuro signs in people. Ocular larvae migrans – granulomatous retinitis resembling retinoblastoma tumor in posterior chamber of eye. Est. 750 children lose vision each year in USA dt OLM. Transplacentally acquired *T. canis* larvae can be pathogenic in utero or after paturition.
· Clinical signs – Pot belly, lack of growth, poor condition of young. In pigs, migration of roundworms causes "milk spots" on liver.
· Diagnosis – Fecal flotation. Differentiate spherical, pitted *Toxocara* spp from oval, smooth *T. leonina* because former has public health significance.
· Treatment – fenbendazole (panacure), pyrantel pamoate (strongid), milbemycine, etc.

Round Cell Tumors – 1) TVT, 2) lymphoma, 3) mast cell tumor, 4) plasma cell, 5) histiocytoma (<5 y.o.).

Ruptured Bladder – In foals, newborn straining to urinate, small amounts, distended abdomen. Blood work shows metabolic acidosis, $\uparrow K^+$, $\downarrow Na^+$, $\downarrow Cl^-$. Abdominal tap creatinine 2x greater in abdomen than in serum. Contrast medium. To tx, drain abdomen w/ concurrent IV fluids, catheterize. In small animals, same. Get stable 1^{st}, do not rush to sx.

Salmon Poisoning - *Neorickettsia helminthoeca.* Transmitted by *Nanophyetus salmincola* trematode, intestinal fluke*. Oxytrema silicula* is snail intermediate host.
· Transmission - Dogs become infected by eating raw or improperly prepared trout, salmon that contains encysted flukes.
· Clinical findings - Sudden onset of high fever. Depression, weakness, anorexia, weight loss. Vomiting, bloody diarrhea, lymphadenopathy.
· Diagnosis - ID fluke ova on fecal exam. Light brown eggs, indistinctly operculated w/ a small knob at one pole. Demonstration of intracellular rickettsia on lymph node aspiration.
· Treatment – Supportive. Praziquantel. Sulfonamides, chlortetracycline, oxytetracycline, chloramphenicol.

Salmonellosis –**ZOONOTIC**. Most asymptomatic. Organic matter, feed and fomites. Fever, foul smelling, bloody feces. Produces fibrin production and necrosis of colonic mucosa. Cytology is nondiagnostic. Protracted shedding w/out appropriate tx. Low mortality. Dairy > beef cattle. Tx w/ antibiotics (ceftiofur) and NSAIDs. Vax in cattle. In rodents, *Salmonellosis typhimurium* is serious pathogen w/ no effective immunization. Eliminate colony and obtain replacements from noninfected source. Turtles are a major source of infection instituting federal regulations banning interstate shipment of baby turtles.

Salt Poisoning - Excessive quantities of salt ingested w/ concomitant water deprivation. Causes eosinophilic meningoencephalitis in pigs. Neurologic signs. Dx via plasma and CSF sodium concentration. Tx w/ small amounts of water at frequent intervals.

Sarcocystis – TX, gulf coast. DH = opossums, shed in feces. Insect fomites move into avian food. Birds ingest spores and die of fulminant pulmonary edema. EPM w/ *S. neurona*, #1 neuro diz of equine.

Sarcoids - Most common tumor of horses. Hairless fibroid tumors that frequently ulcerate, look like large warts, recur after excision, occur most commonly on lower legs. Can occur anywhere on body. Tx w/ cryosurgery (liquid NO_2, CO_2), hypothermia, radiation, immunotherapy w/ cisplatinum or BCG (bacille billié de Calmette-Guérin). Periocular sarcoids are best treated w/ multiple injections of BCG, success rates can reach 100%.

Scabies – *Sarcoptes scabiei* in dogs, *Notoedres cati* in cats. **ZOONOTIC**. Ears, elbows, hocks. Usu found in large quantities, superficial skin scraping. Tx w/ selemectin, ivermectin, lime sulfur dips.

Schiff-Scherrington Syndrome – Acute, severe, compressive thoracolumbar disease. Hyperextension of thoracic limbs w/ paralyzed pelvic limbs. Interference of pathways from inhibitory neurons in cranial lumbar region to provide inhibition to thoracic limb extensor muscles. Usu dt trauma or herniated IVD.

Scrapie – Prion. Sheep (Goat = Bovine Spongiform Encephalitis, Mad Cow Disease). Prolonged incubation. Severe pruritus, CNS, emaciation, death. No treatment. **Reportable**. Creutzfeldt-Jakob disease in humans?

Sebaceous Adenitis

· Standard poodles - Congenital, heritable, scaling disorder. Attacks sebaceous glands. Lesions confined to haired skin. Bad hair coat. No cure. Can improve some w/ topical tx.
· Akitas – Highly inflammatory. May respond to synthetic retinoids.

Septic Arthritis – Gram- in foals, hematogenous spread via umbilicus. Gram+ in adults, *Staph*, dt sx, skin, etc. Tap joint, communication? C&S, cytology, lavage.

Septicemia in Foal - A*ctinobacillus equuli, E. coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Staphylococcus aureus,* Beta-hemolytic *Streptococcus.* Gram- infections most common.

Sertoli Cell Tumor – Testicular tumor. Excess estrogens secreted. Most common in dog. See feminization of the male.

Serum Sickness - Systemic reaction that occurs in response to certain drugs. See lymphadenopothy, neuropathy, vasculitis, nephritis, arthritis, urticaria, fever.

Sesamoid Bones of the Stifle – Patella - Ossification in tendon of insertion of the quadriceps femoris. Protects the tendon. Fabella - Two located in heads of gastrocnemius on medial and lateral condyles. The third is intercalated in tendon of popliteus muscle.

Shoe Boil - Elbow hygroma. Fluid-filled, painless, SQ swelling over point of elbow involving formation of false bursa.

Sialocele - Accumulation of mucoid saliva in tissue after salivary gland or duct has been damaged. Sublingual gland most commonly involved. Saliva usually collects at intermandibular or cranial cervical area (cervical mucocele). May collect in sublingual tissues on floor of mouth (ranula). Surgical removal of mandibular-sublingual gland complex.

Sinusitis – In equine. 1° bacterial sinusitis – unilat nasal dischg, young horse; rads show fluid lines in sinuses; trephine, lavage and drain; sys Abs based on C&S. 2° sinusitis usu dt dental disorders; 4^{th} PM, 1^{st} and 2^{nd} molar; tooth repulsion, flap sinusotomy.

Sole Ulcer – Progression is trauma, hemorrage, necroses, laminitis. Wet environment, heritable. Inside-out phenomenon. Hind lateral claw. Aggressive debridement, trim claws, do not breed.

Sorghum Cystitis – Toxic degneration of SC dt ingestion of green fresh sudan X sorghum or johnson grass. Low grade prussic acid toxicity (jake leg wood alcohol in people). Combo of posterior ataxia and cystitis. Urine scald, penile paralysis, arthyrogryposis in fetus. No tx, do not recover.

Spirocerca lupi – Spondylosis and mass in thorax/esophagus. IH = dung beetle via chicken entrails. Tx w/ Dormamectin.

Spleen Enlargement – Acute and chronic leukemia, systemic mastocytosis, malignant histiocytosis, malignant lymphoma, multiple myeloma. Barbituates.

Splints - Inflammation of interosseous ligament b/w small and large metacarpal bone of horses. Accompanying periostitis and exostosis production on metacarpal bone. Lameness during development of splints after animal is worked. Tx is complete rest or exostectomy/ostectomy.

Sporotrichosis - *Sporothrix schenckii*. Highly **ZOONOTIC**, major public health risk. Chronic granulomatous cutaneous nodules. In cats, lots of organism, draining lesion. Difficult to find organisms in dogs/horses. Pleomorphic, cigar or football shaped organisms, 2-4 μ m, intracytoplasmic basophilic w/ clear thick halo. Tx w/ SSKI (super-saturate potassium iodide) or itraconazole.

Staphylococcosis – Food born enterotoxin.

Steatitis – In reptiles, caused by too much fat and too little vitamin E and selenium in the diet.

Sterilization – Thermal = 121° C for 15min at 15psi. Chemical = gas, ethylene oxide. Inactivates protein. Not used dt chromosomal defects and skin irritation in humans.

Stomach Tumors – Most are bad, biopsy to be sure. Leiomyosarcomas are treatable. Ulcers/erosion – amount of blood does not correlate to size. Gastric ulcers in equine very common. NSAIDs can cause gastric ulcers and right dorsal colitis, also renal impairments (dt decreased blood flow through prostaglandin pathway).

Streptococcus equi equi - Strangles in horses. Contagious URT disease usu in weanlings and yearlings transmitted by fomites and contact. Bastard strangles is same diz elsewhere. Immune mediated reactions can occur such as purpura hemorrhagica, myositis, muscle wasting.

· Clinical signs – Fever, lethargy, mucopurulent nasal discharge. Abscessation of submandibular and retropharyngeal ln
and gutteral pouches (chondroids). Ddx from *Corynebacterium pseudotuberculosis* which causes ln abscessation, esp in pectoral region.

· Diagnosis – Hx, clin signs, culture from abscess/ln. Isolate organism for definitive dx. Treatment – PPG unless ln abscess, then enhance maturation and drainage.

· Control – Vaccine, IM or IN.

Streptococcus zooepidemicus - Causes upper respiratory tract infections in horses. Often 2° invader.

Stress Leukogram – Mild, mature neutrophilia, lymphopenia, eosinopenia, ± moderate monocytosis (dog).

Stringhalt – Unknown etiology. Involuntary repetitive exaggerated flexion of hock. Slamming foot down on ground. Tx w/ tenectomy of lateral digital extensor.

Strongyloides westeri – Larvae passed in milk to foals. Infection by day l0.

Strongyloides vulgaris – Large strongyles. Infection via ingestion of infective larvae. Prepatent period 6-11 mos. Larvae migrate via cranial mesenteric artery. May develop thromboembolism, leads to colic. Dx via eggs in feces. Tx w/ ivermectin.

Strychnine – Rodenticide. CNS stimulant. Inhibits glycine, an inhibitory neurotransmitter. See severe tetanic seizures.

Sulfonamides – G+, G-. Competitively inhibit folic acid synthesis. Bacteriostatic. Broad spectrum. Many bacteria have developed resistance. Sulfas may cause KCS. Most drug side effects of all Abs.

Surgical Pack - 121° C (250° F) for 15 minutes.

Suture Types -

· Absorbable – Lose tensile strength w/in 60 days after implantation. Lose strength more rapidly than disappear from tissue.

· Catgut – Multi, natural. 60% loss by 28d; 80% loss by 60d. Most reactive of all suture mtrls, esp in cats. Intense infl rxn. Don't use in infected wound, to close the stomach, or in vascular areas.
· Polyglycolic acid – PGA, Dexon. Multi, synthetic. Essentially 100% loss by 21 d, accelerated in urine. Poor knot security, don't use to close bladder.
· Polyglactin 910 – Vicryl. Multi, synthetic. 50% loss by 14d, 80% loss by 21 d. More predictable tensile strength, can use in bladder. Fair knot security, min tissue rxn.
· Polydioxanone – PDS. Mono, synthetic. Longer tensile strength than other absorbables. 26% loss by 14d, 42% by 28d, 86% by 56d. Up to 6 mos for complete absorbtion. Min tissue rxn.
· Poliglecaprone 25 – Monocryl. Mono, synthetic. Strongest tensile strength originally, but loses quickly. After 2 wks, only 25% strength maintained. Do not use to close body walls (heals slower than other tissues). Good for SQ.
· Nonabsorbable – Maintain tensile strength for longer than 60d after implantation.
· Silk – Multi, natural. Ideal handling. Most reactive of all nonabsorb. Nidus for calculi in lumens/bladders. Do not use in contaminated wound, GIT, bladders.
· Nylon – Ethilon is mono, Surgilon is multi. Synthetic. Poor knot security (min 5 throws). Possesses memory. Min tissue rxn, but don't use in joints b/c stiff.
· Polymerized Caprolactam – Supramid. Vetafil. Multi, synthetic, coated. No tensile strength loss, good knot security. Use only on skin surface, do not implant.
· Polypropylene – Prolene. Surgilene. Mono, synthetic. No tensile strength loss, excellent knot security (locking action). Least reactive and least thrombogenic; often used in CV sx. Bit slippery to handle.
· Stainless Steel – Metallic, mono or multi. Highest tensile strength of all suture mtrls. No loss. Absolute knot security. Least reactive except for irritation from inflexible ends. Fair to poor handling.
· Selection of suture materials – Wounds do not gain strength until 4-6d postop. Visceral wounds heal rapidly (max strength 14-21d) so absorbable usu. Fascial wounds heal very slowly, can use absorbable like PDS, but nonabsorable may be more appropriate. Skin wounds heals slowly (not quite as slow as body wall). Nonabsorbable sutures indicated. Do not use multifilament, nonabsorbable in contaminated wound. Size of suture material – smallest is 10-0 down to 0 then upto 6 is largest.
· Skin and SQ – 3-0 to 4-0 in SA; 0 to 3-0 in LA
· Fascia and muscle – 0 to 3-0 in SA; 1 to 2 for linea alba in LA, 2-0 to 1 in muscle fascia.
· Ligation of small vessels – 3-0 to 4-0 in SA; 0 to 3-0 in LA.

Suture Patterns –
· Interrupted – Every suture has a knot assoc w/ it. Lose efficiency, gain accuracy
- Simple Interrupted – Appositional. Good cosmesis. 2 tissue penetration points.
- Mattress – At least 4 tissue penetration points. More stable in tissues.
• Horizontal mattress – Everting. Square. Do not use as tension (local ischemia).
• Vertical mattress – Appositional. Far-far-near-near. Tension relieving suture.
• Cruciate – Appositional. Forms an X when tied. 2x as fast as simple interrupted.
• Halstead – Inverting. 8 pts, far-near-near-far-over-far-near-near-far. Secure; friable tissues.
• Lembert – Inverting. Far-near-near-far. Use viscerally, not in skin. Uterus, bladder, stomach.
· Continuous – Only 1st and last stitches are tied. Less time, but whole line can loosen, less apposition.
- Simple Continuous – Everting. Often used for SQ. "Whip stitch".
- Continuous Lock – Everting. Blanket stitch. Inside loops.
- Horizontal mattress – Everting.
- Lembert mattress – Inverting. 2nd closure layer of visceral wounds. Non-lumen penetrating.
- Cushing – Inverting. 1st layer of clsure of visceral wounds. Non-lumen penetrating.
- Connell – Inverting. Closure of visceral wounds. Like Cushing, but full thickness into lumen.
- Purse String – Inverting. Temp or perm clusre of lumina.

Sweet Clover – *Melilotus alba.* Hemorrhagic diz from consumption of toxic quantities of spoiled sweet clover. Causes coumarol poisoning. Results in prolonged clotting time, spontaneous hemorrhage, fatal anemia. Tx w/ vitamin K (Kl, phytonadione is more effective than K3, menadione).

Swine Dysentery - *Serpulina hypdysenteriae.* Mucohemorrhagic LI diarrhea of pigs. Mucoid diarrhea w/ flecks of blood. Dx based on clin signs, characteristic lesions in LI, isolation of organism. Tx w/ antibacterials such as Lincomycin.

Symblepharon - Adhesion of eyelid to eyeball.

Sytemic Lupus Erythematosus (SLE) – Diagnose LE cells in synovial fluid.

SwineVesicular Disease – Vesicular disease. **REPORTABLE**. Enterovirus of picornavirus family. Transient disease of pigs. Important b/c must differentiate from FMD. Transmitted via direct contact or feeding of infected pork. Pig does not lose condition and lesions heal rapidly. Dx ELISA.

Tapeworms – Cestodes. *Diplidium caninum*, double pored dog tapeworm from fleas. *Taenia taeniaeformis* from cats w/ access to infected mice/rats. *Echinoccus granulosus*, the hydatid tape, from near sheep, wild ungulates, wild canids. Rarely cause serious disease.

· Clinical signs - Depend on age, condition, degree of infection, breed. Unthriftiness, malaise, big appetite, shaggy coat, diarrhea.

· Diagnosis – Proglottids in feces and bedding. Eggs on fecal floatation.

· Treatment – Praziquantel (Droncit). Epsiprantel (Cestex). Fenbendazole (Panacure) only effective against *Taenia spp*.

· Control – Flea control for *D. caninum*. **ZOONOSIS**. Cook beef (*T. saginata*) and pork (*T. solium*) well. *D. caninum* from humans ingesting *Ctenocephalides felis* flea; adult tapeworm may develop in SI.

Taurine Deficiency - Generalized retinal degeneration and dilated cardiomyopathy in cats.

TEME - Thromboembolic meningoencephalitis. *Hemophilus somnus.* Acute septicemic diz of CNS and eye. Occurs in cattle. Transmission is aerosol and briefly in urine.

· Pathogenesis - Organism circulates in bloodstream. Causes DIC, severe vasculitis, hemorrhage, thrombosis, infarction.

· Clinical signs – Fever followed by CNS signs. Blindness, weakness, ataxia, recumbency. Hemorrhagic infarcts on brain, synovitis, pleurisy, pneumonia, pericarditis. Retinal hemorrhage.

· Diagnosis - Clinical signs and necropsy.

· Treatment - Penicillin, streptomycin, oxytetracycline; bacterin.

Tendons – Equine. Superficial digital flexor tendon on outside; if cut, drop in fetlock w/ toe on ground. Next inward is deep digital flexor tendon; if cut in addition, deeper drop in fetlock w/ toe elevated. Then interosseous ligament; if cut all three, fetlock on the ground completely.

· Contracted tendons – Ballerina tiptoes, deep digital flexor tendon (attaches to P3). Tx by cutting distal inferior check ligament. If knuckle over, superficial digital flexor tendon (attaches to top of P2).

· Lax tendons – Foal w/ ankle on ground. Confine, time, rest. Heel extensions. Do not support bandage, makes weaker.

· Bowed tendon – Superficial digital flexor tendon inflammation and swelling; racehorses. NSAIDs, ice/heat, rest.

Tetanus – *Clostridium tetani.* Lockjaw. Produces neurotoxin in necrotic tissue. Blocks release of GABA/glycine from inhibitory interneurons. Horses most sensitive, cats least sensitive mammal. Dogs relatively resistant, birds and pigs resistant.

· Pathogenesis - Found in soil and intestinal tracts. Intro to tissue via deep puncture wounds, docking, castration, etc. Spores only grow in necrotic tissue. Toxin absorbed by motor nerves in area and pass up nerve tract to SC, causing ascending tetanus. Toxin interferes w/ release of neurotransmitters causing spasmodic, tonic contractions of voluntary muscles. Incubation is 14 days, then see clin signs.

· Clinical signs - Tonic spasms, hyperesthesia. Erect ears, tail stiff and extended, 3rd eyelid prolapsed, sawhorse stance, sardonic grin. Ears pulled back and bulgy eyes. Slower the onset of clinical signs, better the prognosis.

· Treatment – Penicillin, TLC. Long recovery.

· Control - Tetanus toxoid as preventative or on fresh wound. Antitoxin if unknown vax history or old, contaminated wound. Antitoxin is not effective once toxin has bound to nerves. Phenobarbital and acepromazine are sometimes helpful in mgmt of those cases.

Tetrology of Fallot – Most common defect that produces cyanosis. Includes 1) pulmonic stenosis, 2) high ventricular septal defect, 3) right ventricular hypertrophy, and 4) overriding aorta. Stunted growth, exer intol, cyanosis, collapse, seizures. Usually w/ murmur (dt pulmonic stenosis). β blockers, control polycythemia. Sx correction rarely performed. Px guarded. Pentology of Fallot would add atrial septal defect.

Theiler's Disease – Idiopathic Acute Hepatic Disease; Serum Hepatitis. Most common cause of acute hepatitis in horse. Associated w/ tetanus antitoxin (or contact w/ horse that recently received TAT) and admin of equine immune serum. Usu in adults, most common in broodmares 1-3 mos post foaling. Clinical signs include hepatic insufficiency, icterus, hepatic encephalopathy (yawning), dark urine, photosensitivity. Tx w/ supportive therapy and tx of encephalopathy – often successful. Prevent by careful admin of TAT – only when needed for prophy or if tetanus toxid immunization absent or unknown.

Thelazia – Eyeworm. Parasites of conjunctival sac. Deposited by Musca flies feeding on ocular secretions. Causes conjunctivitis, lacrimation, blepharospasm, and keratitis. Remove parasites with forceps, ocular levamasole solution.

Thoracic Duct - Duct beginning in cisterna chyli and emptying into venous system at junction of left subclavian and left internal jugular veins. Acts as a channel for collection of lymph from portions of the body caudal to diaphragm and from left side of body in front of diaphragm.

Thoroughpin - Tenosynovitis of the deep flexor tendon of hindleg. Soft, nonpainful swelling above point of hock and on medial and lateral aspects of hock. No lameness.

Thromboembolic disease - Occurs in cats associated w/ cardiomyopothy. Embolus occurs most frequently at distal aortic trifurcation.
· Clinical findings – Paralysis, pain, pallor of affected paws, paresthesia, cyanotic nail beds, absence of femoral arterial pulses, cold extremities. Anterior tibial and gastrocnemius mm become hard due to ischemic myopathy. Cardiac abnormalities - heart murmur, supraventricular arrhythmics, left atrial and ventricular enlargement, congestive heart failure.
· Treatment - Manage heart failure. Heparin to prevent further thrombosis. Aspirin.

Tonsillar Tumor - Squamous cell carcinoma in dogs and cats. Unilateral, irregular, firm ulcerated mass. Poor px dt metastasis to retropharyngeal or mandibular lymph nodes. [Bilateral symmetric tonsillar enlargement caused by lymphosarcoma].

Toxocariasis – See Roundworms.

Toxoplasmosis – *Toxoplasma gondii,* coccidian protozoan. Definitive host = cat. Intermediate host = many vertebrates, including rodent, domestic farm animals, and man. **ZOONOTIC**. Many humans have antibodies (25-50%). High risk humans are pregnant (between month 2-6) or immunosuppressed. Transmission via oocysts passed in feces of susceptible cats for 3-21 days following infection. Oocysts sporulate in 2-4 days and become infective. Oocysts very resistant and survive in environment for years. Important cause of abortion in sheep and humans.
· Clinical signs – Usually asymptomatic in cats, may see fever, malaise. Pregant human – miscarriage, stillbirth, birth defects, fetal leukoencephalomalacia. Ocular problems.
· Transmission - Previously unexposed pregnant animals can develop parasitemia w/ spread of infection to fetus. Most toxoplasma infections acquired after birth dt ingestion of undercooked meat, oocyst contaminated soil (gardening), or unpasteurized goat milk. Latent toxoplasmosis may become active following immunosuppression.
· Diagnosis – Serology. 4 fold $\uparrow$ in IgG over 4 wks or single IgM increase. {4 fold $\uparrow$ in IgM titers in cats indicate active infection and potential public health risk. Rising IgG titers indicate active infection. High IgG levels indicate past infection in cats and immunity.} Tissue biopsy w/ active organism = definitive dx. Fecal float (rarely dx).

· Treatment - Seldom warranted. Systemic infection in dogs and cats, use Clindamycin. For oocyst shedding by cats, Clindamycin, Monensin.
· Prophylaxis - Do not feed cats raw meat. Dispose of litter daily. If pregnant, avoid contact w/ cat litter, undercooked meat, contaminated vegetables, gardening, goats milk. Clean litter box daily and wash hands after cleaning. Cover children's sandboxes.

Transmissible Gastroenteritis – Coronavirus. Viral disease of small intestine in pigs of all ages. Transmission is aerosol. TGE results in severe villous atrophy of jejunum and ileum. Vomiting initial sign. Profuse watery diarrhea. Severe dehydration. Dx based on clinical signs and TFA of SI. Tx is supportive, feed sow TGE-infected intestine 2-4 weeks before farrowing.

Transmissible Venereal Tumor - Cauliflower-like tumor located on exterior genitalia. Can be found in oral/nasal cavity as well. Spontaneous regression. Metastasis uncommon (5%). Chemotherapy tx of choice. Vincristine. Px for remission good.

Traumatic Reticuloperitonitis - Hardware disease. Results from perforation of reticulum by swallowed metallic objects. Dairy > Beef (dt diet and environment).
· Clinical findings – Acute drop in milk production and rumen stasis. Acute local peritonitis, usu. Pleuritis, pericarditis, liver or splenic abscess, sudden onset rumenal atony, drop in milk production. May grunt on pressure of xiphoid. Can have signs of pericardial effusion and congestive heart failure (brisket edema, distended jugular veins).
· Diagnosis - Based on history and clinical findings. Hyperfibrinogenemia and hyperglobulinemia (if chronic). Classic signs disappear after few days and harder to dx.
· Treatment – Medical, rumen magnet (recommended in all dairy cattle), approved parenteral antibiotics. Surgical, rarely done, rumenotomy, pericardectomy (5^{th} rib resection).

Trichinosis – *Trichinella spiralis*, nematode. Parasitic diz of public health importance, **ZOONOTIC**. Human infection via ingestion of encysted larvae in insufficiently cooked pork. Often undiagnosed in domestic and wild animals. In man, see 3 phases – intestinal, muscle invasion, convalescent and occasionally death. ELISA to detect anti-Trichinella antibodies. Rodent and carcus control. Cook garbage fed to pigs. Meat inspection. Cook pork to >137° F. Can also freeze or heat to kill trichinae before market.

Trichomoniasis - *Tritrichomonas feotus*. Venereal disease of cattle characterized by early fetal death (repeat breeding and prolonged calving interval), infertility, and postcoital pyometra. Found in genital tract of cow and bull. Transmission by AI can occur. Bulls remain permanently infected unless treated. Cows remain infected throughout pregnancy and 3 mos following pregnancy, then are free of infection. Dx w/ In pouch test from bull prepuce. Find organism in placental fluid, stomach of aborted fetus, prepuce. Tx by culling bulls and resting heifers 3 mos. AI w/ semen free of *T. foetus.* In pigeons and birds of prey causes caseous lesions in oral cavity.

Trypsinlike Immunoreactivity – Best test for exocrine pancreatic insufficiency (maldigestion) in dogs. [ ] of TLI in serum reflects releases of trypsinogen from pancreatic acinar cells. Subnormal values indicate inadequate pancreatic exocrine secretion.

Tyzzer's Disease – *Clostridium piliforme* (used to be *Bacillus piliformis*). Motile, filamentous, gram-, sporeforming, obligate, intracellular bacterium. Oral exposure to spores, contact or contaminated feces results in acute focal bacterial hepatitis seen in many animals. Low glucose, elevated liver enzymes. Death is rapid, esp in young foals. On necropsy see focal areas of necrosis seen in liver, myocardium and intestines, paintbrush hemorrhage, hepatomegaly.

Upward Fixation of the Patella – Equine. Drag toe, can't flex, then suddenly pops. Used to cut medial patellar ligament to repair, now suggest rest and exercise to strengthen surrounding muscles. In cattle, Brahmen are predisposed. Desmotomy of medial patellar ligament ± transection of vastis medialis mm.

Urinary Tract Obstruction – Blocked tomcat. Postrenal azotemia. Hyperkalemic myocardiotaoxicity and metabolic acidosis. Tx w/ fluid therapy and unblock.

Urine Spraying in Cats – Often behavioral. Infection should be assessed. Tx w/ diazepam, megestrol acetate, buspirone. Also amitryptyline (causes dry mouth and urinary retention).

Urolithiasis – Can be composed of single crystalloid, mixed or compound. Usu small breed dogs and dalmations. Most 3- 7 yrs old. Urocystoliths – usu female, struvite w/ UTI. Urethral calculi – usu male w/ obstruction. Metabolic problems lead to excess crystalloid in urine, small, radiodense. To remove, can perform sx extraction, voiding urohydropropulsion (if small enough to pass thru urethra), lithotripsy (uncommon in vet med), dissolution.

· Struvite - Magnesium ammonium phosphate. UTI (urease producing bacteria) leads to alkaline urine, usu in females. Form urocystoliths, palpable cystitis. Most radiodense. Dissolution - can increase solubility of crystalloid by modifying pH. Tx w/ ampicillin (acidifying), calculolytic diet (s/d), restrict protein, phosphate and magnesium intake. Promote diuresis.

· Oxalate – Calcium Oxalate. Forms in acidic urine, hypercalciuria. Renal leak, 1° hyperparathyroidism, hypercalcemic disorder. Radiodense. Surgical extraction required, will not dissolve. To prevent: If absorptive problem, limit Ca+ intake (u/d, w/d); if renal leak, thiazide diuretics. Potassium citrate to maintain pH. Promote diuresis.

· Cystine – Defective reabsoption of amino acids by renal tubules results in insoluble, acidifying cystiuria. Usually male. Moderately radiodense. Alkalinize urine w/ potassium citrate, low protein diet (u/d), thiol drugs to increase cystine solubility (D-penicillamine, N-2-mercaptopropionyl).

· Urate – Dalmation, English Bulldogs, portocaval shunt dogs. ↑ urate excretion, acidifying. Dissolve or sx removal. Feed purine restricted diet, nonacidifying diet (u/d) to ↓ urate output, promote diuresis. May add bicarb to diet. Allopurinol to ↓ hepatic conversionof xanthine to uric acid.

Uterus Unicornis – Long periods of anestrus in cow. 2 ovaries, 1 uterine horn. CL lasts dt lack of luteolytic signal from adjacent uterine horn.

Vagal Indigestion - Lesions that involve vagus nerve of forestomach and abomasum cause varying degrees of paralysis. Results in delayed passage of ingesta, distention of abdomen, anorexia, passage of small amounts of soft, pasty feces. Traumatic reticuloperitonitis is most common cause. Results in acid-base and electrolyte imbalances. Poor response to tx. Rumenotomy for temp relief.

Vascular Ring Anomaly – Persistent Right Aortic Arch. Dog and cat. Esophagus entrapped extraluminally. Regurgitation of solid food. Dx w/ rads, see dilated esophagus cranial to heart, aspiration pneumonia. Sx. Feed from elevated platform. Ddx – stricture, FB, diverticulum, megaesophagus (careful).

Ventricular Septal Defect – Relatively common in cats. Most common congenital cardiac anomaly in horses. Heritable in miniature swine. Shunting of blood from L to R dt ↑ left sided pressures. Systolic murmur in R 4_{th} ICS usu w/ thrill, may be absent if very large defect. Pulmonary aa and vv enlarged. Depending on size of defect, may see significant circulatory derangements and acute L sided congestive heart failure. If resistance ↑ and blood starts shunting R to L, called Eisenmenger's Complex (see cyanosis, fatigue, exer intol). Dx w/ rads, echo. Do not breed.

Vesicular Diseases – Clinical signs indistinguishable b/w diseases. Fever, excessive salivation, lameness seen dt vesicular lesions of mouth, tongue, oral mucosa, soles, coronary band and b/w toes. **REPORTABLE**. Garbage and fish should be cooked before being fed to pigs. DDXs: MCF, Renderpest, BVDV, Blue Tongue.

· Foot and Mouth disease – Aphthovirus in picornavirus family. Ruminant, swine. Test and slaughter.

· Vesicular Stomatitis – Rhabdovirus. Horses, cattle, and pigs. Arthropod vectors.

· Vesicular Exanthema – Calicivirus. Swine only. (Sea lions).

· SwineVesicular Disease – Enterovirus of picornavirus family. Transient diz of pigs.

Vesicular Exanthema – Vesicular Disease. **REPORTABLE**. Calicivirus. Swine only. Acute, highly infectious, febrile disease. US declared VES free in 1959. 1972, indistinguishable virus found in San Miguel sea lions.

Vesicular Stomatitis – Vesicular Disease. **REPORTABLE** . Rhabdovirus. NJ and Indiana subtypes. Infectious disease of horses, cattle, and pigs. Spreads rapidly, but not as contagious as FMD. Transmitted by mosquitoes and biting flies and via movement of animals. Dx ELISA. Serious diz because looks like others. No specific treatment.

Vitamin A Deficiency – Lack of green feed. Liver is storage organ. Colustrum is calf source. Blindness, ill thrift, repro probs. Dx by history, clin signs, necropsy, [vitaA], [beta carotene]. Tx w/ vita A injection or oral prep.
· In Avian – Deficiency turns mucous membranes into skin, multiple "abscess looking" lesions in oral cavity, respiratory signs. Due to all seed diet.
· Also a vitamin A responsive primary seborrhea.

Vitamin C – Guinea pigs require dietary vitamin C.

von Willebrand's Disease – Most common inherited bleeding disorder in dogs. Deficiency of vWF causes ↓ platelet binding to vessels. Appears clinically as platelet defect, but platelet # and fxn are normal. Common in DPs. vWF circulates w/ factor VIII. May be assoc w/ hypothyroidism.

Waardenburg-Klien Syndrome – Cats. Blue eyed albino assoc w/ deafness. Dt melanoblast migration.

Water Consumption – Normal water consumption is 20-40 mls/pound/day.

Whipworms – Trichuriasis. *Trichuris vulpis*. 40-70mm long w/ slender anterior and thick posterior. Inhabit cecum. Direct life cycle w/ ingestion of infective eggs, larvae develop in jejunal wall, adults mature in cecum in approx 3 mos.
· Clinical signs - Asymptomatic to wt loss and diarrhea. Fresh blood in feces, anemia. Can see ↓ Na^+, ↑ K^+ which mimics addison's.
· Diagnosis – Direct fecal and floatation, see thick shelled eggs w/ bipolar plugs. Heavy ova; periodic shedders.
· Treatment – Fenbendazole (Panacure), Milbemycin (Interceptor, Sentinel). Eggs susceptible to dessication, clean areas.

White Muscle Disease – Nutritional Myodystrophy (NMD). Vitamin E/Selenium deficiency, which are important antioxidants. Generalized muscle weakness or stiffness (ddx tetanus), repro probs, ill thrift, hepatosis dietetica (mulberry diz). Dx by history, clin signs, necropsy, [vitaE], [Se]. ↑ CK, myoglobinuria, ↑ AST. Tx w/ vitaE and Se injections. Provide salt/trace mineral mixes.

Wooden Tongue – *Actinobacillus lignieresii*. G- aerobic coccobacillus. Granulomatous, soft tissue lesion in pharyngeal area. Swelling of tongue, mass in buccal or cervical area seperately moveable from bone. Easy to culture. Tx w/ NaI (one time) and antibiotics.

Wound Healing – 4 stages that overlap. 1) Inflammatory phase, N∅ are 1° cells. 1^{st} 2-3 days usu. 2) Debridement phase, w/in 6-12 hrs and lasts 12hrs to 5 days dependent on amt of debris to clean up. Healing will not proceed until necrotic tissue is removed. N∅ and monocytes. 3) Repair phase, begins w/in 1^{st} 12 hrs. Fibroblasts, capillary infiltration, collagen = granulation tissue, which appears 3-6 d after injury. "Proud flesh" when in excess. Epithelialization involves sliding of epithelial cells across wound surface, can take wks to mos. This phase ↑ tensile strength. 4) Maturation phase. Remodeling. Begins 15 d after wound and continues for 6-12 mos or longer. Cont'd tensile strength, checks an balances. Regression of caps and fibroblast. Results in scar which is never as strong as tissue it replaced (15-20% weaker). Skin heals by contraction and/or epithelialization, it does not regenerate.
· First Intention – Primary closure. Close apposition of skin edges. Fresh, clean, w/ adeq vascularization. Perform during the "Golden Period", which is ~ 6 hrs after wound (up to 12 hrs). Healing is rapid, scarring minimal.
· Second Intention – Nature's method. Contraction and epithelialization have occurred to some degree. Many factors inhibit contraction including steroids, NSAIDs (in high doses), infection, proud flesh, shape. Epithelialization is ↑ by heat (bandaging), oxygenation (bandaging, casting), moisture, silver sulfadiazine, insulin. ↓ by infection, necrotic tissue, proud flesh, too frequent of bandage changes.
· Third Intention - Delayed Primary Closure. Apposition of wound after golden period but before appearance of granulation tissue. 4-5 days after injury. Debride, irrigate, pack and dress. Close when ready w/ primary closure.
· Delayed Secondary Closure – After gran bed, after 4-5 days. Chronic, contaminated wounds. Often excise and debride until primary closure can be performed.

Xanthomatosis – Abnormal lipid metabolism.

Zearalenone - Estrogenic substance produced by *Fusarium graminearum.* Found in moldy corn. Causes signs of hyperestrogenism (such as bone marrow suppression).

Zinc Deficiency - Involved in process of cell division. Broad effects include slipping of wool, anorexia, listlessness, poor production, parokeratosis, stiff joints, unthriftiness, alopecia, dermatitis, poor wound healing. Crusted food pad lesions in dogs.

Zinc Responsive Dermatosis – Heriditary in arctic breeds (SH, AM). Not Zn deficient, but improves. Zn methionine well absorbed w/ few side effects. Zn sulfate is cheap but poor bioactivity and GI upset limits usage. Requires lifelong therapy.