Small Animal Veterinary Medicine
Treatment of Dogs and Cats with Human Pharmaceutical Products

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This program has been supported by PharmCon

Speaker: Peter A. Kreckel R.Ph. is a graduate of the University of Pittsburgh, Bachelor of Science in Pharmacy, Magna Cum Laude, Class of 1981. He served as the President of the Pharmacy School Class of 1981 for 3 years, and President of the Pharmacy School Student Council for 2 years. During this time he received the Upjohn Achievement Award for leadership and academic achievement. In addition to managing a retail pharmacy, pharmacist Kreckel is an Adjunct Assistant Professor of Pharmacology, Department of Physicians Assistant Sciences, St. Francis University. His assignments include teaching a HIV pharmacotherapy course for Physician Assistant students, currently doing their clinical rotations, that are pursuing a Masters of Medical Science Degree from St. Francis University.

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Goals and Objectives

- Identify common disease states of canines and felines, and the available human medications used to treat them.
- Discuss emergency treatment and drug treatment of cat and dog bites.
- Discuss treatment for ingestion of common household foods that can be toxic.
US Dog and Cat Ownership

<table>
<thead>
<tr>
<th></th>
<th>Dogs</th>
<th>Cats</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of households</td>
<td>37.2%</td>
<td>32.4%</td>
</tr>
<tr>
<td>Total number</td>
<td>72,114,000</td>
<td>81,721,000</td>
</tr>
<tr>
<td>Average #</td>
<td>1.7</td>
<td>2.2</td>
</tr>
<tr>
<td>Vet $ spent household</td>
<td>$356</td>
<td>$190</td>
</tr>
<tr>
<td>Vet $ per animal mean</td>
<td>$200.00</td>
<td>$81.00</td>
</tr>
</tbody>
</table>

Vital Signs

<table>
<thead>
<tr>
<th>Animal</th>
<th>Temp (F)</th>
<th>Pulse rate (bpm)</th>
<th>Respiratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat</td>
<td>100-103.1</td>
<td>100-120 old 130-140</td>
<td>20-30</td>
</tr>
<tr>
<td>Dog</td>
<td>99.5-102.5</td>
<td>80-120 old 110-120</td>
<td>15-30</td>
</tr>
</tbody>
</table>

Top Reasons for Trips to the Vet

**CATS**
- Urinary tract infection
- Gastritis/vomiting
- Chronic renal failure
- Enteritis/diarrhea
- Diabetes mellitus

**DOGS**
- Ear infections
- Skin allergies
- Pyoderma/hot spots
- Gastritis/vomiting
- Enteritis/diarrhea

Interactive Slide

- All of the commonly used references give dosages for dogs and cats without any differentiation between breeds.
- Of all of the breeds of dogs, which one has the MOST different metabolic, and lab parameters???
The ANSWER:

THE GREYHOUND!!

Comparison of Blood Values

<table>
<thead>
<tr>
<th>Blood Value</th>
<th>Greyhounds</th>
<th>Other Breeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC</td>
<td>7.4-9</td>
<td>5.5-8.5</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>19.0-21.5</td>
<td>12.0-18.0</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>55-65</td>
<td>37-55</td>
</tr>
<tr>
<td>White Blood Cells</td>
<td>3.5-6.5</td>
<td>6.0-17.0</td>
</tr>
<tr>
<td>Platelets</td>
<td>80K-200K</td>
<td>150K-400K</td>
</tr>
<tr>
<td>Creatinine</td>
<td>0.8-1.6</td>
<td>0.0-1.0</td>
</tr>
<tr>
<td>T4 (Thyroid)</td>
<td>0.5-3.6</td>
<td>1.52-3.6</td>
</tr>
</tbody>
</table>

PAIN MANAGEMENT

<table>
<thead>
<tr>
<th>Drug</th>
<th>DOG</th>
<th>CAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen (Tylenol)</td>
<td>10-15mg/kg q8-12 hrs</td>
<td>CONTRAINDICATED</td>
</tr>
<tr>
<td>Aspirin (Bufferin)</td>
<td>10-25 mg/kg q 8-12 hrs</td>
<td>10mg/kg q OTHER day</td>
</tr>
<tr>
<td>Etodolac (Lodine)</td>
<td>5-15mg/kg once daily</td>
<td>CONTRAINDICATED</td>
</tr>
<tr>
<td>Ketoprofen (Orudis)</td>
<td>0.5-1mg/kg BID</td>
<td>0.5-1mg/kg daily for a max=5days</td>
</tr>
</tbody>
</table>

PAIN MANAGEMENT

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOG</th>
<th>CAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ketorolac (Toradol)</td>
<td>0.3mg/kg po BID</td>
<td>.25mg/kg IM q 8-12hr max=2 doses</td>
</tr>
<tr>
<td>Meloxicam (Mobic)</td>
<td>0.2mg/kg-day-1. 0.1mg/kg thereafter</td>
<td>0.2mg/kg-day-1. 0.1mg/kg for days 2 &amp;3. Then 0.025mg/kg 2-3 times a week</td>
</tr>
<tr>
<td>Tramadol (Ultram)</td>
<td>1-4 mg/kg q 8-12hrs</td>
<td>4mg/kg BID ¼ tablet BID- average cat</td>
</tr>
</tbody>
</table>
**Highlights of PAIN Management**

- Acetaminophen: CONTRAINDICATED in cats in ANY doses
- Hydrocodone: used as an Antitussive in dogs and cats (WATCH Acetaminophen)
- Naproxen: Use only if other NSAIDS have not been effective
- Ibuprofen: usually avoided in small animals. Dogs get 5mg/kg/day at most. (1/8 of the human dose)
- Buffered Aspirin: 1 tablet for every 32lb of weight for dog BID q12hrs

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**Pruritis**: sensation that provokes the desire to scratch, rub, chew or lick.

- Causes: parasites, allergic, bacterial, fungal, seborrhea, other dermatoses.
- Topical treatment therapies:
  - Colloidal oatmeal (max effect 2 days)
  - Lime sulfur (can stain and has a bad odor)
    - Is antipruritic, anti parasitic, antifungal, antibacterial
  - Topical corticosteroids are most useful. Sprays are a good choice, avoid alcohol based.

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**Treatment of Pruritis**

- 3 separate pathways lead to itching and inflammation. Steroids block all 3. Antihistamines block only 1 path.
- Tricyclic antidepressants (Elavil): potent antihistaminic actions in dogs.
- **Hydroxyzine**: dog: 2.2mg/kg/TID.
  - Cats: 1-2mg/kg q 8-12 hrs. 5-10mg/cat
- **Diphenhydramine**: 2-4mg/kg TID
  - Cats: 0.5mg/kg q12hr. (cats hate human liquid)
- **Prednisone**: dog: 0.5mg/kg BID for 5-10 days. Then taper to minimum every other day dose.
  - Cats: 1-2mg/kg q12 hrs. Taper to minimum every other day dose

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**Motion Sickness**

- Dog motion sickness is more commonly seen in younger dogs than in older dogs, just as carsickness afflicts more children than adults. The reason for this is because the ear structures used for balance aren’t fully developed in puppies.
- **Antivert** (meclizine): 25 mg/dog give one hour before traveling. (4mg/kg/day)
- **Benadryl** (diphenhydramine) 2-4 mg/kg PO every 8 hours
### Feline hyperthyroidism

- **Most** common endocrine disease in cats. Excessive thyroid levels
- Seen in middle age to older cats.
- Signs: hyperactivity, weight loss, increase appetite, increase water consumption and urination.
- Vomiting and diarrhea. Increase HR, arrhythmias and CHF.
- **Treatment:** drug therapy; surgery; I\(^{131}\)
- **Drug of choice:** Methimazole (Tapazole®) start 2.5mg/day. Increase by 2.5mg every 2 weeks until T4 levels are normal.

### Thyroid Disease - Dogs

- **Most common:** HYPOthyroidism (low thyroid). More common in medium to large breed dogs, and middle age dogs.
- **Symptoms:** lethargy, inactivity, mental dullness, dry or lusterless haircoat, cold intolerance, hair loss and excessive shedding. Weight gain.
- **Alopecia** is non-pruritic. Hair loss in friction areas.
- **80%** of hypothyroid dogs present with hypercholesterolemia.

### Treatment of HYPOthyroidism

- **High TSH** (thyroid stimulating hormone) in conjunction with low T\(_4\) strongly indicate hypothyroidism.
- **Treatment of choice:** levothyroxine
- **Starting dose:** .02mg/kg every 12 hours
  - (66lb dog=30 kg= 0.6mg) every 12 hours.
  - L-thyroxine 200mcg: 3 tablets q12hrs

### Hypothyroidism- follow up

- **Follow-up care:** re-check T\(_4\) after one month of initial therapy. Also recheck 1 month after any change in dosage, or in generic manufacturer.
- **Test for peak concentration** 4-8 hours after l-thyroxine administration.
- Excellent prognosis, with normal life expectancy.
Treatment of Seizure Disorders with Human Meds

- Phenobarbital: 2.5mg/kg PO BID. Adjust dose based on serum levels. May use IV loading dose (20mg/kg) to achieve steady state faster. Increase dose by 50% to 100% in puppies due to increased metabolic rate. P-450 inducer. (Cats: same parameters)
- Primidone: metabolized to PEMA and phenobarb. Second line treatment. 10-30mg/kg /day. Divide to BID or TID.
- Clorazepate: Dose: 1-2 mg/kg po q12h
- IMPORTANT: Seizure failure due to Non compliance. Owner must be counseled on importance of giving doses regularly

Diabetes in Dogs

- Symptoms
  - Increased urination. (may be confused for incontinence or bladder infection).
  - Drinks frequently / excessively.
  - Weight loss.
  - Dog is often tired, lethargic or sleeps more often.

Insulin Therapy for Dogs

- Vetsulin: is a lente insulin, (intermediate-acting insulin). Is U-40 pork insulin. (currently unavailable)
- NPH (human) 0.25units/kg BID. Evaluate every 7 days.
- Lantus® (glargine) (total NPH bid dose reduced by 20%)
- Administer the injection subcutaneously, 2 to 5 cm (3/4 to 2 in) from the dorsal midline, varying from behind the scapulae to the mid-lumbar region and alternating sides.
- Glucose levels very similar to humans 100-150mg/dl.

Insulin Therapy for Cats

- Glargine (Lantus) peakless insulin, works well with low-carb high protein diet. Dose 2 units SC q12h
- 70-100% remission rate
- And just like humans: gradual weight reduction.
- Some cats may recover, and relapse later. Prognosis is good. Normal life span
### Non-Insulin Dependant Diabetes (only for cats)

- **Metformin**: can be used for NIDDM in cats. Dose: 5mg/kg PO BID. Described as “relatively investigational”
- **Glipizide**: most commonly used secretagogue in cats. Dose 2.5mg BID with meals. May increase to 5mg BID.
- **Glyburide**: dose 0.625mg daily (1/2 of a Glyburide 1.25mg) (use only if need once daily dosing)
- **Acarbose**: 12.5mg PO q12 hrs

### Treatment of Anxiety and Phobias -CATS

**Chronic anxiety or fear can lead to behavior problems such as overgrooming, spraying and destructive behavior.**

- **Amitriptyline (Elavil)**: 0.5-1mg/kg PO q12-24hrs
- **Fluoxetine (Prozac)**: 0.5mg-1mg/kg PO/day
- **Paroxetine (Paxil)**: 0.5mg-1mg/kg PO/day
- **Buspirone (Buspar)**: 2.5-7.5mg/cat
- **Alprazolam (Xanax)**: 0.125-0.25mg q12h

### Treatment of Anxiety and Phobias -DOGS

**Fear**: apprehension associated with presence of an object, individual, social situation.

- **Phobia**: profound abnormal response resulting in extremely fearful behavior.
- **Amitriptyline or Imipramine**: 1-2mg/kg PO q12h
- **Sertraline**: 1mg/kg q24hrs x 2months. Max=3mg/kg
- **Fluoxetine**: 1mg/kg q12hr x 2months.
- **Diazepam**: 0.5-2.2mg/kg po prn
- **Clorazepate**: 0.55-2.2mg/kg q812hr
- **Alprazolam**: best choice for benzos: 0.01-1mg/kg max 4mg for small to medium dogs.

### Thunderstorm Phobias

- All meds are used off label
- Buspirone, and SSRI require 2-4 weeks for effectiveness. Give daily during storm season to control anxiety.
- Benzodiazepines for acute short term anxiety control.
- Use benzos with caution in cats, and aggressive dogs-disinhibition of aggression is possible
- Avoid TCA in breeding males, patients with seizure disorder, cardiac disease, DM, glaucoma and thyroid disease
Drugs and dosages for Thunderstorm phobias

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOG</th>
<th>CAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoxetine (Prozac)</td>
<td>1mg/kg q24 hrs</td>
<td>0.5-1mg/kg q24hr</td>
</tr>
<tr>
<td>Paroxetine (Paxil)</td>
<td>1mg/kg q24hr</td>
<td>0.5-1mg/kg q24hr</td>
</tr>
<tr>
<td>Buspirone (Buspar)</td>
<td>0.5-2mg/kg po q8-12h</td>
<td>2.5mg-7.5mg/cat q12hr</td>
</tr>
<tr>
<td>Alprazolam (Xanax)</td>
<td>0.02-1mg/kg q4-12hr</td>
<td></td>
</tr>
<tr>
<td>Clonazepam (Klonopin)</td>
<td>0.1-0.5mg/kg q12h</td>
<td></td>
</tr>
<tr>
<td>Diazepam (Valium)</td>
<td>0.5-1mg/kg q4-12hr</td>
<td></td>
</tr>
<tr>
<td>Amitriptyline (Elavil)</td>
<td>1-3mg/kg q12h</td>
<td>0.5-2mg/kg q24hr</td>
</tr>
</tbody>
</table>

INTERACTIVE SLIDE

- Cats or Dogs- which is more of a germ breeder???
- According to the “Association for Professionals in Infection Control and Epidemiology” 2009;37: 454-7 which households have more MRSA colonies, dog owners or cat owners, or are they equal?

And the answer is…..

CATS!!!
- “the odds of having MRSA on one or more surfaces in a home were 7.9 times greater in homes with a cat than homes without a cat”
- There was no association between anyone in the home having a recent infection or pet in the home being ill or on antibiotic therapy.

Antibiotic Therapy

<table>
<thead>
<tr>
<th>DRUG</th>
<th>Dog</th>
<th>Cat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>20 mg/kg q12hr</td>
<td>11-22mg/kg daily</td>
</tr>
<tr>
<td>Augmentin</td>
<td>13.75mg/kg BID</td>
<td>62.5mg/cat q12hr</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>5-10mg/kg daily x5</td>
<td>5-10mg/kg daily x5</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>22-40mg/kg q12hr</td>
<td>30-50mg/kg q12hr</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>5-15mg/kg q12hr</td>
<td>5-15mg/kg q12hr</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>11mg/kg q12hr</td>
<td>5-10mg/kg q12hr</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>10-20mg/kg TID</td>
<td>10-20mg/kg TID</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>30-60mg/kg once daily</td>
<td>25mg/kg q12hr</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>4mg/kg q6hr</td>
<td>4mg/kg q6hr</td>
</tr>
<tr>
<td>Penicillin VK</td>
<td>10mg/kg q8h</td>
<td>10mg/kg q8h</td>
</tr>
<tr>
<td>TrimethSulfa</td>
<td>30mg/kg q12hr</td>
<td>30mg/kg q12hr</td>
</tr>
</tbody>
</table>
Stomach Disorders—treatment of gastroduodenal ulcers

Histamine-2 Receptor Antagonists

• Dogs and Cats:
  – Ranitidine: 0.5-2mg/kg q 8-12 hours
  – Famotidine 0.5mg/kg q 12-24hrs

  Treat for 6-8 weeks

  Taper to prevent acid rebound

• Proton Pump inhibitor
  – Omeprazole: 0.7mg/kg q24h for dogs

HYPERTENSION: Drugs of Choice—Dogs

- **CCB:** amlodipine: 0.2–0.4mg/kg q24hr
diltiazem: 0.5-1.5mg q8h
- **ACEI:** enalapril: 0.5mg/kg q 12 or 24hr
  benazepril: 0.25-1.0mg/kg q24hr
- **BB:** propranolol: 0.2-1mg/kg q8h
  atenolol: 0.25-1mg/kg q12-24hr.

  Caution with BB: worsen bronchiolar disease and CHF. Watch with 2nd & 3rd AV block.

HYPERTENSION: Drugs of Choice—Cats

- **CCB:** amlodipine: 0.18-0.3mg/kg q24h
diltiazem: 1.5-2.5mg/kg q8h
diltiazem-CD: 10mg/kg q24hr
- **ACEI:** enalapril: 0.25-0.5mg/kg q12-48hr
  benazepril: 0.25-1.0mg/kg q24hr
- **BB:** atenolol: 6.25 to 12.5mg / cat

  Caution with BB: worsen bronchiolar disease and CHF. Watch with 2nd & 3rd AV block.

Other Human Meds—Novel Veterinary Uses

- Naltrexone: treatment of self mutilating or tail chasing behaviors in dogs and cats.
- Nizatadine (Axid): prokinetic effects—treat delayed gastric emptying, constipation.
- Ethanol: treatment of methanol or ethylene glycol toxicity. Percutaneous EtOH for feline hyperthyroidism.
- Baclofen: treatment of urinary retention in dogs.
- Amitriptyline: generalized anxiety or separation anxiety in dogs.
- Pentoxifylline: reduces indirect lung injury in dogs after fresh water drowning.
Dog Bites

- 80% of animal bites are attributed to dogs. 70% to the extremities.
- Facial bites occur in children under 15, and can be lethal. Mostly in adult males.
- Only 5% of dog bites get infected.
- 2 distinct groups seek medical attention:
  - 8-12 hours after a bite. General wound care, repair of tear wounds, and rabies or tetanus shots.
  - More than 12 hours. Have signs of infection and seek medical attention for
- Greatest risk for wound infection are:
  - Puncture wounds are greatest risk for infection.
  - No medical attention in 12 hours
  - Older than 50

Dog bites

- An estimated 4.7 million dog bites occur in the U.S. each year. Approximately 25% of fatal dog attacks involved chained dogs
- Nearly 800,000 dog bites require medical care
- Approximately 92% of fatal dog attacks involved male dogs, 94% of which were not neutered.
- Approximately two-thirds of bites occurred on or near the victim’s property, and most victims knew the dog
- The insurance industry pays more than $1 billion in dog-bite claims each year
- Source: Americanhumane.org

Treatment of Dog Bites

- Dog bites: 5% get infected. (*Pasteurella canis; S.aureus, Bacteroides*)
- Drug of Choice: Augmentin 875/125 BID or Augmentin 500/125 TID
- (alternative) Adult: Clindamycin 300mg QID + Fluoroquinolone
- Child: Clindamycin + Trimeth/Sulfas
- Source: Sanford Guide (2010 p.48)

Cat Bites

- Mostly occur in women
- Infection is at 80% (more than double dog bites)
- Most common organism: *P. Multocida* in 70% of healthy cats carry this.
- Treatment similar to dog bites.
- Treat cat scratches in a similar manner.
Treatment of Cat Bites

- **Cat bites**: 80% get infected. Culture and treat empirically! *(P.multocida)*
- **Drug of choice**: Augmentin 875/125 BID or Augmentin 500/125 TID
- **(alternatives): Adult**
  - **cefuroxime 0.5gm q12h**
  - **doxycycline 100mg bid**
  - **do NOT use Cephalexin**

Source: Sanford Guide (2010 p.48)

Help, Duke just ate my Hershey bar!

- Need fairly large amount of theobromine 100-150 mg/kg to cause a toxic reaction. Variables include dog size, and type of chocolate:
  - **Milk chocolate**: contains 44 mg of theobromine per oz.
  - **Semisweet chocolate** contains 150mg/oz.
  - **Baker’s chocolate** 390mg/oz.

- If we call 100 mg/kg as the toxic dose estimate:
  - 1 ounce per 1 pound of body weight for **Milk chocolate**
  - 1 ounce per 3 lb of body weight for **Semisweet chocolate**
  - 1 ounce per 9 lb of body weight for **Baker’s chocolate**.

100mg/kg of body weight toxic dose would be:

<table>
<thead>
<tr>
<th>Type of chocolate</th>
<th>1 pound dog</th>
<th>10 pound dog</th>
<th>20 pound dog</th>
<th>40 pound dog</th>
</tr>
</thead>
<tbody>
<tr>
<td>White chocolate</td>
<td>200 oz</td>
<td>125lb</td>
<td>250lb</td>
<td>500lb</td>
</tr>
<tr>
<td>Milk chocolate</td>
<td>1 oz</td>
<td>8 oz</td>
<td>16 oz</td>
<td>32 oz</td>
</tr>
<tr>
<td>SemiSweet cocoa</td>
<td>0.3oz</td>
<td>3 oz</td>
<td>6 oz</td>
<td>12 oz</td>
</tr>
<tr>
<td>Baking chocolate</td>
<td>0.1oz</td>
<td>1 oz</td>
<td>2 oz</td>
<td>4 oz</td>
</tr>
</tbody>
</table>

Excess Xanthines

- Xanthines affect the nervous system, cardiovascular system and peripheral nerves. It has a diuretic effect as well.
  - Clinical signs:
    - Hyper excitability
    - Hyper irritability
    - Increased heart rate
    - Restlessness
    - Increased urination
    - Muscle tremors
    - Vomiting
    - Diarrhea
Treatment of Xanthine toxicity

• There is no specific antidote. T½ of the toxin is 17.5 hours in dogs. Induce vomiting in the first 1-2 hours if the quantity is unknown. Activated charcoal may inhibit absorption of the toxin. Might need anticonvulsant therapy for seizure. Oxygen, IV fluids, lidocaine (dogs only) might be needed to protect the heart.
• Milk chocolate will often cause diarrhea 12-24 hours after ingestion. This should be treated symptomatically (fluids, etc.) to prevent dehydration.
• Refer chocolate toxicity to vet for treatment

Grape and Raisin Toxicity

• Affects dogs. Causes renal insufficiency
• Toxic dose:
  – Raisins: 2.8-9.6gm/kg
  – Grapes: 11-31 g/kg
• Treatment:
  – Induce emesis
    • (hydrogen peroxide or apomorphine)
  – Fluid diuresis
  – Diuretics if oliguria or anuria develops

Pharmacist Practice Pearls for Veterinary Medicine

• Don’t “shoot from the hip” on questions asked about veterinary dosages.
• Buy a reputable reference when advising owners about pet dosages
• If compounding be sure to “brush up” on existing FDA regulations concerning compounding of medications.
• If dispensing medications for food production animals, be aware of drug residues with respect to date of slaughter.

Resources for the Pharmacist

• Merck Veterinary Manual - www.merckvetmanual.com
• Plumbs Veterinary Drug Handbook
  – By Donald C. Plumb 6th edition
• Blackwells Five Minute Veterinary Consult: Canine and Feline
  – Larry Tilley & Francis WK Smith JR. 4th edition