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Disclosure

Isabella Bean has no relationships with ineligible companies.

A slide with a dark background. The word "Disclosure" is written in a light grey font on the left side. A large, light grey semi-circle is positioned on the right side of the slide. Below the dark background, there is a white rectangular box containing the text "Isabella Bean has no relationships with ineligible companies." in a black font.

2

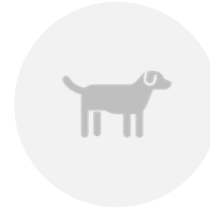
Learning Objectives



DESCRIBE THE TYPES OF ANIMALS AND HEALTH PROBLEMS MOST LIKELY TO BE ENCOUNTERED IN COMMUNITY PHARMACIES



LIST THE MOST COMMON PRESCRIPTIONS FOR COMPANION ANIMALS AND KEY DISPENSING CONSIDERATIONS



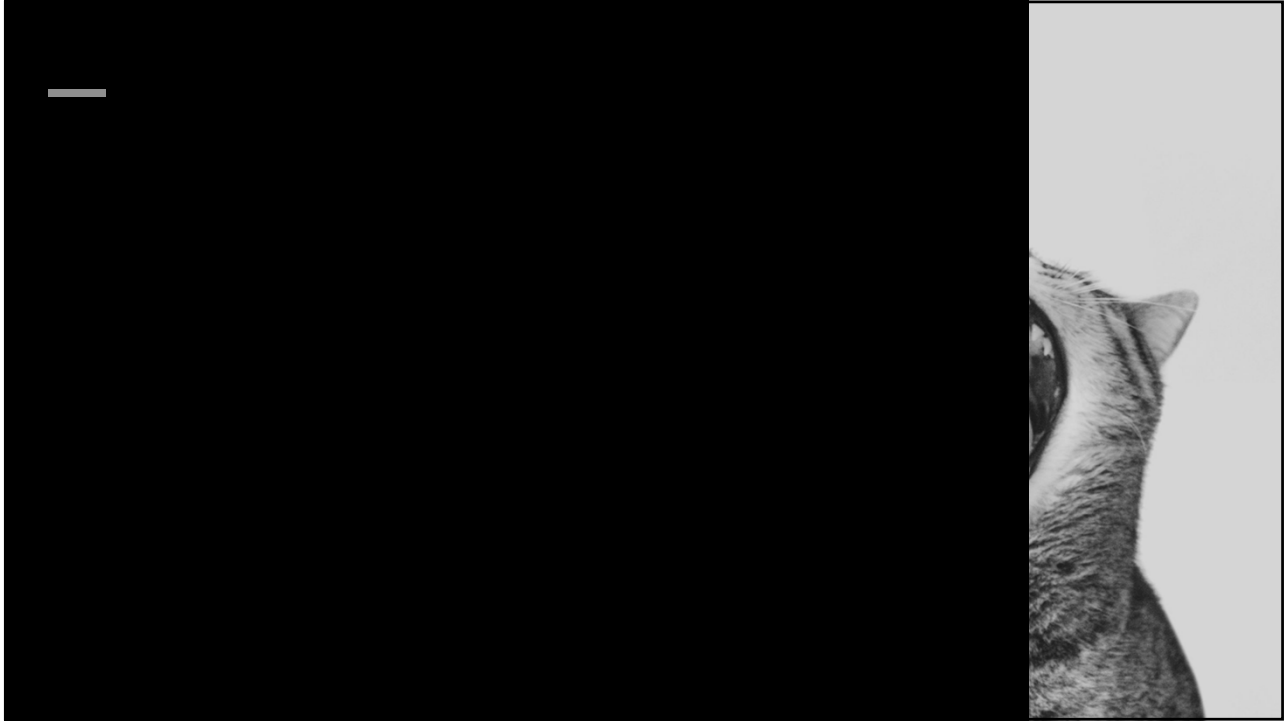
IDENTIFY RELIABLE RESOURCES WHEN FILLING PRESCRIPTIONS FOR ANIMALS

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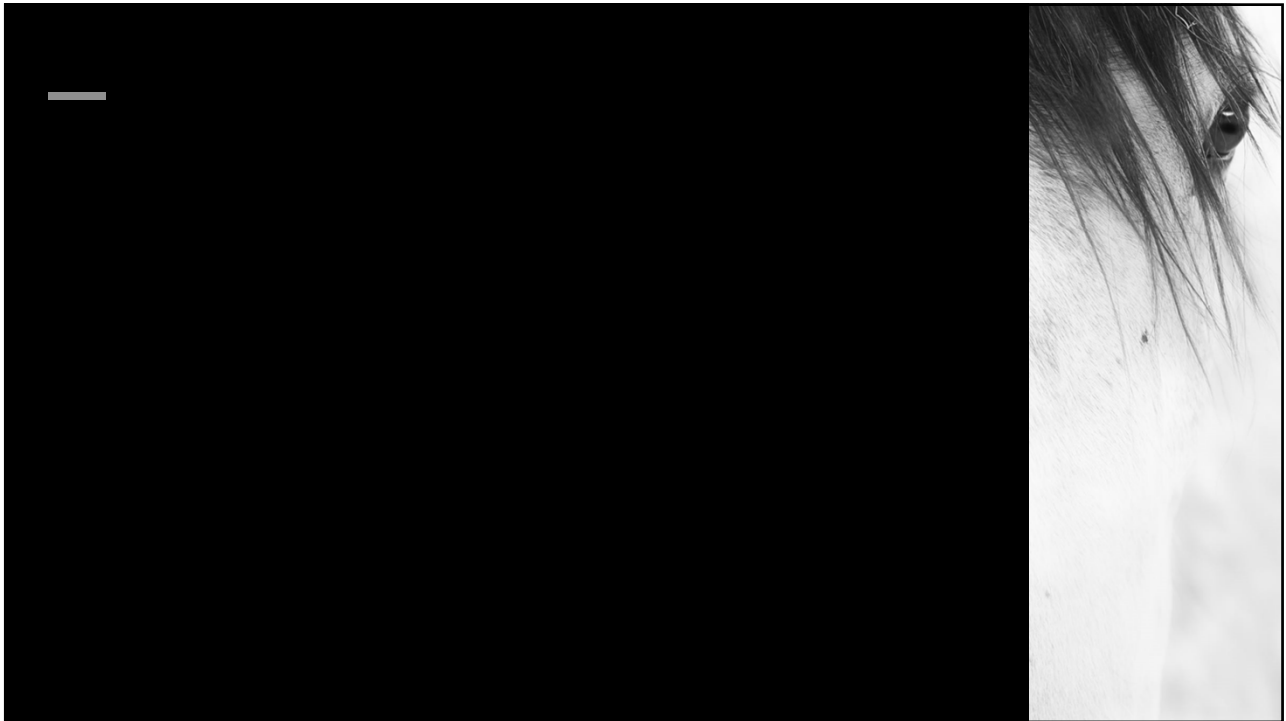
Pharmacokinetic Species Differences: Dogs

- Monogastric
- GI Transit Time: 7-9 hours
- Gastric pH: 1.1 fed, 2.0 fasted
- pH of 1.1 facilitates the digestion of meat and kills pathogenic bacteria

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Pharmacokinetic
Species
Differences:
Nontraditional
Pets

- Nontraditional pets such as rabbits and “pocket pets” which include guinea pigs, hamsters, hedgehogs, mice, rats, gerbils, chinchillas, and sugar gliders
- PK studies are lacking in nontraditional pets
- Generally, anecdotal experience guides drug dosing in these species

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- Similar physiology between humans and animals
- Maintaining ideal body weight, using heat or cold therapy for localized pain, and physical therapy can all help with pain
- Conditions that may require pharmacologic treatment include osteoarthritis, postoperative procedure, trauma, degenerative joint disease, neoplastic pain
- Difficult to determine if behaviors such as whining, trying to escape, vocalizing, or being aggressive are from pain or another reason

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Which Oral
Solution Likely
Contains Xylitol?

- a) Tramadol
- b) Codeine-guaifenesin
- c) Gabapentin

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- Mild to moderate pain
- Veterinary NSAIDs are COX2 selective
- Dogs and cats are more sensitive to GI and renal adverse effects than humans
- Cats are more sensitive than dogs to renal adverse effects
- Can result in kidney and liver failure
- Counsel owners to monitor for lethargy, vomiting, diarrhea, or black/tarry stools

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- In dogs 0.2 mg/kg PO QD for osteoarthritis
- In cats 0.1 mg/kg PO QD
- In horses 0.6 mg/kg PO QD for up to 14 days in adults or foals 6 weeks or older
- Give on top of food or with food

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- Commonly used in combination with an opioid
- Toxic to cats and ferrets
- In dogs 10-15 mg/kg PO q8h
- In horses 20-30 mg/kg PO either QD or BID
- Immediate release tablet can be split/crushed to be given with food

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- Mild to severe pain
- Mild respiratory depression in animals
- Low oral bioavailability and rapid elimination
- Like humans, animals can experience GI side effects such as nausea, vomiting, and constipation

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- In dogs as a single agent 0.5 - 1 mg/kg PO q4-6h
- In dogs in combination with acetaminophen 1-2 mg/kg PO q8h
- In cats as a single agent 0.5 - 2 mg/kg PO q6-8h
- May give with or without food
 - If animals acts sick after being given codeine without food, try giving it with a food or a treat
- "Morphine mania" in cats

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- In dogs 4-10 mg/kg PO q8h
- In cats for osteoarthritis 3 mg/kg PO q12h
- In horses 5-10 mg/kg PO q12h
- Dogs don't produce the active metabolite
- Longer half-life in cats (3-4 hours) than in dogs
- May give with or without food
 - If animals acts sick after being given tramadol without food, try giving it with a food or a treat
 - Canned food may help hide tramadol's bitter taste

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- In dogs 10-20 mg/kg PO q8-12h
- In cats 10 mg/kg PO q12h
- Most human oral solutions contain xylitol
- Xylitol is highly TOXIC and can result in hypoglycemia and liver failure
- May give with or without food
 - If animals acts sick after being given gabapentin without food, try giving it with a food or a treat

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- In dogs 2-5 mg/kg PO q8-12h
- In cats 1 mg/kg PO q8-12h
- Gabapentin more commonly prescribed for cost reduction
- May give with or without food
 - If animals acts sick after being given pregabalin without food, try giving it with a food or a treat

17

Which Oral
Solution Likely
Contains Xylitol?

- a) Tramadol
- b) Codeine-guaifenesin
- c) **Gabapentin**

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Infections

- Antimicrobial stewardship still important in veterinary patients
- Some pathogens that infect animals are also common causes of infection in humans (ex: *E coli*)
- Other pathogens are exclusive to animals (ex: equine herpes virus)
- Zoonotic transmission involves infection transmitting from animals to humans and vice versa

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Which Medication Must be Given with a Moist Treat or Small Amount of Liquid to Prevent Esophageal Erosion?

- a) Metronidazole
- b) Doxycycline
- c) Cephalexin

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Infections: Respiratory Disease

- Transmission can occur from viruses and bacteria in the air or from coming into contact with a contaminated surface or directly from another pet
- Pets are likely to pick up germs at places where they are in close contact with one another such as at boarding kennels, parks, groomers, or pet shows
- Common signs of respiratory disease:
 - Coughing
 - Sneezing
 - Nasal or eye discharge
 - Difficulty breathing or wheezing



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Infections: UTI

- More common in female dogs due to the urethra being closer to the anus
- Can occur when bacteria from the skin or feces reaches the urethra or from animals not urinating often enough
- Common signs of UTI:
 - Incontinent
 - Excessive licking around genitals
 - Straining to urinate
 - Frequent urination with small amounts

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Infections: Pyoderma

- Common in dogs
- Can be caused by infection, inflammation, or cancer
- Mainly caused by bacterial infections but can be secondary to conditions such as allergies or parasites
- Symptoms of pyoderma:
 - Redness
 - Swelling
 - Scabbing/crusting
 - Secretion of blood and pus



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Infections: Amoxicillin/Clavulanate

- Used to treat skin and soft tissue infections (SSTI), endocarditis, respiratory disease, urinary tract infections (UTI), and pyoderma
 - In dogs for SSTI 13.75 mg/kg PO twice daily
 - In cats for SSTI 62.5mg/CAT PO twice daily

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Infections: Amoxicillin/Clavulanate

- Veterinary amox/clav has a 4:1 ratio whereas human formulations vary in their ratios
 - Can be used interchangeably
 - Veterinary product is listed as the sum of the amox/clav component
- Can be given with or without food, but best to give with food to prevent GI side effects
- Do not give to any "pocket pets" as life-threatening diarrhea can occur

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Infections: Cephalexin

- Can be used in dogs, cats, birds, and ferrets
- Used to treat skin infections and UTIs
 - In dogs with skin infections 15-30 mg/kg PO q12h
 - In cats with skin infections 15-30 mg/kg PO q12h
- Generally recommended to continue medication 1-2 weeks after clinical signs have resolved
- Can be given with or without food, but best to give with food to prevent GI side effects

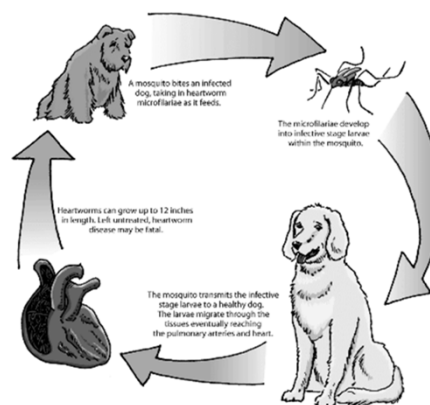
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Infections: Canine Heartworm Disease

- Preventable, but potentially fatal
- Caused by the worm parasite, *Dirofilaria immitis*
- Transmitted by mosquitoes
- Live in blood vessels, but in severe cases can live in the heart
- Parasites cause cardiac stress and inflammation
- Reinfection possible

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Infections: Canine Heartworm Disease



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Infections: Doxycycline

- Used to treat a variety of infections including canine heartworm disease, Rickettsial diseases, chlamydial infections, and respiratory infections.
 - In dogs with susceptible bacterial infections 5-10 mg/kg PO q 12-24h
 - In dogs with canine heartworm disease 10 mg/kg PO q12h for 4 weeks
 - In cats with susceptible bacterial infections 5 mg/kg PO twice daily
 - In pocket pets with susceptible bacterial infection 2.5-5 mg/kg PO q12h

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Infections: Doxycycline

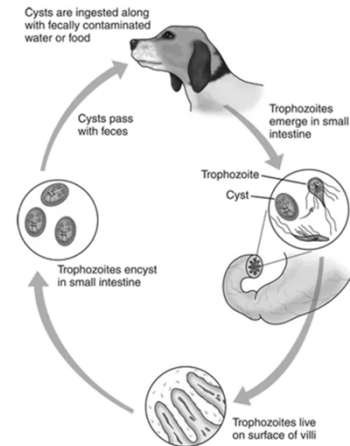
- Must be given with a moist treat or a small amount of liquid
 - Do not give as a dry pill or capsule!
 - Esophageal erosion, strictures, and esophagitis can occur in tablet gets lodged in the esophagus
 - Give with food to minimize stomach upset
 - Avoid administering multivitamins, calcium supplements, antacids, or laxatives within 2 hours of doxycycline
 - May make pets skin more sensitive to sunlight



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Infections: Giardia

- Caused by the parasite, Giardia
- Dogs become infected when they sniff or ingest the cyst stage of the parasite
- Can be in feces, soil, or water
- Often asymptomatic in health canines
- Most common sign is diarrhea
- Reinfection possible



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Infections: Metronidazole

- Used to treat infections including *Giardia*, anaerobic infections, protozoal infections, perioperative surgical prophylaxis, inflammatory bowel disease.
- Can be used in cats, dogs, horses, bird, ferrets, pocket pets, and reptiles/amphibians
 - In dogs with less severe anaerobic infections 10-15 mg/kg PO q8-12
 - In cats with less severe anaerobic infection 10-15 mg/kg PO q12h
 - In dogs with Giardiasis 25 mg/kg PO twice daily for 5 consecutive days
- Rapidly absorbed in small animals

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Infections: Metronidazole

- Give with food
- Bitter, unpleasant taste may be alleviated by placing tablets in gelatin capsules or using a capsule formulation
- CNS side effects can be seen at high doses
- Side effects may dissipate 1 to 2 weeks after discontinuation of the drug
- Banned for use food animals (including food products)



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Which Medication Must be Given with a Moist Treat or Small Amount of Liquid to Prevent Esophageal Erosion?

- a) Metronidazole
- b) Doxycycline**
- c) Cephalexin

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Congestive Heart Failure

- Anatomically similar in dogs, cats, and humans
- Surgery is an option, but not widely available
- Drug cocktail includes a diuretic, an ACE inhibitor, pimobendane, and spironolactone
- Symptoms
 - Chronic cough
 - Lethargy, reduced stamina
 - Difficulty getting comfortable
 - Trouble breathing



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Congestive Heart Failure: Furosemide

- Also used for pulmonary edema, acute kidney injury, as an adjunct in hyperkalemia, and hypercalcemia
- Used in dogs, cats, horses, birds, pocket pets, reptiles
 - In dogs and cats with edema 2.2-5.5 mg/kg PO QD
- May give with or without food
 - If animals acts sick after being given furosemide without food, try giving it with a food or a treat



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Congestive Heart Failure: Enalapril

- Also used for chronic kidney disease, hypertension, and proteinuria in dogs and cats
- Used in dogs, cats, birds, rabbits, and ferrets
 - In dogs with heart failure 0.5 mg/kg PO QD
 - In cats with heart failure 0.25-0.5 mg/kg PO QD
- Generally, well tolerated with GI side effects being the most common
- Avoid use in pregnancy
- May give with or without food
 - If animals acts sick after being given enalapril without food, try giving it with a food or a treat



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Congestive Heart Failure: Spironolactone

- Research conflicting spironolactone's ability to provide cardio protection in canines
- Used in congestive heart failure caused by myxomatous mitral valve disease (MMVD), ascites, hypertension
- In dogs with MMVD 0.5-4 mg/kg PO q12-24h
- Give with a meal
- Hazardous drug , counsel owners to consider using precautions such as wearing gloves especially if pregnant



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- Pets can suffer from chronic anxiety or situational anxiety (ex: vet visits)
- Signs of anxiety can be subtle or mistaken for another disorder
- Symptoms in dogs:
 - Yawning
 - Tail tucked under body
 - Scratching
 - Sniffing
- Symptoms in cats:
 - Excessive grooming
 - Scratching
 - Urinating or defecating outside of litter box
 - Hiding

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When Should Anti-Anxiety Medications be Given to Pets to Prevent Anxiety in Stressful Events?

- a) During the stressful event
- b) Whenever your pet asks for it
- c) 1 to 2 hours prior to stressful event

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- May also be used for aggression and other behavior disorders
- Can be used in dogs, cats, horses, birds, ferrets, and rabbits
 - In dogs with separation anxiety 1-2 mg/kg PO once daily in conjunction with a behavior modification plan
 - In cats with behavior disorders 0.5-1.3 mg/kg PO q24h
- Common side effects include lethargy, hyporexia, and weight loss
- May give with or without food
 - If animals acts sick after being given fluoxetine without food, try giving it with a food or a treat

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- Effects can be seen within 4 weeks, but may take up to 8 weeks to see a full effect
- Do not use a flea/tick collar while on this medication
- Alert veterinarian if patient has been on a flea/tick collar within 2 weeks
- Some collars contain the MAOI, amitraz
- MAOIs should be avoided with this medication to prevent serotonin syndrome
- A two week washout period is recommended

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- May also be used for aggression and other behavior disorders
- Used in cats and dogs
- In dogs with anxiety 0.5-4 mg/kg PO q24h
- In cats with anxiety 0.5-1.5 mg/kg PO q24h
- Common side effects include drowsiness, sleepiness, and decreased appetite
- May give with or without food
 - If animals acts sick after being given sertraline without food, try giving it with a food or a treat

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- May take between 6 to 8 weeks to see full effect
- Do not discontinue abruptly, wean off over at least 2 to 3 weeks
- Do not use a flea/tick collar while on this medication
- Alert veterinarian if patient has been on a flea/tick collar within 2 weeks
- Avoid concurrent therapy with an MAOI or within a 14 days of using an MAOI

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- Used in dogs, cats, and horses
- Often used in combination with gabapentin to treat anxiety in stressful conditions such as veterinary visits, thunderstorms, or transportation
- In dogs with anxiety 2-19.5 mg/kg/day
- In cats prior to veterinary visits 50 mg/cat PO 60-90 minutes prior to appointment
- Common side effects include sleepiness and decreased activity
- May give with or without food
 - If animals acts sick after being given trazodone without food, try giving it with a food or a treat

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- Chronic administration may require 1 to 2 weeks to see full effect
- If using chronically, may gradually reduce dose to prevent withdrawal symptoms
- Trazodone should be administered 1 to 2 hours before acute stressful event
- Use caution in working/service dogs because they may not be able to fully perform their duties while taking trazodone

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- Used in dogs and cats
- Can also be used in epilepsy or as a muscle relaxant
- In dogs with anxiety 0.1-1 mg/kg PO up to 2-3 times/day
- In cats with anxiety 0.02-0.25 mg/kg PO up to 2 times/day
- Common side effects include sleepiness, drooling, greater appetite
- May give with or without food
 - If animals acts sick after being given clonazepam without food, try giving it with a food or a treat
- Give clonazepam an hour before stressful event

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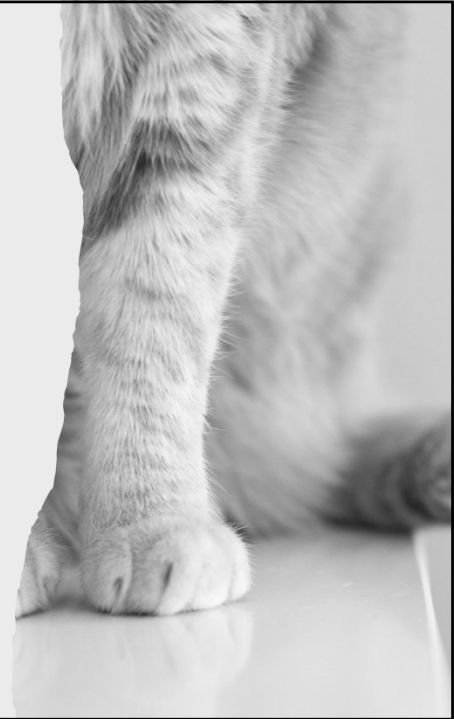
When Should Anti-Anxiety Medications be Given to Pets to Prevent Anxiety in Stressful Events?

- a) During the stressful event
- b) Whenever your pet asks for it
- c) **1 to 2 hours prior to stressful event**

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Thyroid Diseases: Hyperthyroidism

- Hyperthyroidism is a common disease in cats
- Mainly affects middle-aged and older cats
- Signs include:
 - Weight loss
 - Hyperactivity
 - Tachycardia
- Treatment options include radioactive iodine therapy, surgery, dietary therapy (iodine-restricted diet), and medication



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Thyroid Diseases: Methimazole

- Can be used in cats and guinea pigs
- In cats 2.5 mg/CAT PO q12h
- Can titrate in 2.5 mg increments
- Max daily dose is 20 mg divided
- Do not exceed 10 mg in a single dose



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Thyroid Diseases: Methimazole

- Pregnant women, nursing mothers, or those trying to become pregnant should avoid handling this medication
- Generally, well tolerated
- Common side effects include vomiting and poor/decreased appetite
- May give with or without food
 - If animals acts sick after being given methimazole without food, try giving it with a food or a treat
- Human products have a bitter taste compared to veterinary products



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Thyroid Diseases: Hypothyroidism

- Hypothyroidism is common in dogs and rare in cats
- Occurrence in cats is usually from overtreatment of hyperthyroidism
- Signs include:
 - Weight gain
 - Lethargy
 - Exercise intolerance
 - Muscle weakness
 - Unique to dogs are alopecia and thinning hair coat
- Treatment includes levothyroxine

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Thyroid Diseases: Levothyroxine

- Can be used in dogs, cats, horses, birds, and reptiles
- In dogs 0.022 mg/kg PO in single or divided doses
- In cats 0.05 – 0.15 mg/CAT PO once daily
- May be given with or without food
- Give at the same day everyday
- Generally, well tolerated
- Common side effects include racing heartbeat, greater appetite with weight loss, and increased thirst and need to urinate

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Resources for Filling Prescriptions for Animals



Plumbs

Printed and electronic format

Author: Donald C. Plumb, PharmD and various contributors in the veterinary field



Saunders Handbook of Veterinary Drugs: Small and Large Animal

Printed and eBook format

Author: Mark G. Papich, board-certified veterinary clinical pharmacology expert



The Exotic Animal Formulary

Printed

Authors: James W. Carpenter, clinical and research veterinarian

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Resources for Filling Prescriptions for Animals



Journal of Veterinary Internal
Medicine

Electronic



Veterinary Information Network

Electronic format
277 consultants and editors



Merck Manual – Veterinary
Manual

Printed and electronic format

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Questions?



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