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PRAZIQUANTEL

(pra-zi-kwon-tel) Droncit®

ANTICESTODAL ANTIPARASITIC

Prescriber Highlights

- ▶ Anticestodal anthelmintic also may be useful for some other parasites
- ▶ Contraindications: Puppies less than 4 weeks old or kittens less than 6 weeks old; hypersensitivity to the drug
- ▶ Adverse Effects: Uncommon after oral use; pain at injection site, anorexia, salivation, vomiting, lethargy, weakness, or diarrhea possible after using injectable

For information on the spot-on combination product containing praziquantel and emodepside (Profender®), see the Emodepside monograph.

For information on the combination product containing praziquantel and moxidectin (Quest Plus®), see the Moxidectin monograph.

Uses/Indications

Praziquantel is indicated for (FDA-approved labeling) for the treatment of *Dipylidium caninum*, *Taenia pisiformis*, and *Echinococcus granulosus* in dogs, and *Dipylidium caninum* and *Taenia taeniaeformis* in cats. Fasting is not required nor recommended before dosing. A single dose is usually effective, but measures should be taken to prevent reinfection, particularly against *D. caninum*. Praziquantel can also be used for treating *Alaria* spp. in dogs and cats and *Spirometra mansonioides* infections in cats.

Praziquantel has been used in birds and other animals, but it is usually not economically feasible to use in large animals. In humans, praziquantel is used for schistosomiasis, other trematodes (lung, liver, intestinal flukes) and tapeworms. It is not routinely effective in treating *F. hepatica* infections in humans.

Combination products can give a wide spectrum of internal parasite control in a variety of species.

Pharmacology/Actions

Praziquantel's exact mechanism of action against cestodes has not been determined, but it may be the result of interacting with phospholipids in the integument causing ion fluxes of sodium, potassium and calcium. At low concentrations *in vitro*, the drug appears to impair the function of their suckers and stimulates the worm's motility. At higher concentrations *in vitro*, praziquantel increases the contraction (irreversibly at very high concentrations) of the worm's strobilla (chain of proglottids). In addition, praziquantel causes irreversible

focal vacuolization with subsequent cestodal disintegration at specific sites of the cestodal integument.

In schistosomes and trematodes, praziquantel directly kills the parasite, possibly by increasing calcium ion flux into the worm. Focal vacuolization of the integument follows and the parasite is phagocytized.

Pharmacokinetics

Praziquantel is rapidly and nearly completely absorbed after oral administration, but there is a significant first-pass effect. Peak serum levels are achieved between 30–120 minutes in dogs.

Praziquantel is distributed throughout the body. It crosses the intestinal wall and across the blood-brain barrier into the CNS.

Praziquantel is metabolized in the liver via CYP3A enzymes to metabolites of unknown activity. It is excreted primarily in the urine; elimination half-life is approximately 3 hours in the dog. In dogs, orally administered grapefruit juice can increase the area under the curve by 150–200%.

Contraindications/Precautions/Warnings

The manufacturer recommends not using praziquantel in puppies less than 4 weeks old or in kittens less than 6 weeks old. However, a combination product containing praziquantel and febantel from the same manufacturer is FDA-approved for use in puppies and kittens of all ages. No other contraindications are listed for this compound from the manufacturer. In humans, praziquantel is contraindicated in patients hypersensitive to the drug.

Adverse Effects

When used orally, praziquantel can cause anorexia, vomiting, lethargy, or diarrhea in dogs, but the incidence of these effects is less than 5%. In cats, adverse effects were quite rare (<2%) in field trials using oral praziquantel, with salivation and diarrhea being reported.

A greater incidence of adverse effects has been reported after using the injectable product. In dogs, pain at the injection site, vomiting, drowsiness, and/or a staggering gait were reported from field trials with the drug. Some cats (9.4%) showed clinical signs of diarrhea, weakness, vomiting, salivation, sleepiness, transient anorexia, and/or pain at the injection site.

Reproductive/Nursing Safety

Praziquantel is considered safe to use in pregnant dogs or cats. In humans, the FDA categorizes this drug as category **B** for use during pregnancy (*Animal studies have not yet demonstrated risk to the fetus, but there are no adequate studies in pregnant women; or animal studies have shown an adverse effect, but adequate studies in pregnant women have not demonstrated a risk to the fetus in the first trimester of pregnancy, and there is no evidence of risk in later trimesters.*) In a separate system evaluating the safety of drugs in canine and feline pregnancy (Papich 1989), this drug is categorized as class: **A** (*Probably safe. Although specific studies may not have proved the safety of all drugs in dogs and cats, there are no reports of adverse effects in laboratory animals or women.*)

Praziquantel appears in maternal milk at a concentration of approximately 25% of that in maternal serum, but is unlikely to pose harm to nursing offspring.

Overdosage/Acute Toxicity

Praziquantel has a wide margin of safety. In rats and mice, the oral LD50 is at least 2 g/kg. An oral LD50 could not be determined in dogs, as at doses greater than 200 mg/kg, the drug induced vomiting. Parenteral doses of 50–100 mg/kg in cats caused transient ataxia and depression; injected doses at 200 mg/kg were lethal in cats.

There were 22 exposures to praziquantel reported to the ASPCA Animal Poison Control Center (APCC) during 2001–2009. In these cases 12 were cats with 4 showing clinical signs. The remaining 10 were dogs that showed no clinical signs.

Drug Interactions

Reportedly in humans, synergistic activity occurs with praziquantel and oxamniquine in the treatment of schistosomiasis. The clinical implications of this synergism in veterinary patients are not clear.

Doses

■ **DOGS:**

- a) For susceptible cestodes:
IM or SC using the 56.8 mg/mL injectable product:
Body weight: Dose
≤5 lbs: 17 mg (0.3 mL)
6–10 lbs: 28.4 mg (0.5 mL)
11–25 lbs: 56.8 mg (1 mL)
≥25 lbs: 0.2 mL/5 lb body weight; maximum 3 mL
Oral: Using the 34 mg canine tablet:
Body weight: Dose
≤5 lbs: 17 mg (½ tab)
6–10 lbs: 34 mg (1 tab)
11–15 lbs: 51 mg (1.5 tabs)
16–30 lbs: 68 mg (2 tabs)
31–45 lbs: 102 mg (3 tabs)
46–60 lbs: 136 mg (4 tabs)
≥60 lbs: 170 mg (5 tabs maximum); (Package insert; *Droncit*® *Injectable* and *Tablets*—Bayer)
- b) For *Taenia*, *Echinococcus*, *Dipylidium caninum*, *Mesocestoides* (adult): 5 mg/kg PO or SC.
For *Diphylobothrium*: 7.5 mg/kg PO either once or for 2 days.
For *Sparganum proliferum* (adult): 7.5 mg/kg or 25 mg/kg PO or SC daily for 2 days. (Conboy 2009)
- c) For *Echinococcus granulosus*: 10 mg/kg (Sherding 1989)
- d) For *Spirometra mansonioides* or *Diphylobothrium erinacei*: 7.5 mg/kg, PO once daily for 2 days (Roberson 1988)
- e) For treatment of Paragonimiasis (*Paragonimus kellicotti*): 23–25 mg/kg PO q8h for 3 days (Reinemeyer 1995), (Hawkins 2000)
- f) For treatment of liver flukes (Platynosum or Opisthorchiidae families): 20–40 mg/kg PO once daily for 3–10 days (Taboada 1999)
- g) For *Alaria* spp.: 20 mg/kg PO (Ballweber 2004)
- h) For giardia using *Drontal Plus*®: Use label dose once daily PO for 3 days. (Lappin 2006)
- i) For adjunctive treatment of the flukes (*Nanophyetus salmincola*) associated with Salmon poisoning: Single dose of 10–30 mg/kg PO or SC. (Headley *et al.*)

■ **CATS:**

- a) For susceptible cestodes:
IM or SC using the 56.8 mg/mL injectable product:
Body weight: Dose
<5 lbs: 11.4 mg (0.2 mL)
5–10 lbs: 22.7 mg (0.4 mL)
≥10 lbs: 34.1 mg (0.6 mL maximum)
Oral: Using the 23 mg feline tab
Body weight: Dose
<4 lbs: 11.5 mg (½ tab)
5–11 lbs: 23 mg (1 tab)
>11 lbs: 34.5 mg (1.5 tabs)
(Package insert; *Droncit*® *Injectable* and *Tablets*—Bayer)

- b) For susceptible parasites using combination product with pyrantel pamoate (*Drontal*®): Administer a minimum dose of 2.27 mg praziquantel and 9.2 mg pyrantel pamoate per pound of body weight according to the dosing tables on labeling. May be given directly by mouth or in a small amount of food. Do not withhold food prior to or after treatment. If reinfection occurs, treatment may be repeated. (Package insert; *Drontal*®—Bayer)
- c) For treatment of Paragonimiasis (*Paragonimus kellicotti*): 23–25 mg/kg PO q8h for 3 days (Reinemeyer 1995)(Hawkins 2000)(
- d) For treatment of Giardia infections: Give two small dog tablets of *Drontal Plus*® (febantel 113.4 mg; pyrantel 22.7 mg; praziquantel 22.7 mg) once daily PO for 5 days. (Scorza *et al.* 2004)
- e) For *Alaria* spp.: 20 mg/kg PO (Ballweber 2004)
- f) For *Spirometra mansonioides*: 30–35 mg/kg PO. (Bowman 2006)
- g) For *Taenia*, *Echinococcus*, *Dipylidium caninum*, *Mesocestoides* (adult): 5 mg/kg PO or SC.
For *Diphylobothrium* (adult): 35 mg/kg PO once has been recommended.
For *Sparganum proliferum* (adult): 7.5 mg/kg or 25 mg/kg PO or SC daily for 2 days. (Conboy 2009)

■ **RABBITS, RODENTS, SMALL MAMMALS:**

- a) **Chinchillas:** 6–10 mg/kg PO (Hayes 2000)
- b) **Mice, Rats, Hamsters and Gerbils:** For tapeworms: 30 mg/kg, PO once (note the high dosage required) (Burke 1999)
- c) **Mice, Rats, Gerbils, Hamsters, Guinea pigs, Chinchillas:** For tapeworms: 6–10 mg/kg PO (Adamcak & Otten 2000)
- d) **Rabbits:** For cestodes and trematodes: 5–10 mg/kg PO once. (Bryan 2009)

■ **SHEEP & GOATS:**

- a) For all species of *Moniezia*, *Stilesia*, or *Avitellina*: 10–15 mg/kg (Roberson 1988)

■ **HORSES:**

- For labeled parasites using the oral gel combination of moxidectin/praziquantel:
 - a) Dial in the weight of the animal on the syringe. Administer gel by inserting the syringe applicator into the animal’s mouth through the interdental space and depositing the gel in the back of the mouth near the base of the tongue. Once the syringe is removed, the animal’s head should be raised to insure proper swallowing of the gel. Horses weighing more than 1250 lb require additional gel from a second syringe. (Label Directions; *Quest*® *Plus*—Fort Dodge)

■ **LLAMAS:**

- For susceptible parasites:
 - a) 5 mg/kg, PO (Fowler 1989)

■ **BIRDS:**

- For susceptible parasites (tapeworms):
 - a) ¼ of one 23 mg tablet/kg PO; repeat in 10–14 days. Add to feed or give by gavage. Injectable form is toxic to finches. (Clubb 1986)
 - b) For common tapeworms in chickens: 10 mg/kg (Roberson 1988)
 - c) For cestodes and some trematodes: Direct dose: 5–10 mg/kg PO or IM as a single dose -or- 12 mg of crushed tablets baked into a 9"x9"x2" cake. Finches should have their regular food withheld and be pre-exposed to a non-medicated cake. (Marshall 1993)

■ REPTILES/AMPHIBIANS

- Reptiles: For cestodes and some trematodes in most species: 7.5 mg/kg PO once; repeat in 2 weeks PO (Gauvin 1993)
- For removal of common tapeworms in snakes: 3.5–7 mg/kg (Roberson 1988)
- For cestodes and trematodes in reptiles and amphibians: 7–8 mg/kg PO, IM, SC. (de la Navarre 2003)

Monitoring

- Clinical efficacy

Client Information

- Fasting is neither required nor recommended before dosing. A single dose is usually effective, but measures should be taken to prevent reinfection, particularly against *D. caninum*.
- Tablets may be crushed or mixed with food.
- Because tapeworms are often digested, worm fragments may not be seen in the feces after using.

Chemistry/Synonyms

A prazinoisoquinoline derivative anthelmintic, praziquantel occurs as a white to practically white, hygroscopic, bitter tasting, crystalline powder, either odorless or having a faint odor. It is very slightly soluble in water and freely soluble in alcohol.

Praziquantel may also be known as: EMBAY-8440, praziquantelum, *Biltricide*®, *Bio-Cest*®, *Cercon*®, *Cesol*®, *Cestox*®, *Cisticid*®, *ComboCare*®, *Cysticide*®, *Droncit*®, *Drontal*®, *Ehliten*®, *Equimax*®, *Extiser Q*®, *Mycotricide*®, *Opticide*®, *Quest*® Plus, *Praquantel*®, *Prasikon*®, *Prazite*®, *Prozitel*®, *Sincerck*®, *Teniken*®, *Virbantel*®, *Waycital*®, or *Zifartel*® and *Zimecterin Gold Paste*®.

Storage/Stability

Unless otherwise instructed by the manufacturer, praziquantel tablets should be stored in tight containers at room temperature. Protect from light.

Dosage Forms/Regulatory Status

VETERINARY-LABELED PRODUCTS:

Praziquantel Tablets: 23 mg (feline); 34 mg (canine); *Droncit*® Tablets (Bayer); generic; (Rx; OTC). FDA-approved for use in cats and dogs.

Praziquantel Injection: 56.8 mg/mL in 10 mL and 50 mL vials; *Droncit*® Injection (Bayer); generic; (Rx). FDA-approved for use in cats and dogs.

Combination Products:

Tablets: Praziquantel 13.6 mg/pyrantel pamoate 54.3 mg (as base) for 2–5.9 lb cats and kittens; Praziquantel 18.2 mg/pyrantel pamoate 72.6 mg (as base); Praziquantel 27.2 mg/pyrantel pamoate 108.6 mg (as base) for 6–24 lb. cats; *Drontal*® Tablets (Bayer); (OTC); some sizes may be available as generics or under various trade names (OTC). FDA-approved for use in cats and kittens that are 2 months of age or older and weigh 2 lb. or greater.

Chewable Tablets: Praziquantel 30 mg/pyrantel pamoate 30 mg; & Praziquantel 114 mg/pyrantel pamoate 114 mg chewable tablets; *Virbantel Flavored Chewables*® (Virbac); (OTC). FDA-approved for use in dogs.

Chewable Tablets: Fenbendazole 454 mg, Ivermectin 27 micrograms, & Praziquantel 23 mg (2.16 grams small chews) Chewable Tablets; *Panacur Plus*® Soft Chews (Intervet); (Rx). FDA-approved for use in adult dogs.

Chewable Tablets: Fenbendazole 1.134 grams, Ivermectin 68 micrograms, & Praziquantel 57 mg (5.4 grams large chews) Chewable Tablet; *Panacur Plus*® Soft Chews (Intervet); (Rx). FDA-approved for use

in adult dogs. Tablets: Praziquantel/pyrantel pamoate plus febantel; *Drontal*® Plus Tablets (Bayer); (Rx); small, medium and large dog sizes. FDA-approved for dogs and puppies 3 weeks of age or older and weighing 2 lb. or greater.

Oral Gel: containing 20 mg/mL moxidectin and 125 mg/mL of praziquantel in 11.6 grams syringes (sufficient to treat one 1150 lb horse); *Quest*® Plus (Fort Dodge); *ComboCare*® Equine Oral Gel (Farnam); (OTC). FDA-approved for use in horse or ponies not intended for food purposes.

Oral Paste: containing 1.87% ivermectin and 14.03% of praziquantel in oral syringes (sufficient to treat one 1320 lb horse); *Equimax*® (Pfizer); (OTC). FDA-approved for use in horse or ponies not intended for food purposes.

Oral Paste: containing 1.55% ivermectin and 7.75% of praziquantel in oral syringes (sufficient to treat one 1250 lb horse); *Zimecterin Gold Paste*® (Merial); (OTC). FDA-approved for use in horse or ponies not intended for food purposes.

HUMAN-LABELED PRODUCTS:

Praziquantel Oral Tablets (Film-coated): 600 mg; *Biltricide*® (Schering); (Rx)

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