Tolfenamic Acid may also be known as: acidum tolfenamicum, *Bifenac®*, *Clotam®*, *Clotan®*, *Fenamic®*, *Flocur®*, *Gantil®*, *Migea®*, *Polmonin®*, *Purfalox®*, *Rociclyn®*, *Tolfamic®*, *Tolfedine®* or *Turbaund®*.

Storage/Stability
Unless otherwise labeled, store tolfenamic acid tablets and solution at room temperature.

Dosage Forms/Regulatory Status
VETERINARY-LABELED PRODUCTS: None in the USA.

In Canada and Europe: Tolfenamic Acid Tablets: 6 mg, 30 mg, 60 mg and Tolfenamic Acid Injection 40 mg/mL are available. Common trade name is *Tolfedine®* (Vetoquinol).

HUMAN-LABELED PRODUCTS: None in the USA

TOLTRAZURIL

(tole-*traz*-yoo-ril) Baycox®

ANTIPROTOZOAL/ANTICOCCIDIAL

Prescriber Highlights

- Antiprotozoal labeled for treating coccidia in poultry (in Europe)
- May be considered as an alternative for treating coccidiosis in dogs & cats, oocyst shedding stage of toxoplasmosis in cats, etc.
- Not commercially available in the USA, must be legally imported
- Adverse effect profile not well described

Uses/Indications
Toltrazuril is an antiprotozoal agent that may be considered as an alternative treatment for coccidiosis in dogs and cats, Hepatazoon infections, or for treating the oocyst shedding stage of toxoplasmosis in cats. It has also been used as a treatment for overwhelming parasitic loads in lizards (Bearded Dragons).

Toltrazuril has activity against parasites of the genus *Hepatozoon*, but other drugs (*e.g.,* imidocarb, primaquine, doxycycline) are generally used.

While toltrazuril has been used to treat equine protozoal myeloencephalitis (EPM) caused by *Sarcocystis neurona*, use of approved products now available (*e.g.,* nitazoxanide, ponazuril, pyrimethamine/sulfadiazine) is preferred.

Toltrazuril has been used in some countries to treat *Isospora suis* in piglets.

Pharmacology/Actions
Toltrazuril is the parent compound to ponazuril (toltrazuril sulfone). Its mechanism of action is not well understood, but it appears to inhibit protozoal enzyme systems.

Toltrazuril has activity against *Hepatozoon*, *Isospora*, *Sarcocystis*, *Toxoplasma*, and all intracellular stages of coccidia.

Pharmacokinetics
Little information is available. Toltrazuril is about 50% absorbed after oral consumption in poultry. Highest concentrations are found in the liver; it is rapidly metabolized into the sulfone derivative (ponazuril).

Contraindications/Precautions/Warnings
Toltrazuril should not be used in patients who have had prior hypersensitivity reactions to it or other triazinone (triazine) antiprotozoals (*e.g.,* ponazuril, diclazuril).

The principle metabolite of toltrazuril reportedly persists in the environment and can contaminate groundwater, however there appears to be little risk for significant environmental contamination when toltrazuril is used in dogs, cats, horses, or other companion animals (pet birds, reptiles).

Adverse Effects
Toltrazuril appears to be well tolerated in birds. An adverse effect profile in mammals is not well described. Potentially, GI signs could occur. Some horses receiving the related drug ponazuril, developed blisters on their nose and mouth, and some, a rash or hives during field trials.

Reproductive/Nursing Safety
No reproductive or nursing safety information was located; weigh potential risks versus benefits of use during pregnancy or lactation.

Overdosage/Acute Toxicity
Very limited information is available. Doses of up to 10x in horses were tolerated without significant adverse effects. 5x overdoses in poultry have been tolerated without clinical signs noted. Decreased water intake has been seen if overdoses are greater than 5X.

Drug Interactions
None reported

Laboratory Considerations
No issues were noted.

Doses
DOGS:

a) For coccidiosis (Cystoisosporosis): 10–20 mg/kg PO one time to all puppies at 3–4 weeks of age will help prevent problems associated with intestinal coccidiosis (Daugschies, Mundt et al. 2000)

b) For coccidiosis: 15 mg/kg PO once daily for 3–6 days (Dubey and Greene 2006)

CATS:

a) For enteroepithelial cycle of toxoplasmosis (oocyst shedding): 5–10 mg/kg PO once daily for 2 days (Dubey and Lappin 2006)

b) For coccidiosis: 30 mg/kg PO once daily for 2–3 days (Greene, Hartmannn et al. 2006)

BIRDS:

a) For coccidiosis in raptors: 7 mg/kg PO once daily for 2–3 days (Jones 2004b)

REPTILES:

a) For parasitism in Bearded Dragons: 5–15 mg/kg PO once daily for 3 days (Kramer 2006)

Monitoring
- Clinical efficacy

Client Information
- Avoid direct contact with this medication; the manufacturer recommends wearing synthetic rubber gloves when handling the 2.5% solution. Wash exposed skin after use.

Chemistry/Synonyms
Related to other antiprotozoals such as ponazuril, toltrazuril is a triazinone (triazine) antiprotozoal (anticoccidial) agent. The commercially available (in Europe) 2.5% oral solution is an alkaline, clear, colorless to yellow brown solution which also contains triethanolamine 30 mg/mL and polyethylene glycol 80.7 mg/mL. Toltrazuril has a molecular weight of 425.4

Toltrazuril may also be known as Bay-Vi-9142, toltrazurilo, toltrazurilum and *Baycox*®.

Storage/Stability
The 2.5% solution should be stored at temperatures at 25°C or below.

Dilutions in drinking water more concentrated than 1:1000 (1 mL of the 2.5% solution to 1 liter of water) may precipitate. After dilution, the resulting solution is stable for 24 hours. It is recommended that medicated drinking water not consumed after 24 hours be discarded.

Dosage Forms/Regulatory Status
VETERINARY-LABELED PRODUCTS: None in the USA

In some European countries: Toltrazuril 2.5% (25 mg/mL) solution for dilution in drinking water in 1 liter bottles; *Baycox® 2.5% Solution* (Bayer); (Rx). Approved for treatment of coccidiosis in poultry. In the UK, slaughter withdrawal is 18 days for poultry. Not for use in birds producing eggs for human consumption.

The FDA may allow legal importation of this medication for compassionate use in animals; for more information, see the *Instructions for Legally Importing Drugs for Compassionate Use in the USA* found in the appendix.

HUMAN-LABELED PRODUCTS: None

TOPIRAMATE

(toe-***pie***-rah-mate) Topamax®

ANTICONVULSANT

Prescriber Highlights

- Antiseizure medication that may be useful for seizure disorders in dogs, particularly partial seizure activity; may be of benefit in treating cats, but little information available
- Very short half-life in dogs (2–4 hours), but therapeutic activity may persist secondary to high affinity for receptors in brain
- Adverse effect profile may include GI distress, inappetance, & irritability in dogs; in cats, sedation & inappetance have been noted
- Expense may be an issue; generics now available

Uses/Indications
Topiramate may be useful for treating seizures in dogs, particularly partial seizure activity. It may also be of benefit in treating cats, but little information is available.

Pharmacology/Actions
While the exact mechanism for its antiseizure action is not known, topiramate possesses three properties that probably play a role in its activity: Topiramate blocks in a time-dependent manner action potentials elicited repetitively by a sustained depolarization of neurons; it increases the frequency that GABA activates $GABA_A$ receptors; and it antagonizes the kainite/AMPA receptors without affecting the NMDA receptor subtype. Topiramate's actions are concentration-dependent; effects can first be seen at 1microMole and maximize at 200 microMoles. Topiramate is a weak inhibitor of carbonic anhydrase isoenzymes CA-II and CA-IV, but it is believed that this effect does not contribute significantly to its antiepileptic actions.

Pharmacokinetics
In dogs, topiramate is rapidly absorbed after oral administration, but absolute bioavailability varies between 30–60%. Half-life ranges from 2–4 hours after multiple doses. Comparatively, the half-life in humans is about 21 hours in adults, but shorter in children. In humans, the drug is not extensively metabolized and about 70% is excreted unchanged in the urine.

Contraindications/Precautions/Warnings
Topiramate is contraindicated in patients hypersensitive to it. It should be used with caution (in humans) with impaired hepatic or renal function.

Adverse Effects
Because this drug rarely has been used in veterinary patients, an accurate adverse effect profile is not known. In dogs, most prevalent adverse effects reported include GI distress, inappetance, and irritability. In cats, sedation and inappetance have been noted.

In humans, the most likely adverse effects include somnolence, dizziness, nervousness, confusion, and ataxia. Very rarely, acute myopia with secondary angle closure glaucoma has been reported. Incidence of kidney stones is about 2–4 times higher in patients taking topiramate than in the general population.

Reproductive/Nursing Safety
In humans, the FDA categorizes topiramate as a category ***C*** drug for use during pregnancy (*Animal studies have shown an adverse effect on the fetus, but there are no adequate studies in humans; or there are no animal reproduction studies and no adequate studies in humans.*) Teratogenic effects were noted in mice and rats given topiramate at dosages equivalent to those used in humans.

Topiramate enters maternal milk; use with caution in nursing patients.

Overdosage/Acute Toxicity
There were 132 exposures to topiramate reported to the ASPCA Animal Poison Control Center (APCC; www.apcc.aspca.org) during 2005–2006. In these cases 113 were dogs with 10 showing clinical signs and 19 were cats with 4 showing clinical signs. Common findings in dogs recorded in decreasing frequency included ataxia, lethargy, anxiety, disorientation and head shaking. Common findings in cats recorded in decreasing frequency included vomiting, ataxia and lethargy.

Overdoses in humans have cause convulsions, drowsiness/lethargy, slurred speech, blurred and double vision, impaired mentation/stupor, ataxia, metabolic acidosis, hypotension, agitation, and abdominal pain.

Treatment consists of gut emptying protocols if the ingestion was recent, and supportive therapy. Hemodialysis is effective in enhancing the elimination of topiramate from the body.