■ **SWINE:**

Magnesium sulfate (as a cathartic):
a) 1–2 gm/kg PO (Howard 1986)

■ **BIRDS:**

Magnesium sulfate:
a) To act as a cathartic and reduce lead absorption: 0.5–1 gm/kg PO as a 5% solution in drinking water (McDonald 1986)

Monitoring

■ Fluid and electrolyte status in susceptible patients, high doses, or chronic use
■ Clinical efficacy

Client Information

■ Do not give dosages greater than, or for periods longer than recommended by veterinarian
■ Contact veterinarian if patient begins vomiting

Chemistry/Synonyms

Magnesium cation containing solutions of magnesium citrate, magnesium hydroxide, or magnesium sulfate act as saline laxatives. Magnesium citrate solutions contain 4.71 mEq of magnesium per 5 mL. Magnesium hydroxide contains 34.3 mEq of magnesium per gram and milk of magnesia contains 13.66 mEq per 5 mL. One gram of magnesium sulfate (Epsom salt) contains approximately 8.1 mEq of magnesium.

Polyethylene glycol 3350 is a non-absorbable compound that acts as an osmotic agent.

Storage/Stability

Magnesium citrate solutions should be stored at 2–30°C. Store milk of magnesia at temperatures less than 35°C, but do not freeze. PEG 3350 reconstituted (from powder by the pharmacy, client, clinic, etc.) solutions should be kept refrigerated and used within 24 hours.

Dosage Forms/Regulatory Status

Saline cathartic products have apparently not been formally approved for use in domestic animals. They are available without prescription (OTC). PEG 3350 products are available only by prescription and are approved for use in humans.

VETERINARY-LABELED PRODUCTS: None located

HUMAN-LABELED PRODUCTS:

Saline Laxatives (not an inclusive list):

Magnesium Hydroxide Suspension (Milk of Magnesia): equiv. to 30 mL milk of magnesia in 100 mL, 400 mL & UD 10 mL; magnesium hydroxide 160 mg/mL & 80 mg/mL in 180 mL, 240 mL, 360 mL, 400 mL, 480 mL, 780 mL, UD 30 mL; *Milk of Magnesia Concentrated*® (Roxane); *Phillips'*® *Milk of Magnesia* and *Phillips'*® *Milk of Magnesia Concentrated* (Bayer); generic; (OTC)

Magnesium Sulfate (Epsom Salt) Granules: in 120 g, 1lb and 4lbs; generic; (OTC)

Hyperosmotic Laxatives (not an inclusive list):

Polyethylene Glycol-Electrolyte Solution:

OCL® *Solution* (Abbott); (Rx) Oral Solution in 1500 mL: 146 mg sodium chloride, 168 mg sodium bicarbonate, 1.29 g sodium sulfate decahydrate, 75 mg potassium chloride, 6 grams PEG-3350 and 30 mg polysorbate–80/100 mL

CoLyte® (Schwartz Pharma); (Rx); 1 gallon of Powder for Oral Solution in bottles: 227.1 g PEG 3350, 5.53 gm sodium chloride, 6.36 gm sodium bicarbonate, 21.5 gm sodium sulfate, 2.82 gm potassium chloride; 4L of solution: 240 g PEG 3350, 22.72 g sodium sulfate, 6.72 g sodium bicarbonate, 5.84 g NaCl, 2.98 g KCL

GoLYTELY® (Braintree Labs); (Rx); Powder for Oral Solution in jugs: 5.86 gm sodium chloride, 6.74 gm sodium bicarbonate, 22.74 gm sodium sulfate, 2.97 gm potassium chloride, 236 gm PEG 3350; Packets: 227.1 g PEG 3350, 21.5 g sodium sulfate, 6.36 g sodium bicarbonate, 5.53 g NaCl, 2.82 g KCl

NuLytely® (Braintree Labs); *TriLyte*® (Schwarz Pharma); (Rx); Powder for Reconstitution in 4 L jugs: 420 g PEG 3350, 5.72 g sodium bicarbonate, 11.2 g NaCl, 1.48 g KCL

MoviPrep® (Salix); (Rx); Powder for Reconstitution in pouches: 100 g PEG 3350, 7.5 g sodium sulfate, 2.691 g NaCl, 1.015 KCl.

SELAMECTIN

(sell-a-*mek*-tin) Revolution®

AVERMECTIN (TOPICAL) ANTIPARASITIC

Prescriber Highlights

- **Topical avermectin antiparasiticide approved for multiple indications in dogs & cats**
- **Applied monthly (usually; some indications one time dosing)**
- **Adverse effect profile appears minimal**

Uses/Indications

Topical selamectin (*Revolution*®—Pfizer) is indicated for flea infestations (*Ctenocephalides felis*), prevention of heartworm disease (*Dirofilaria immitis*), and for ear mites (*Otodectes cynotis*) in both dogs and cats. Additionally in dogs, it is indicated for sarcoptic mange (*Sarcoptes scabeii*), and tick infestations (*Dermacentor variabilis*). In cats: hookworm (*Ancylostoma tubaeforme*) and roundworm (*Toxocara cati*).

The product (*Revolution*®) is labeled as not effective against either adult heartworms or clearing circulating microfilaria, but it possibly may have some efficacy with prolonged, continuous administration (Atkins 2007b).

Pharmacology/Actions

Like other compounds in its class, selamectin is believed to act by enhancing chloride permeability or enhancing the release of gamma amino butyric acid (GABA) at presynaptic neurons. GABA acts as an inhibitory neurotransmitter and blocks the post-synaptic stimulation of the adjacent neuron in nematodes or the muscle fiber in arthropods. By stimulating the release of GABA, it causes paralysis of the parasite and eventual death. As liver flukes and tapeworms do not use GABA as a peripheral nerve transmitter, selamectin would probably be ineffective against these parasites.

Pharmacokinetics

After topical administration to dogs, about 5% of the drug is bioavailable and peak plasma levels occur about 3 days later. Elimination half-life after topical administration is about 11 days.

After topical administration to cats, about 75% of the drug is bioavailable and peak plasma levels occur about 15 hours later. Elimination half-life after topical administration is about 8 days. In cats, bioavailability is about 75% and peak levels may be 64 times those in dogs.

The persistence of the drug in the body is believed to be due to the drug forming reservoirs in skin sebaceous glands. It is secreted into the intestine to kill susceptible endoparasites in cats.

Contraindications/Precautions/Warnings

The manufacturer recommends caution when using in sick, underweight, or debilitated dogs or cats. It is not recommended for use in animals under 6 weeks of age. At labeled doses of selamectin, dogs at risk for MDR1-allele mutation (Collies, Australian Shepherds, Shelties, Long-haired Whippet, etc "white feet") should tolerate the medication, but use cautiously.

Adverse Effects

In field trials (limited numbers of animals) adverse effects were rare. Approximately 1% of cats showed a transient, localized alopecia at the area of administration. Other effects reported (< or = 0.5% incidence) include diarrhea, vomiting, muscle tremors, anorexia, pruritus/urticaria, erythema, lethargy, salivation and tachypnea. Very rarely, seizures and ataxia have been reported in dogs.

Reproductive/Nursing Safety

Selamectin appears to be safe to use in pregnant or lactating dogs or cats.

Overdosage/Acute Toxicity

Dogs: Oral overdoses of up to 15 mg/kg did not cause adverse effects (except for ataxia in one avermectin sensitive collie). Topical overdoses (10x) to puppies caused no adverse effects; topical overdoses to avermectin-sensitive Collies caused salivation.

Cats: Oral ingestion may cause salivation and vomiting. Topical overdoses of up to 10x caused no observable adverse effects.

There were 218 exposures to selamectin reported to the ASPCA Animal Poison Control Center (APCC; www.apcc.aspca.org) during 2005–2006. In these cases 125 were dogs with 4 showing clinical signs and 86 cases were cats with 15 showing clinical signs. The remaining 7 cases consisted of 5 ferrets and 2 lagomorphs none of which had clinical signs. Common findings in dogs recorded in decreasing frequency included hypersalivation, agitation, diarrhea, edema of the face and hyperactivity. Common findings in cats recorded in decreasing frequency included vomiting, anorexia, hyperesthesia, hyperthermia and mydriasis.

Drug Interactions

None documented, but caution is advised if using other drugs that can inhibit **p-glycoprotein**. Those dogs at risk for MDR1-allele mutation (Collies, Australian Shepherds, Shelties, Long-haired Whippet, etc "white feet") should probably not receive selamectin with the following drugs, unless tested "normal": Drugs and drug classes involved include:

- **AMIODARONE**
- **CARVEDILOL**
- **CLARITHROMYCIN**
- **CYCLOSPORINE**
- **DILTIAZEM**
- **ERYTHROMYCIN**
- **ITRACONAZOLE**
- **KETOCONAZOLE**
- **QUINIDINE**
- **SPIRONOLACTONE**
- **TAMOXIFEN**
- **VERAPAMIL**

Laboratory Considerations

None reported.

Doses

- **DOGS:**

For prophylaxis and treatment of dirofilariasis, it is suggested to review the guidelines published by the American Heartworm Society at www.heartwormsociety.org for more information

a) The recommended topical dose is 6 mg/kg. Dosing frequency: Heartworm prevention, flea control = monthly; Ticks = monthly (if heavy infestations, may repeat 2 weeks after the first dose); Ear Mites, Sarcoptes = once, repeat in one month if necessary. See the package for specific instructions on administration technique. (Label information; *Revolution*®—Pfizer)

- **CATS:**

a) The recommended topical dose is 6 mg/kg. Dosing frequency: Heartworm prevention, flea control = monthly; Ear Mites = once, repeat in one month if necessary. Hookworms, Roundworms = once. See the package for specific instructions on administration technique. (Label information; *Revolution*®—Pfizer)

- **FERRETS:**

a) For heartworm prevention: 18 mg/kg topically every 30 days. (Johnson 2006c)

- **RABBITS:**

a) For ear mites (*P. Cunuculi*): 6–18 mg/kg topically (McTier, Hair et al. 2003)

Monitoring

- Clinical efficacy
- Owner compliance with treatment regimen

Client Information

- Follow label directions for administration technique; do not massage into skin, and do not apply if hair coat is wet. Because the product contains alcohol, do not apply to broken skin.
- Avoid contact with animal while the application site is wet.
- Wait two hours or more after applying to bathe the animal (or allow to go swimming).
- Avoid getting the product on human skin; if contact occurs, wash off immediately. Dispose of tubes in regular household refuse.
- Do not expose to flame as the product is flammable.

Chemistry/Synonyms

A semi-synthetic avermectin, selamectin is commercially available as a colorless to yellow solution (flammable).

Selamectin may also be known as UK-124114, or *Revolution*®.

Storage/Stability

The commercially available solution should be stored below 30°C (86°F). Keep away from flame or other igniters.

Dosage Forms/Regulatory Status

VETERINARY-LABELED PRODUCTS:

Selamectin Topical Solution for Cats; *Revolution*® (Pfizer); (Rx):

Up to 5 lbs in wt, Pkg. Color: mauve. 15 mg/tube. Tube volume: 0.25 mL

5.1–15 lbs in wt, Pkg. Color: blue. 45 mg/tube. Tube volume: 0.75 mL

Selamectin Topical Solution for Dogs; *Revolution*® (Pfizer); (Rx)

Up to 5 lbs in wt, Pkg. Color: mauve. 15 mg/tube. Tube volume: 0.25 mL

5.1–10 lbs in wt, Pkg. Color: purple. 30 mg/tube. Tube volume: 0.25 mL

10.1–20 lbs in wt, Pkg. Color: brown. 60 mg/tube. Tube volume: 0.5 mL

20.1–40 lbs in wt, Pkg. Color: red. 120 mg/tube. Tube volume: 1 mL

40.1–85 lbs in wt, Pkg. Color: teal. 240 mg/tube. Tube volume: 2 mL

85.1–130 lbs in wt, Pkg. Color: plum. One 120 mg tube and one 240 mg tube. Total volume: 3 mL

HUMAN-LABELED PRODUCTS: None

SELEGILINE HCL
L-DEPRENYL

(se-*le*-ji-leen) Anipryl®, Eldepryl®

MONAMINE OXIDASE INHIBITOR

Prescriber Highlights

- **MAO-B inhibitor that may be useful for canine cognitive dysfunction syndrome or Cushing's (efficacy in doubt for Cushing's)**
- **Contraindications: Hypersensitivity to it. May be contraindicated in patients receiving opiates**
- **Adverse Effects: Vomiting & diarrhea; CNS effects manifested by restlessness, repetitive movements, or lethargy; salivation & anorexia. Diminished hearing/deafness, pruritus, licking, shivers/trembles/shakes possible**
- **Drug Interactions**

Uses/Indications

Selegiline is approved for use in dogs for the treatment of Cushing's disease and for Canine Cognitive Dysfunction (so-called "old dog dementia"). Its use for Cushing's disease is somewhat controversial as clinical studies evaluating its efficacy have shown disappointing results. In humans, selegiline's primary indication is for the adjunctive treatment of Parkinson's disease.

Pharmacology/Actions

Selegiline's mechanism of action for treatment of Cushing's disease (pituitary dependent hyperadrenocorticism—PDH) is complex; a somewhat simplified explanation follows: In the hypothalamus, corticotropin-releasing hormone (CRH) acts to stimulate the production of ACTH in the pituitary and dopamine acts to inhibit the release of ACTH. As dogs age, there is a tendency for a decrease in dopamine production that can contribute to the development of PDH.

As dopamine is metabolized by monamine oxidase-B (MAO-B) and selegiline inhibits MAO-B, dopamine levels can be increased at receptor sites after selegiline administration. In theory, this allows the levels of dopamine and CRH to be in balance in the hypothalamus, thereby reducing the amount of ACTH produced and ultimately, cortisol.

While selegiline is labeled as a MAO-B inhibitor, at higher than labeled dosages, the drug loses its MAO-B specificity and also inhibits MAO-A. Two of three metabolites of selegiline are amphetamine and methamphetamine that may contribute to both the efficacy and the adverse effects of the drug.

Pharmacokinetics

There is only limited information on the pharmacokinetics of selegiline in dogs. A study done in 4 dogs showed that selegiline was absorbed rapidly and had an absolute bioavailability of about 10%. The volume of distribution of the central compartment was measured at approximately 7 L/kg. Terminal half-life was about one hour.

In humans, selegiline pharmacokinetics have wide interpatient variability. The drug has a high first pass effect where extensive metabolism to L-desmethylselegiline, methylamphetamine, and L-amphetamine occur. Each of these metabolites is active. While L-desmethylselegiline does inhibit MAO-B, the others do not, but thye are CNS stimulants. The drug is excreted in the urine, primarily as conjugated and unconjugated metabolites.

Contraindications/Precautions/Warnings

Selegiline is contraindicated in patients known to be hypersensitive to it. In human patients, it is contraindicated in patients receiving meperidine and possibly with other opioids as well.

The manufacturer cautions to perform appropriate diagnostic tests to confirm the diagnosis before starting therapy and not to attempt to treat hyperadrenocorticism not of pituitary origin.

Adverse Effects

Adverse reports reported thus far in dogs include, vomiting, diarrhea, CNS effects manifested by restlessness, repetitive movements or lethargy, salivation, and anorexia. Should GI effects be a problem, discontinue the drug for a few days and restart at a lower dose. Diminished hearing/deafness, pruritus, licking, shivers/trembles/shakes have also been reported. The manufacturer advises to observe animals carefully for atypical responses.

Adverse effects that have been reported in human patients include nausea (10%), hallucinations, confusion, depression, loss of balance, insomnia, and hypersexuality. These effects are noted because of their "subjective" nature and they could help explain untoward behavioral changes in canine patients should they occur.

Because selegiline could potentially be abused by humans, veterinarians should be alert for drug "shoppers." Selegiline is classified by the Association of Racing Commissioners International (ARCI) as a class 2 agent (high abuse potential in racing horses).

Reproductive/Nursing Safety

Safety of selegiline in pregnant, breeding or lactating animals has not been established. Rat studies have not demonstrated overt teratogenicity. In humans, the FDA categorizes this drug as category ***C*** 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.*)

It is not known whether selegiline is excreted in maternal milk.

Overdosage/Acute Toxicity

Oral LD_{50} in laboratory animals was approximately 200–445 mg/kg. In limited data, dogs receiving 3x dosages showed signs of decreased weight, salivation, decreased pupillary response, panting, stereotypic behaviors and decreased skin elasticity (dehydration). Overdoses, if severe, should be treated with appropriate gut emptying and supportive treatments.

Drug Interactions

Evaluating the potential for drug interactions for selegiline in dogs is problematic. There are a plethora of significant interactions with monamine oxidase inhibitors in humans for selegiline, but because there are significant species differences in quantities and locations of MOA-A and B and selegiline's effects at various dosages on these