Doses

- **DOGS:**
  a) For treatment of myasthenia gravis: 0.04 mg/kg IM q6h to bypass the problem of oral medication in actively regurgitating animals (Inzana 2000)
  b) For diagnosis of myasthenia gravis: 0.05 mg/kg IM (diagnostic for MA if clinical improvement occurs in 15–30 minutes; pre-treat with atropine) (LeCouteur 1988)
  c) For treatment of curare overdoses: 0.001 mg/kg SC, follow with IV injection of atropine (0.04 mg/kg) (Bailey 1986)
- **CATS:**
  For treatment of myasthenia gravis:
  a) 0.04 mg/kg IM q6h to bypass the problem of oral medication in actively regurgitating animals (Inzana 2000)
- **CATTLE:**
  a) 1 mg/100 lbs of body weight SC; repeat as indicated (Package Insert; *Stiglyn® 1:500-P/M*—Mallinckrodt)
- **HORSES:** (**Note:** ARCI UCGFS Class 3 Drug)
  a) 1 mg/100 lbs of body weight SC; repeat as indicated (Package Insert; *Stiglyn® 1:500-P/M*—Mallinckrodt)
  For treatment of paralytic ileus of large colon:
  a) 2–4 mg SC q2h. Use after correction of large bowel displacement; discontinue when GI motility returns. May cause increased secretion into GI tract and, therefore, may be harmful in small intestinal disease. Does not produce progressive contractions of small intestine. (Stover 1987)
  b) 0.02 mg/kg SC; duration of action may be very short (15–30 minutes); does not increase propulsive motility of jejunum and may delay gastric emptying time. (Clark and Becht 1987)
  c) 0.44 mg/kg (approximately 2 mg total dose for a 450 kg horse) SC or IV; may be repeated every 1/2 to 2 hours. If ineffective and no adverse effects seen, may increase dose in 2 mg increments to a total of 10 mg per treatment. (Moore 1999)
  d) For ileus with marked colonic distension in foals secondary to *C. perfringens* type C: 1–2 mg (2 mg for foals greater than 250 lb) SC, 2–3 doses at 1–hour intervals then as needed. (Slovis 2003a)
  e) 0.025 mg/kg SC q2–6h (Hassel 2005)
- **SWINE:**
  a) 2–3 mg/100 lbs of body weight IM; repeat as indicated (Package Insert; *Stiglyn® 1:500-P/M*—Mallinckrodt)
  b) 0.03 mg/kg (Davis 1986)
- **SHEEP:**
  a) 1–1.5 mg/100 lbs of body weight SC; repeat as indicated (Package Insert; *Stiglyn® 1:500-P/M*—Mallinckrodt)
  b) 0.01–0.02 mg/kg (goats also) (Davis 1986)

Monitoring

Dependent on reason for use.

- Adverse reactions (see Adverse Effects and Overdosage above)
- Clinical efficacy

Client Information

- This product should only be used by professionals in locations where the drug's effects can be monitored.

Chemistry/Synonyms

Synthetic quaternary ammonium parasympathomimetic agents, neostigmine bromide and neostigmine methylsulfate both occur as odorless, bitter-tasting, white, crystalline powders that are very soluble in water and soluble in alcohol. The melting point of neostigmine methylsulfate is from 144–149°. The pH of the commercially available neostigmine methylsulfate injection is from 5–6.5.

Neostigmine methylsulfate may also be known as: neostigmine metilsulfate, neostigmine methylsulphate, neostigmini metilsulfas, proserinum, *Glycostigmin®*, *Intrastigmina®*, *Neostig-Reu®*, *Normastigmin®*, *Prostigmin®*, *Prostigmina®*, *Prostigmine®*, *Stiglyn®*, or *Tilstigmin®*.

Storage/Stability/Compatibility

Neostigmine bromide tablets should be stored at room temperature in tight containers. Neostigmine methylsulfate injection should be stored at room temperature and protected from light; avoid freezing.

Neostigmine methylsulfate injection is reportedly physically **compatible** with the commonly used IV replacement solutions and the following drugs: glycopyrrolate, pentobarbital sodium, and thiopental sodium.

Dosage Forms/Regulatory Status

VETERINARY-LABELED PRODUCTS: None

The ARCI (Racing Commissioners International) has designated this drug as a class 3 substance. See the appendix for more information.

HUMAN-LABELED PRODUCTS:

Neostigmine Methylsulfate Injection: 1:1000 (1 mg/mL), 1:2000 (0.5 mg/mL), 1:4000 (0.25 mg/mL) in 1 mL amps (only 1:2000 and 1:4000) and 10 mL vials; *Prostigmin®* (ICN); generic; (Rx)

NIACINAMIDE (NICOTINAMIDE)

(nye-a-***sin***-a-mide)

IMMUNOMODULATOR; NUTRITIONAL

Prescriber Highlights

- **Used in canine medicine in combination with tetracycline for treatment of discoid lupus erythematosus; may be useful in other immune-mediated dermatologic conditions such as sterile pyogranulomas, idiopathic onychodystrophy, pemphigus foliaceous, & pemphigus erythematosus**
- **Possible Contraindications: Liver disease, active peptic ulcers, or hypersensitivity to it**
- **Adverse Effects: Anorexia, vomiting, & lethargy; occasionally increases in liver enzymes seen**
- **Improvement may be gradual & take 6–8 weeks**
- **Inexpensive**

Uses/Indications

When used in conjunction with tetracycline, niacinamide may be useful for the treatment of discoid lupus erythematosus in dogs. It is occasionally been found to be useful in sterile pyogranulomas, idiopathic onychodystrophy, pemphigus foliaceous and pemphigus erythematous. It may make take 1–2 months before efficacy is noted.

Pharmacology/Actions
While niacinamide is an essential nutrient in humans (necessary for lipid metabolism. tissue respiration, and glycogenolysis) its primary pharmacologic use (in combination with tetracycline for discoid lupus erythematosus) in dogs is secondary to its action of blocking IgE-induced histamine release and degranulation of mast cells. When used with tetracycline, niacinamide may suppress leukocyte chemotaxis secondary to complement activation by antibody-antigen complexes. It also inhibits phosphodiesterases and decreases the release of proteases. In combination with tetracycline's immunomodulating and antiinflammatory effects, efficacy has been noted in up to two-thirds of dogs treated for DLE. While niacinamide and niacin act identically as vitamins, niacinamide does not affect blood lipid levels or the cardiovascular system.

Pharmacokinetics
Niacinamide is absorbed well after oral administration and widely distributed to body tissues. Niacinamide is metabolized in the liver to several metabolites that are excreted into the urine. At physiologic doses, only a small amount of niacinamide is excreted into the urine unchanged, but as dosages increase, larger quantities are excreted unchanged.

Contraindications/Precautions/Warnings
In humans, niacinamide therapy is contraindicated in patients with liver disease, active peptic ulcers, or hypersensitivity to the drug.

Adverse Effects
Adverse effects of niacinamide in dogs are uncommon, but may include anorexia, vomiting, and lethargy. Occasionally, increases in liver enzymes may be noted.

Reproductive/Nursing Safety
While niacinamide alone should be safe to use in pregnant and lactating animals, its use in combination with tetracycline may not be safe.

Overdosage/Acute Toxicity
There is unlikely to be a problem with niacinamide overdoses other than acute GI distress.

Drug Interactions
Niacinamide and tetracycline treatment does not interfere with antibody production associated with routine vaccinations in dogs. Also see the tetracycline monograph for additional drug interactions if using combination therapy.

The following drug interactions have either been reported or are theoretical in humans or animals receiving niacinamide and may be of significance in veterinary patients:

- **INSULIN/ORAL ANTIDIABETIC AGENTS:** In diabetic humans, dosage adjustments for insulin or oral antidiabetic agents have sometimes been necessary after initiating niacinamide therapy.

Doses
- **DOGS:**

For discoid lupus erythematosus:

a) For dogs weighing 10 kg or more: 500 mg of niacinamide and 500 mg of tetracycline PO q8h. For dogs weighing from 5–10 kg: 250 mg of each drug PO q8h. For dogs weighing less than 5 kg: 100 mg of each drug PO q8h. Improvement is usually noted within 6 weeks. (White 2000)

b) Dogs weighing more than 10 kg: 500 mg of niacinamide and 500 mg of tetracycline PO q8h. For dogs weighing less than 10 kg: 250 mg of each PO q8h. May use in combination with corticosteroids and Vitamin E. If adverse effects become a problem, reduce dose of niacinamide first. May also try this regimen for pemphigus foliaceous or pemphigus erythematous (approximately (Campbell 1999)

For various immune-mediated diseases (discoid lupus erythematosus, pemphigus erythematosus, pemphigus foliaceous, vasculitis, sterile pyelogranuloma, dermatomyositis, and lupoid onychodystrophy:

a) For dogs less than 10 kg: 250 mg each of niacinamide and tetracycline PO three times daily.

For dogs larger than 10 kg: 500 mg each of niacinamide and tetracycline PO three times daily. May substitute doxycycline for tetracycline at 5 mg/kg PO once a day. (Tapp 2002)

Monitoring
- Efficacy
- Adverse effects (baseline and occasional monitoring of liver enzymes is suggested)

Client Information
- Give as directed. Improvement may not be noted for 6–8 weeks.
- If dog's condition deteriorates or if adverse effects are a problem, contact veterinarian.

Chemistry/Synonyms
Niacinamide, also commonly known as nicotinamide, occurs as a white crystalline powder. It is odorless or nearly odorless and has a bitter taste. It is freely soluble in water or alcohol.

Niacinamide may also be known as: nicotinamide, nicotinamidum, nicotinic acid amide, nicotylamide, Vitamin B(3), or Vitamin PP.

Storage/Stability/Compatibility
Store niacinamide tablets in tight containers at room temperature unless otherwise labeled. Niacinamide is **incompatible** with alkalis or strong acids.

Dosage Forms/Regulatory Status
VETERINARY-LABELED PRODUCTS: None

HUMAN-LABELED PRODUCTS:

Niacinamide (Nicotinamide) Tablets: 100 mg & 500 mg; generic; (OTC); also available in bulk powder.

NITAZOXANIDE

(nye-tah-*zox*-ah-nide) Navigator®

ANTIPARASITIC AGENT

Prescriber Highlights
- Drug that has activity against a variety of protozoa, nematodes, bacteria, & trematodes, including *Sarcocystis neurona,* giardia, cryptosporidia, & *Helicobacter pylori*
- Approved for use in horses (EPM) & humans (Giardia & Cryptosporidia)
- Interest in using in other companion animals (*e.g.,* dogs, cats), but data is lacking to support use
- Adverse effects in horses may be therapy limiting; very well tolerated in humans