Interferon Alfa-2b (recombinant (IFN-alpha2; rIFN-a2; a-2-interferon) Injection: 3 million IU/dose; 5 million IU/dose, & 10 million IU/dose in multidose pens; *Intron A*® (Schering); (Rx)

Interferon Alfa-2b (recombinant (IFN-alpha2; rIFN-a2; a-2-interferon) Solution for Injection: 3 million IU/vial, 5 million IU/vial; 10 million IU/vial; 18 million IU/vial & 25 million IU/vial in vials, Pak-3, -5, -10 (vials & syringes); & in multidose vials (22.8 million IU/3.8 mL/vial or 32 million IU/3.2 mL/vial); *Intron A*® (Schering); (Rx)

Interferon Alfa-N3 (human leukocyte derived) Injection: 5 million IU/mL (8 mg NaCl, 1.74 mg Na phosphate dibasic, 0.2 mg K phosphate monobasic, 0.2 mg KCl) in 1 mL vials; *Alferon N* ® (Interferon Sciences Inc.); (Rx)

INTERFERON-Ω (OMEGA)

(in-ter-*feer*-on oh-*may*-ga) Virbagen Omega®, Recombinant Omega Interferon of Feline Origin, rFelFN-ωOmega

IMMUNOMODULATOR

Prescriber Highlights

- Immunomodulating cytokine labeled for treating FeLV & FIV in cats & Parvo in dogs; not commercially available in USA
- Appears to be well tolerated; adverse effects include: hyperthermia, vomiting, diarrhea (cats), fatigue (cats)
- Increases in ALT & decreases in RBC, WBC, & platelet counts have been seen
- Treatment may be very expensive

Uses/Indications

Omega interferon (feline) is labeled (in the EU) for dogs 1 month of age or older for the reduction in mortality and clinical signs of parvovirus (enteric form). In cats 9 weeks of age or older, it is labeled for treating FeLV and/or FIV, in non-terminal clinical stages. It may be of benefit in treating canine distemper, acute feline calicivirus infections, FIP, or topically for feline herpetic keratitis, but data is still being gathered to document efficacy.

Pharmacology/Actions

Omega interferon is a type 1 interferon related to alpha interferon. Its principle action is not as a direct anti-viral, but by acting on virus-infected cells inhibiting mRNA and translation proteins thereby inhibiting viral replication. It may also nonspecifically enhance immune defense mechanisms.

Pharmacokinetics

It has been stated that omega interferon pharmacokinetics in dogs and cats is similar to that of human interferons. After intravenous injection, omega interferon is rapidly bound to specific receptor sites on a variety of cells. Highest tissue levels are found in the liver and kidneys. Interferon is filtered in the renal glomeruli and catabolized in the kidneys. In dogs, volume of distribution at steady state is about 0.1L/kg. Biphasic elimination occurs with an alpha half-life of 3.14 hours and a beta half-life of 0.24 hours. Total body clearance is 6.9 mL/min/kg.

Contraindications/Precautions/Warnings

The manufacturer cautions against vaccinating dogs currently being treated with omega interferon and not to vaccinate until the patient appears to have recovered. As both FeLV and FIV infections are known to be immunosuppressive, the manufacturer states that cat vaccinations are contraindicated during and after omega interferon treatment.

There are several different interferons available for use in humans (several sub-types of alpha, beta, or gamma interferon); one cannot be substituted for another.

Adverse Effects

In cats and dogs, hyperthermia (3–6 hours post-dose) and vomiting have been reported. Slight decreases in RBCs, platelets and WBCs, and increased ALT have been observed but, reportedly, these indices return to normal within a week of the last injection.

Additionally, soft feces/mild diarrhea and transient fatigue may be noted in cats. Intravenous administration to cats may cause increased incidence and severity of adverse effects.

Dogs may develop antibodies to interferon omega if treatment is prolonged (beyond labeled dosage period) or repeated.

Reproductive/Nursing Safety

Safety during pregnancy or lactation has not been established.

Overdosage/Acute Toxicity

10X overdoses in dogs and cats caused mild lethargy/somnolence, slight hyperthermia, slight increases in respiratory and heart rates. In animals tested, signs resolved within 7 days and no treatment was required.

Drug Interactions

No reported drug interactions at the time of writing, but use caution when using other drugs that can be hepatotoxic or myelosuppressive.

Laboratory Considerations

No specific concerns were noted

Doses

- **DOGS:**
  a) For treatment of parvovirus as labeled: 2.5 million Units/kg IV once daily for 3 days. The earlier the dog is treated, the more likely of success. (Label information; *Virbagen Omega*®—Virbac UK)
- **CATS:**
  a) For treatment of FeLV or FV as labeled: 1 million Units/kg SC once daily for 5 days. Three separate 5-day treatments performed at day 0, day 14, and day 60. (Label information; *Virbagen Omega*®—Virbac UK)

Monitoring

- Monitor for efficacy for infection treated
- CBC and hepatic function tests suggested

Client Information

- This drug is best administered on an inpatient basis where the patient may be observed and supported

Chemistry/Synonyms

Interferon omega of feline origin is a type 1 recombinant interferon obtained from silkworms after inoculation with a recombinant baculovirus. It is provided commercially as a lyophilisate powder with a separate solvent.

Recombinant omega interferon of feline origin may also be known as: Interferon omega, omega interferon, interferon-ω, IFN-ω, IFN-ω (feline recombinant), rFelFN-ω, and *Virbagen Omega*®.

Storage/Stability/Compatibility
The commercial veterinary product should be stored in its original carton refrigerated (4°C ± 2°C) and protected from freezing. It has a designated shelf life of 2 years when properly stored. Once reconstituted with the supplied isotonic sodium chloride solution, it should be used immediately as it contains no preservative, however, the solution is reported to be stable for at least 3 weeks when refrigerated. No data was located on the stability of the reconstituted solution when frozen. The manufacturer states: Do not mix with any other vaccine/immunological product, except the solvent supplied for use with the product.

Dosage Forms/Regulatory Status
VETERINARY-LABELED PRODUCTS: None in the USA
In the EU:
Recombinant Omega Interferon of Feline Origin 10 million Units/vial; *Virbagen Omega*® (Virbac); (Rx). Approved for dogs and cats. A 5 million Unit vial may be available in some countries.

The FDA may allow legal importation into the USA 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

IODIDE, SODIUM
IODIDE, POTASSIUM

(*eye*-oh-dide) **SSKI, Iodoject®**

ANTIFUNGAL, NUTRITIONAL

Prescriber Highlights

- Iodides used for actinobacillosis in ruminants, sporotrichosis in horses, dogs, & cats
- Contraindications: Iodide hypersensitivity, lactating animals, hyperthyroidism, renal failure, or dehydration
- Do not inject IM; give IV slowly & with caution to horses as severe generalized reactions have been reported
- May cause abortion in cattle
- Adverse Effects: Iodism: Excessive tearing, vomiting, anorexia nasal discharge, muscle twitching, cardiomyopathy, scaly haircoats/dandruff, hyperthermia, decreased milk production & weight gain, coughing, inappetence, & diarrhea
- Cats more prone to developing toxicity

Uses/Indications
The primary use for sodium iodide is in the treatment of actinobacillosis and actinomycosis in cattle. It has been used as an expectorant with little success in a variety of species and occasionally as a supplement for iodine deficiency disorders. In horses, dogs and cats, oral sodium or potassium iodide has been used in the treatment of sporotrichosis. Use in cats is controversial as they may be prone to developing adverse effects; cats may require other antifungal (*e.g.*, itraconazole) therapy. Potassium iodide has also been used as an expectorant, but documentation of efficacy is lacking.

Pharmacology/Actions
While the exact mode of action for its efficacy in treating actinobacillosis is unknown, iodides probably have some effect on the granulomatous inflammatory process. Iodides have little, if any, *in vitro* antibiotic activity.

Pharmacokinetics
Little published information appears to be available. Therapeutic efficacy of intravenous sodium iodide for actinobacillosis is rapid, with beneficial effects usually seen within 48 hours of therapy.

Contraindications/Precautions/Warnings
Sodium iodide injection labels state that it should not be given to lactating animals or to animals with hyperthyroidism. Do not inject intramuscularly (IM).

Iodides given parenterally should be administered slowly intravenously and with caution to horses; severe generalized reactions have been reported.

Should not be used in animals in renal failure or that are severely dehydrated.

Adverse Effects
In ruminants, the adverse effect profile is related to excessive iodine (see Overdosage below). Young animals may be more susceptible to iodism than adults.

Foals have developed goiter when mares have been excessively supplemented.

Chronic use or overdoses may cause iodism. Cats are apparently more prone to developing this than other species. Signs can include vomiting, inappetance, depression, twitching, hypothermia, and cardiovascular failure.

Reproductive/Nursing Safety
Anecdotal reports that iodides can cause abortion in cattle persist and label information of some veterinary products state not to use in pregnant animals. Clearly, potential risks versus benefits of therapy must be weighed. In humans, the FDA categorizes this drug as category ***D*** for use during pregnancy (*There is evidence of human fetal risk, but the potential benefits from the use of the drug in pregnant women may be acceptable despite its potential risks.*)

Iodides are excreted in milk. If iodides are required in the nursing dam, switch to milk replacer.

Overdosage/Acute Toxicity
Excessive iodine in animals can cause excessive tearing, vomiting, anorexia, nasal discharge, muscle twitching, cardiomyopathy, scaly haircoats/dandruff, hyperthermia, decreased milk production and weight gain, coughing, inappetence, and diarrhea.

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

- **ANTITHYROID MEDICATIONS:** Iodides may decrease the efficacy of antithyroid medications
- **THYROID SUPPLEMENTS:** Iodides may enhance the efficacy of thyroid medications

Doses
- **DOGS:**

  For Sporotrichosis:
  a) Using SSKI: 40 mg/kg PO q8h for at least 60 days (Greene and Watson 1998)
  b) Using SSKI: 40 mg/kg PO q12h with food; itraconazole less likely to have adverse effects (Grooters 2005)