Uses/Indications
Somatotropin may be useful in treating hypopituitary dwarfism or growth hormone-responsive dermatosis (in adult dogs).

Pharmacology/Actions
Growth hormone (somatotropin) is responsible for, or contributes to, linear and skeletal growth, organ growth, and cell growth. It also is a factor in protein, carbohydrate, lipid, connective tissue, and mineral metabolism.

Pharmacokinetics
No canine information was located. Both the liver and kidney are major elimination organs for somatotropin.

Contraindications/Precautions/Warnings
Growth hormone derived from other species is contraindicated in patients hypersensitive to it.

Adverse Effects
Growth hormone may cause diabetes mellitus in dogs. This may be transient or permanent even after discontinuing treatment. Blood and urine glucose should be routinely monitored. If blood glucose exceeds 150 mg/dl, therapy should be stopped. Hypersensitivity reactions are possible, but less so if using porcine origin product. Long-term treatment at high doses may cause acromegaly. Acromegaly in dogs can cause increased size of paws and head, increased skin folds around head and neck area, prognathism, and inspiratory stridor.

Reproductive/Nursing Safety
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.*)

Overdosage/Acute Toxicity
Acute overdosage could cause hypoglycemia initially and then hyperglycemia. Blood glucose should be monitored and supportive treatment (glucose/insulin) performed.

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

- **GLUCOCORTICOIDS**: May inhibit the growth promoting effect of somatotropin. When concurrent adrenal insufficiency is diagnosed, adjust glucocorticoid dose carefully to avoid negative effects on growth.

Doses
- **DOGS:**
  a) For treatment of hypopituitary dwarfism: 0.1 IU (0.05 mg)/kg SC three times per week for 4–6 weeks. **Note:** May also require life-long thyroid hormone supplementation and if secondary adrenal insufficiency present, glucocorticoid treatment. If after successful treatment, dermatologic signs recur, may dose as above (0.1 IU/kg three times weekly for one week). Repeat these weekly regimens at intervals determined by the time lapse between treatments and relapse. (Feldman and Nelson 1996)
  b) For treatment of growth hormone-responsive dermatosis in adult dogs: Dose as above (a), but thyroid and steroid supplementation not required (Feldman and Nelson 1996)
  c) For Alopecia X: 0.15 IU/kg of porcine growth hormone SC 2 times weekly for 6 weeks. (Hillier 2006a)

Monitoring
- Clinical efficacy
- Blood glucose (weekly)
- Urine glucose (daily)
- Thyroid function, adrenal function initially and then periodically (pituitary dwarfism pts.)

Client Information
- Clients should be instructed on the methods for SC injection and testing urine glucose
- May be expensive to treat and diabetes (permanent) can occur

Synonyms
Somatotropin may also be known as: CB-311, HGH, human growth hormone, LY-137998, somatropinum; many trade names are available.

Dosage Forms/Regulatory Status
There are several manufacturers of human recombinant DNA origin somatotropin products, but these are expensive, can cause immunogenicity reactions in dogs, and not sold for veterinary use.

The bovine recombinant growth hormone product (*Posilac*®—Monsanto) is not suitable for canine use as it is a sustained release formulation and not easily diluted down to the smaller doses required for dogs.

Porcine growth hormone appears to have little immunogenicity in dogs and reportedly can be obtained via: Dr A. F. Partlow at: 310-222-3537 E-Mail: Partlow@HUMC.edu WEBSITE: www.humc.edu/hormones

The ARCI (Racing Commissioners International) has designated this drug as a class 2 substance. See the appendix for more information.

SOTALOL HCL

(***soh***-ta-lole) Betapace®

BETA-ADRENERGIC BLOCKER

Prescriber Highlights
- **Non-selective beta blocker/Class III antiarrhythmic for ventricular tachycardia**
- **Adverse Effects: Most serious: negative inotropism & pro-arrhythmic but dyspnea/bronchospasm, fatigue/dizziness, & nausea/vomiting possible**
- **Treatment is relatively expensive**

Uses/Indications
Sotalol may be useful in the treatment of ventricular tachycardias and, possibly, supraventricular tachycardias in dogs.

Pharmacology/Actions
Sotalol is a non-selective beta-blocker and Class III antiarrhythmic agent. The beta blocking activity of sotalol is about 30% that of propranolol. Its primary usage in veterinary medicine is associated with its antiarrhythmic activity. Like other Class III drugs, it prolongs repolarization and refractoriness without affecting conduction. The pharmacologic action is believed caused by selectively inhibiting potassium channels.

Pharmacokinetics
Unlike propranolol, sotalol does not have any appreciable first pass effect after oral administration. Food may reduce the bioavailability of sotalol by approximately 20% (human data) and, if given on an empty stomach, bioavailability is 90–100%. The drug has relatively low lipid solubility and virtually no protein binding. Elimination is almost all via the kidney and most of the drug is excreted unchanged. In dogs, sotalol's elimination half-life is 5 hours; in humans about 12 hours.

Contraindications/Precautions/Warnings
Sotalol is considered contraindicated in patients with asthma, sinus bradycardia, 2nd or 3rd degree heart block (unless artificially paced), long Q-T syndromes, cardiogenic shock or uncontrolled CHF. Because of the potential for negative inotropic effects, use with caution in CHF. Also, use with caution in patients with diabetes mellitus, or hyperthyroidism (may mask signs). Use with caution in patients with renal dysfunction; dosage intervals may need to be extended.

Adverse Effects
Primary concerns with sotalol in dogs are the potential for negative inotropic and proarrhythmic effects. These generally are not clinically important if dosage is not excessive. Other potential adverse effects include dyspnea/bronchospasm, fatigue/dizziness, and nausea/vomiting.

Reproductive/Nursing Safety
Sotalol did not cause any fetotoxicity or teratogenicity when given to pregnant lab animals at high dosages, but clear safety in pregnancy has not been established. Sotalol enters maternal milk in concentrations up to 5X found in the serum; consider using milk replacer in nursing animals.

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.*)

Sotalol is excreted in milk; use with caution in nursing patients. It is not recommended for use in nursing humans.

Overdosage/Acute Toxicity
Overdoses may result in bradycardia, hypotension, CHF, bronchospasm, and hypoglycemia. Use gut evacuation (if not contraindicated) when significant risk of morbidity is possible. Treat adverse effects symptomatically and supportively.

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

- **AMIODARONE**: May prolong refractory periods; concurrent use not recommended in human patients
- **ANESTHETICS, GENERAL**: Additive myocardial depression may occur with the concurrent use of sotalol and myocardial depressant anesthetic agents
- **ANTACIDS**: May reduce oral sotalol absorption; separate doses by at least 2 hours
- **ANTIARRHYTHMICS, CLASS IA** (**quinidine, procainamide, disopyramide**): May prolong refractory periods; concurrent use not recommended in human patients; may also prolong QT interval
- **ANTIARRHYTHMICS, CLASS IB, 1C** (**lidocaine, mexiletine, phenytoin, flecainide** etc.): May prolong QT interval
- **CALCIUM CHANNEL BLOCKERS** (**verapamil, diltiazem,** etc.): Potential to increase hypotensive effects; may have additive effects on AV conduction or ventricular function; use with caution, particularly in patients with preexisting cardiomyopathy or CHF
- **CISAPRIDE**: May prolong QT interval
- **CLONIDINE**: If clonidine is discontinued after concomitant therapy with sotalol, there is an increased risk for rebound hypertension
- **DIGOXIN**: Potential for increased risks for proarrhythmic events
- **ERYTHROMYCIN; CLARITHROMYCIN**: May prolong QT interval
- **LIDOCAINE**: Clearance may be impaired by sotalol
- **PHENOTHIAZINES**: May prolong QT interval
- **RESERPINE**: May have additive effects (hypotension, bradycardia) with sotalol
- **SYMPATHOMIMETICS, BETA 2 AGONISTS** (*e.g.*, **metaproterenol, terbutaline, albuterol**): May have their actions blocked by sotalol
- **TRICYCLIC ANTIDEPRESSANTS**: May prolong QT interval

Laboratory Considerations
- Beta-blockers may produce hypoglycemia and interfere with **glucose** or insulin tolerance tests
- Sotalol may falsely elevate urine **metanephrine** levels (pheochromocytoma screen) if using a fluorometric or photometric assay

Doses
- **DOGS:**
  a) 1–2 mg/kg PO q12h (Fox 2003a), (Moise 2002)
  b) 2–3 mg/kg PO q12h (Meurs 2002)
  c) For ventricular tachycardia: 1–2 mg/kg PO twice daily (Atkins 2007a)
  d) For ventricular tachycardias, supraventricular tachycardias: 1–2 mg/kg PO q12h (Smith 2007)
  e) For ventricular tachyarrhythmias in Boxers in combination with mexiletine: Sotalol 1.5–3 mg/kg PO twice daily with mexiletine (5–7.5 mg/kg PO three times daily). (Prosek, Estrada et al. 2006)
- **CATS:**
  a) 2 mg/kg PO twice daily (Atkins 2003b)

Monitoring
- Efficacy (ECG)
- Adverse effects

Client Information
- Relatively limited clinical experience; but appears safe
- Must be given as prescribed; do not stop drug suddenly or alter dosing without veterinarian guidance
- Report adverse effects to veterinarian immediately

Chemistry/Synonyms
A non-selective beta-blocker and Class III antiarrhythmic agent, sotalol HCl is a racemic mixture of the d- and l- forms. Both isomers exhibit antiarrhythmic (Class II) activity, but only the Levo- form has beta blocking activity. Sotalol HCl occurs as white, crystalline solid that is soluble in water.

Sotalol may also be known as: MJ-1999, d,l-sotalol hydrochloride, or sotaloli hydrochloridum; many trade names are available.

Storage/Stability
Store tablets at room temperature.

Dosage Forms/Approval

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:

Sotalol HCl Tablets: 80 mg, 120 mg, 160 mg & 240 mg; *Betapace*® & *Betapace*® *AF* (Berlex); generic; (Rx)

SPECTINOMYCIN HCL SPECTINOMYCIN SULFATE

(spek-ti-noe-*mye*-sin) Adspec®, Spectam®

AMINOCYCLITOL ANTIBIOTIC

Prescriber Highlights

- **Aminocyclitol antibiotic used primarily in food producing animals; relatively broad spectrum but minimal activity against anaerobes & most strains of Pseudomonas**
- **Contraindications: Hypersensitive to it**
- **Adverse Effects: Appears to have minimal adverse effects at labeled dosages; probably less nephrotoxicity/ototoxicity than other aminocyclitols. Can cause neuromuscular blockade. May cause swelling at SC injection sites.**

Uses/Indications

Although occasionally used in dogs, cats, and horses for susceptible infections, Spectinomycin only has approved dosage forms for cattle, chickens, turkeys, and swine. Refer to the Dosage section below for more information on approved uses.

Pharmacology/Actions

Spectinomycin is primarily a bacteriostatic antibiotic that inhibits protein synthesis in susceptible bacteria by binding to the 30S ribosomal subunit.

Spectinomycin has activity against a wide variety of gram-positive and gram-negative bacteria, including *E. coli*, Klebsiella, Proteus, Enterobacter, Salmonella, Streptococci, Staphylococcus, and Mycoplasma. It has minimal activity against anaerobes, most strains of Pseudomonas, Chlamydia, or Treponema.

In human medicine, spectinomycin is used principally for its activity against *Neisseria gonorrhoeae*.

Pharmacokinetics

After oral administration only about 7% of the dose is absorbed, but the drug that remains in the GI tract is active. When injected SC or IM, the drug is reportedly absorbed well with peak levels occurring in about 1 hour.

Tissue levels of absorbed drug are lower than those found in the serum. Spectinomycin does not appreciably enter the CSF or the eye and is not bound significantly to plasma proteins. It is unknown whether spectinomycin crosses the placenta or enters milk.

Absorbed drug is excreted via glomerular filtration into the urine mostly unchanged. In cattle, terminal half-life is about 2 hours.

Contraindications/Precautions/Warnings

Spectinomycin is contraindicated in patients hypersensitive to it.

Adverse Effects

When used as labeled, adverse effects are unlikely with this drug. It is reported that parenteral use of this drug is much safer than with other aminocyclitol antibiotics, but little is known regarding its prolonged use. It is probably safe to say that spectinomycin is significantly less ototoxic and nephrotoxic than other commonly used aminocyclitol antibiotics, but can cause neuromuscular blockade. Parenteral calcium administration will generally reverse the blockade.

Adverse effects that have been reported in human patients receiving the drug in single or multidose studies include soreness at injection site, increases in BUN, alkaline phosphatase and SGPT, and decreases in hemoglobin, hematocrit, and creatinine clearance. Although increases in BUN and decreases in creatinine clearance and urine output have been noted, overt renal toxicity has not been demonstrated with this drug.

Cattle receiving the sulfate form subcutaneously have developed swelling at the injection site.

Reproductive/Nursing Safety

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.*)

It is not known whether spectinomycin is excreted in milk; use caution when administering to nursing patients.

Overdosage/Acute Toxicity

No specific information was located on oral overdoses, but because the drug is negligibly absorbed after oral administration, significant toxicity is unlikely via this route.

Injected doses of 90 mg produced transient ataxia in turkey poults.

Drug Interactions

- Antagonism has been reported when spectinomycin is used with **chloramphenicol** or **tetracycline**.

Doses

- **DOGS:**

  For susceptible infections:

  a) 5.5–11 mg/kg q12h IM or 22 mg/kg PO q12h (for enteric infections; not absorbed) (Kirk 1989)

  b) 5–10 mg/kg IM q12h (Davis 1985)

  c) For acute infectious gastroenteritis: 5–12 mg/kg IM q12h (DeNovo 1986)

- **CATS:**

  For susceptible infections:

  a) For acute infectious gastroenteritis: 5–12 mg/kg IM q12h (DeNovo 1986)

- **CATTLE:**

  For susceptible infections:

  a) For bronchopneumonia and fibrinous pneumonia: 33 mg/kg SC q8h. Suggested withdrawal time is 60 days. (Hjerpe 1986)

  b) 22–39.6 mg/kg/day IM divided three times daily (Upson 1988)

  c) For bovine respiratory disease: 10–15 mg/kg SC (in the neck; not more than 50 mL per site) once daily (q24h) for 3–5 consecutive days (Label directions; *Adspec*®)