

PRODUCT MONOGRAPH

^{Pr}HUMATROPE[®]

(somatropin for injection)

Biosynthetic Human Growth Hormone of
Recombinant DNA Origin

5 mg vial
6, 12, 24 mg cartridges

Sterile Lyophilized Powder
and Diluent

Lilly Standard

Growth Stimulant

© ELI LILLY CANADA INC.
3650 Danforth Avenue
Toronto, Ontario
M1N 2E8
1-888-545-5972
www.lilly.ca

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HUMATROPE®

(somatropin for injection)

PART I: HEALTH PROFESSIONAL INFORMATION

SUMMARY PRODUCT INFORMATION

Route of Administration	Dosage Form / Strength	Clinically Relevant Non-medicinal Ingredients*
Subcutaneous	Sterile lyophilized powder in: Vial: 5 mg Cartridges: 6 mg 12 mg 24 mg	Supplied with diluent that contains metacresol and glycerin.

*For a complete listing, see DOSAGE FORMS, COMPOSITION and PACKAGING section.

DESCRIPTION

HUMATROPE (somatropin) is a polypeptide hormone of recombinant DNA origin. The amino acid sequence is identical to that of human growth hormone of pituitary origin. HUMATROPE is synthesized in a strain of *E. coli* that has been modified by the addition of the gene for human growth hormone.

INDICATIONS AND CLINICAL USE

Pediatric Patients:

Growth Hormone Deficiency:

HUMATROPE (somatropin) is indicated for the long-term treatment of pediatric patients who have growth failure due to an inadequate secretion of normal endogenous growth hormone and whose epiphyses are not closed.

Turner Syndrome:

HUMATROPE is indicated for the treatment of short stature associated with Turner syndrome in patients whose epiphyses are not closed.

Idiopathic Short Stature (ISS):

HUMATROPE is indicated for the long-term treatment of idiopathic short stature defined by:

- normal birth weight,
- careful diagnostic evaluation that excludes other known causes of short stature that should be either observed or treated by other means,
- height at least 2.25 standard deviation scores (SDS) below the mean for age and sex,
- height velocity below the 25th percentile for bone age and sex over 12 months of observation and unlikely to permit attainment of adult height in the expected range.

HUMATROPE treatment for idiopathic short stature should be prescribed only for those patients whose epiphyses are not closed and should be managed by physicians who have sufficient knowledge of idiopathic short stature and the efficacy/safety profile of HUMATROPE.

Short Stature Homeobox-containing Gene (SHOX) Deficiency:

HUMATROPE is indicated for the treatment of short stature or growth failure in children with *SHOX* (short stature homeobox-containing gene) deficiency whose epiphyses are not closed.

Small for Gestational Age (SGA):

HUMATROPE is indicated for the treatment of growth failure in children born small for gestational age (birth weight and/or length below -2 SD) and who fail to achieve catch-up growth by 2 to 4 years or later.

Adult Patients:

HUMATROPE is indicated for replacement of endogenous growth hormone in adults with growth hormone deficiency, who meet either of the following two criteria:

1. **Adult Onset:** Patients must have somatotropin deficiency syndrome, either alone or associated with multiple hormone deficiencies (hypopituitarism), as a result of pituitary disease, hypothalamic disease, surgery, radiation therapy, or trauma;
or
2. **Childhood Onset:** Patients who were growth hormone-deficient during childhood as a result of congenital, genetic, acquired, or idiopathic causes.

Confirmation of the diagnosis of adult growth hormone deficiency in both groups by appropriate growth hormone stimulation test is usually required. However, confirmatory growth hormone stimulation testing may not be required in patients with congenital/genetic growth hormone deficiency or multiple pituitary hormone deficiencies due to organic disease.

CONTRAINDICATIONS

Somatotropin should not be initiated in patients with acute critical illness due to complications following cardiac or abdominal surgery, or multiple accidental trauma, or to patients who have acute respiratory failure. Clinical studies demonstrated that high doses of somatotropin were associated with a significantly increased morbidity and mortality in those patients (see WARNINGS AND PRECAUTIONS, General).

Somatropin is contraindicated in patients with Prader-Willi syndrome who are severely obese, have a history of upper airway obstruction or sleep apnea, or have severe respiratory impairment. There have been reports of sudden death when somatropin was used in such patients. HUMATROPE is not indicated for the treatment of pediatric patients who have growth failure due to genetically confirmed Prader-Willi syndrome (see SERIOUS WARNINGS AND PRECAUTIONS).

Somatropin should not be used for growth promotion in pediatric patients with closed epiphyses. Treatment of pediatric growth disorders with somatropin should be discontinued when the patient has reached satisfactory adult height, or the epiphyses are closed.

Somatropin should not be used or should be discontinued when there is any evidence of neoplastic activity, including intracranial tumour. Anti-tumour therapy must be completed with evidence of remission prior to the institution of somatropin therapy. Patients should be examined frequently for progression or recurrence of the underlying process. Somatropin should be discontinued if there is evidence of recurrent tumour growth (see WARNINGS AND PRECAUTIONS, Carcinogenesis and Mutagenesis).

Somatropin should not be administered to patients with active proliferative or severe non-proliferative diabetic retinopathy.

For patients with a known sensitivity to either metacresol or glycerin, HUMATROPE should not be reconstituted with the supplied diluent for HUMATROPE. If sensitivity to the supplied diluent should occur, HUMATROPE in vials may be reconstituted with Sterile Water for Injection, USP (see WARNINGS AND PRECAUTIONS, Sensitivity and DOSAGE AND ADMINISTRATION, Reconstitution and Specific Precautions).

Treatment with somatropin should be discontinued at the time of renal transplantation (see WARNINGS AND PRECAUTIONS, Renal/Hepatic/Biliary/Pancreatic Impairment).

WARNINGS AND PRECAUTIONS

Serious Warnings and Precautions

- HUMATROPE therapy should be directed by physicians experienced in the diagnosis and management of patients with growth hormone deficiency, Turner syndrome, idiopathic short stature, small for gestational age, SHOX deficiency, or adult patients with either childhood-onset or adult-onset growth hormone deficiency (see INDICATIONS AND CLINICAL USE).
- Any change in brand of somatropin products should be made cautiously and only under medical supervision (see WARNINGS AND PRECAUTIONS, Immune – Antibody Production).
- Reconstituted HUMATROPE must only be used if the solution is water-clear and contains no particles (see DOSAGE AND ADMINISTRATION, Reconstitution and Specific Precautions).

- There have been reports of fatalities associated with the use of somatropin in pediatric patients with Prader-Willi syndrome who have one or more of the following risk factors: severe obesity, history of respiratory impairment or sleep apnea or unidentified (i.e. previously undiagnosed/mildly symptomatic) respiratory infections (see CONTRAINDICATIONS and WARNINGS AND PRECAUTIONS, Congenital Disorders).

General

It is recommended that insulin-like growth factor-I (IGF-I) concentrations be monitored regularly and maintained within the normal range for age and sex (see Monitoring and Laboratory Tests).

A significant increase in mortality was reported among somatropin-treated adult patients (who received high somatropin doses of 5.3 to 8.0 mg/day) with acute critical illnesses in intensive care units due to complications following open heart surgery or abdominal surgery, multiple accidental trauma or acute respiratory failure, compared with those who received placebo injections (see CONTRAINDICATIONS). The safety of continuing somatropin in patients receiving replacement doses for approved indications who concurrently develop these illnesses has not been established. Therefore, the potential benefit of treatment continuation with somatropin in patients suffering from acute critical illnesses should be weighed against the potential risk.

The subcutaneous injection site should be rotated to minimize the risk of lipoatrophy.

To avoid transmission of disease, somatropin [HUMATROPE] cartridges must not be used by more than one person.

Instructions for appropriate use should be provided to patients and/or their caregivers. Patients being treated with somatropin should be informed of the potential benefits and risks associated with treatment. Patients should be instructed to contact their physician should they experience any side effects or discomfort during treatment with somatropin (see Information for Patients and Part III: CONSUMER INFORMATION).

Concomitant glucocorticoid therapy at supraphysiologic doses may inhibit the response to somatropin. Glucocorticoid replacement dosing should be carefully adjusted in children receiving concomitant somatropin and glucocorticoid treatments to avoid both hypocortisolism and glucocorticoid excess, with an inhibitory effect on growth (see DRUG INTERACTIONS, Drug-Drug Interactions).

Carcinogenesis and Mutagenesis

Long-term animal studies for carcinogenicity with somatropin have not been performed. There is no evidence of somatropin-induced mutagenicity.

Leukemia has been reported in a small number of growth hormone deficient patients treated with growth hormone, including growth hormone of pituitary origin, as well as of recombinant DNA origin (somatrem and somatropin). Based on the current evidence, experts cannot conclude that growth hormone therapy is responsible for these occurrences.

Neoplasia has been identified as a potential risk for treatment with HUMATROPE. Patients who develop neoplasia should be reported to the Health Products and Food Branch (HPFB) by the treating physician.

Pre-existing tumours or growth hormone deficiency secondary to an intracranial tumour: Patients with pre-existing tumours or with growth hormone deficiency secondary to an intracranial tumour should be examined routinely for progression or recurrence of the underlying disease process.

- In pediatric patients, clinical literature has demonstrated no relationship between somatropin therapy and central nervous system (CNS) tumour recurrence.
- In adults, it is unknown whether there is any relationship between somatropin therapy and CNS tumour recurrence.

Second neoplasm in survivors of childhood cancer:

In childhood cancer survivors, an increased risk of a second neoplasm (benign and malignant) has been reported in patients treated with somatropin. Intracranial tumours, in particular meningiomas, in patients treated with radiation to the head for their first neoplasm, were the most common of these second neoplasms. However, in childhood cancer survivors, no increased risk of primary cancer recurrence has been reported in patients treated with somatropin.

Congenital Disorders

Prader-Willi Syndrome:

- Lilly has not studied the use of somatropin in patients with Prader-Willi syndrome, therefore, HUMATROPE is not indicated in patients who have Prader-Willi syndrome without a diagnosis of growth hormone deficiency.
- There have been reports of sleep apnea and fatalities after initiating therapy with somatropin in pediatric patients with Prader-Willi syndrome who had one or more of the following risk factors:
 - severe obesity,
 - history of upper airway obstruction or sleep apnea, or
 - unidentified (i.e. previously undiagnosed/mildly symptomatic) respiratory infection.

Male patients with one or more of these risk factors may be at greater risk than females.

- Patients with Prader-Willi syndrome should be evaluated for signs of upper airway obstruction and sleep apnea before initiation of treatment with somatropin (see Monitoring and Laboratory Tests).
- If a somatropin-treated patient shows signs of upper airway obstruction (including onset of or increased snoring) and/or new onset of sleep apnea, somatropin treatment should be interrupted and the patient should be treated for upper airway obstruction and/or sleep apnea.
- All patients with Prader-Willi syndrome treated with somatropin should also have effective weight control and be monitored for signs of respiratory infection, which should be diagnosed as early as possible and treated aggressively (see CONTRAINDICATIONS).

and Monitoring and Laboratory Tests).

Turner Syndrome:

- Patients with Turner syndrome may be at increased risk for development of intracranial hypertension. Therefore, these patients should be evaluated for signs and symptoms of intracranial hypertension and, if present, this condition should be treated before initiation of treatment with somatropin.
- Patients with Turner syndrome should be evaluated carefully for otitis media and other ear disorders before and during treatment with somatropin because these patients have an increased risk of ear and hearing disorders (see ADVERSE REACTIONS).
- Patients with Turner syndrome are at risk for cardiovascular disorders (e.g. hypertension, stroke, and aortic dilatation, aneurysm and dissection) and these patients should be monitored closely for development or worsening of these conditions before and during treatment with somatropin.
- Patients with Turner syndrome have an inherently increased risk of developing autoimmune thyroid disease. Therefore, these patients should have periodic thyroid function tests performed and be treated appropriately (see Endocrine and Metabolism).

Skeletal abnormalities including scoliosis are commonly seen in untreated patients with Turner syndrome.

Dependence/Tolerance:

Somatropin is not a drug of dependence.

Potential for Misuse: Inappropriate use of somatropin by individuals who do not have conditions for which there is an approved indication for somatropin, may result in clinically significant negative health consequences.

Drug Interactions: see DRUG INTERACTIONS.

Endocrine and Metabolism:

- Patients with diabetes mellitus or glucose intolerance should be monitored closely during therapy with somatropin, as an adjustment of their antidiabetic therapy may be required (see Monitoring and Laboratory Tests).
- Treatment with somatropin may decrease insulin sensitivity, particularly at higher doses in patients with risk factors for diabetes mellitus, such as obesity, Turner syndrome, or a family history of diabetes mellitus, those receiving high dose corticosteroid therapy, and patients with impaired glucose tolerance or pre-existing diabetes mellitus. As a result, previously undiagnosed impaired glucose tolerance and overt diabetes mellitus may be unmasked during somatropin treatment. Therefore, patients who receive somatropin should be monitored for evidence of abnormal glucose metabolism and/or diabetes mellitus. New-onset type 2 diabetes mellitus has been reported in children and adults receiving somatropin.
- In patients with hypopituitarism, standard hormonal replacement therapy should be monitored closely when somatropin therapy is administered (see Monitoring and Laboratory Tests).

- Somatropin can increase the extrathyroidal conversion of thyroxine (T4) to triiodothyronine (T3) and may unmask incipient hypothyroidism. Because inadequate treatment of hypothyroidism may prevent optimal response to somatropin, thyroid function should be evaluated before starting somatropin therapy and should be monitored regularly during treatment, not less frequently than annually (see Monitoring and Laboratory Tests).

Notes Regarding Potential Effects of Somatropin on Glucocorticoid Metabolism: The microsomal enzyme 11 β -hydroxysteroid dehydrogenase type 1 (11 β HSD-1) is required for conversion of cortisone to its active metabolite, cortisol in hepatic and adipose tissue. Endogenous growth hormone and exogenous somatropin inhibit the activity of 11 β HSD-1. Therefore growth hormone deficiency is associated with a relative increase in 11 β HSD-1 activity, which in turn results in a relative increase in serum cortisol. Somatropin treatment may inhibit 11 β HSD-1, resulting in relative reduction of serum cortisol concentrations.

In addition, somatropin may enhance the activity of CYP3A4, a cytochrome P450 enzyme involved in glucocorticoid catabolism. Therefore, by increasing the activity of CYP3A4, somatropin could potentially decrease serum cortisol concentration. Because somatropin may both inhibit 11 β HSD-1 (an enzyme required for production of cortisol) and induce activity of CYP3A4 (an enzyme involved in cortisol breakdown), careful monitoring of serum cortisol concentrations is required for all patients receiving concomitant glucocorticoid and somatropin therapy.

As a consequence of its actions on enzymes involved in cortisol metabolism, somatropin treatment may unmask previously undiagnosed central (secondary) hypoadrenalism, and glucocorticoid replacement may be required. In addition, patients treated with glucocorticoids for previously diagnosed hypoadrenalism (primary or secondary) may require adjustments of their maintenance or stress doses following initiation of somatropin treatment; this may be especially true for patients treated with cortisone acetate and prednisone, because conversion of these drugs to their biologically active metabolites is dependent on the activity of 11 β HSD-1 (see Monitoring and Laboratory Tests).

Fluid Retention

Fluid retention during somatropin replacement therapy in adults may occur frequently. Clinical manifestations of fluid retention are usually transient and dose dependent.

Immune

Local allergic reactions

- Patients receiving somatropin treatment may experience redness, swelling, pain, inflammation, or itching at the site of injection (see ADVERSE REACTIONS).
- Most of these minor reactions usually resolve in a few days to a few weeks. Such reactions may occur if the injection is given incorrectly (irritants in the skin cleansing agent or poor injection technique), or if the patient is allergic to somatropin or any non-medicinal ingredient (see CONTRAINDICATIONS).
- Rarely, subcutaneous administration of somatropin can result in lipoatrophy or lipohypertrophy. Regular rotation of the injection site may help reduce or prevent these reactions.

- Patients should be advised to consult their doctor if they notice any of the conditions described above.
- On rare occasions, injection site reactions may require discontinuation of somatropin therapy.

Systemic allergic reactions

- As with any protein, local or systemic allergic reactions may occur. Parents/patients should be informed that such reactions are possible and that prompt medical attention should be sought if allergic reactions occur.
- These reactions may be characterized by a generalized rash (with pruritus), shortness of breath, wheezing, angioneurotic edema and drop in blood pressure (see ADVERSE REACTIONS).
- Severe cases of generalized allergy including anaphylactic reaction may be life threatening (see CONTRAINDICATIONS).
- If any serious hypersensitivity or allergic reaction occurs, somatropin therapy should be discontinued immediately and appropriate therapy initiated.

Antibody production

- A small percentage of patients treated with somatropin may develop antibodies during treatment that could potentially reduce treatment response (see ADVERSE REACTIONS).
- Patients who have demonstrated an allergic reaction to other somatropin products may demonstrate an allergic reaction to HUMATROPE.

Intracranial Hypertension

- Intracranial hypertension with papilledema, visual changes, headache, nausea and/or vomiting has been reported in a small number of patients treated with somatropin. Symptoms usually occurred within the first eight weeks of initiation of somatropin therapy. In all reported cases, signs and symptoms of intracranial hypertension resolved after discontinuation of therapy or a reduction of somatropin dose (see DOSAGE AND ADMINISTRATION and ADVERSE REACTIONS).
- Funduscopic examination is recommended at the initiation and periodically during the course of somatropin therapy (see Monitoring and Laboratory Tests).

Musculoskeletal

- Musculoskeletal discomfort (pain, swelling and/or stiffness) may occur during treatment with somatropin (see ADVERSE REACTIONS). These symptoms may resolve spontaneously, with analgesic therapy, or after reducing the dosage (see DOSAGE AND ADMINISTRATION).
- Swelling of the hands and feet may occur during treatment with somatropin and may lead to carpal tunnel syndrome, which may be improved by decreasing the dosage of somatropin.
- Somatropin has not been shown to increase the occurrence of scoliosis. However, identification of a new scoliosis or progression of pre-existing scoliosis can occur in pediatric patients who experience rapid growth. Therefore, because somatropin increases growth rate, patients should be initially screened for presence of a scoliosis and patients with a history of scoliosis who are treated with somatropin should be monitored for progression of scoliosis.

- Slipped capital femoral epiphysis may occur more frequently in patients with endocrine disorders (including pediatric growth hormone deficiency, Turner syndrome and hypothyroidism) or in patients undergoing rapid growth. Any pediatric patient with the onset of a limp or complaints of hip or knee pain during somatropin therapy should be carefully evaluated (see Monitoring and Laboratory Tests).

Renal/Hepatic/Biliary/Pancreatic Impairments

- Somatropin should be discontinued from the time of renal transplantation until one year post-transplant (see CONTRAINDICATIONS).

Somatropin requirements may need to be adjusted in patients with renal and/or hepatic and/or biliary and/or pancreatic impairments.

Reproduction Studies

- No adequate and well-controlled studies with HUMATROPE on reproductive function have been performed (see Special Populations, Pregnant Women).

Sensitivity

Sensitivity to diluent (metacresol or glycerin)

- For patients with a known sensitivity to the diluent for HUMATROPE, and those who develop sensitivity to either metacresol or glycerin, HUMATROPE should not be reconstituted with the supplied diluent for HUMATROPE (see CONTRAINDICATIONS; DOSAGE AND ADMINISTRATION, Reconstitution and Specific Precautions).
- Only if sensitivity to the supplied diluent is present or develops, HUMATROPE in vials may be reconstituted with Sterile Water for Injection, USP. When reconstituted with Sterile Water for Injection the solution should be kept refrigerated at 2°-8°C and used within 24 hours. HUMATROPE in cartridges must be reconstituted ONLY with the supplied diluent. Patients who have or develop allergic reactions to HUMATROPE in cartridges should discontinue use of this product.

Information for Patients

Patients and/or their parents/caregivers should be informed about potential advantages and disadvantages of HUMATROPE therapy including the possible side effects. Patients should also be offered instructions for use of injection devices, storage, travelling and other pertinent information (see PART III CONSUMER INFORMATION).

Female patients should be advised to inform their doctor if they are, or become pregnant, or are contemplating pregnancy. Careful monitoring is essential in pregnant patients (see WARNINGS AND PRECAUTIONS, Special Populations and PART III CONSUMER INFORMATION).

Special Populations

Pediatric Patients (see INDICATIONS AND CLINICAL USE)

Children who have endocrine disorders, including growth hormone deficiency, may develop slipped capital femoral epiphyses more frequently than children in the general population. Any pediatric patient with onset of a limp during somatropin therapy should be evaluated.

Somatropin has not been shown to increase the occurrence of scoliosis. However, identification of a new scoliosis or progression of pre-existing scoliosis can occur in pediatric patients who experience rapid growth. Therefore, because somatropin increases growth rate, patients should be initially screened for presence of a scoliosis and patients with a history of scoliosis who are treated with somatropin should be monitored for progression of scoliosis.

Children treated with somatropin may have an increased risk of developing pancreatitis compared to adults. Although rare, pancreatitis should be considered in somatropin-treated children who develop abdominal pain (see ADVERSE REACTIONS).

Some of the height gain obtained with somatropin treatment may be lost if treatment is stopped before final height is reached.

Turner Syndrome: see Congenital Disorders.

Idiopathic Short Stature: Other medical reasons or treatments that could explain growth disturbance should be ruled out before starting HUMATROPE treatment for children with idiopathic short stature (ISS). HUMATROPE treatment for ISS should be prescribed only for those patients whose epiphyses are not closed and should be managed by physicians who have sufficient knowledge of ISS and the efficacy/safety profile of HUMATROPE.

Small for Gestational Age: In short children born small for gestational age (SGA) other medical reasons or treatments that could explain growth disturbance should be ruled out before starting treatment with somatropin [HUMATROPE]. Experience with SGA patients with Silver-Russell syndrome is limited, as is experience in initiating treatment in SGA patients near onset of puberty.

In short children born SGA, it is recommended that IGF-I concentrations should be measured before initiation of treatment and monitored regularly thereafter. If on repeated measurements IGF-I concentrations exceed +2 SD compared to references for age and pubertal status, the IGF-I/IGFBP-3 ratio could be taken into account to consider dose adjustment.

Adult Patients: Patients with epiphyseal closure who were treated with somatropin therapy in childhood should be re-evaluated according to the criteria provided in INDICATIONS AND CLINICAL USE before continuation of somatropin therapy at the reduced dose level required for growth hormone-deficient adults.

Experience with prolonged treatment in adults is limited. Adverse events such as peripheral edema, myalgia, arthralgia, and paresthesiae have been reported during post-marketing studies (see ADVERSE REACTIONS).

Growth hormone deficiency in the adult is a lifelong condition and should be treated accordingly. Experience with patients over sixty years of age is limited.

Based on assessment of clinical trial data, post-marketing data, and spontaneous reports, carpal tunnel syndrome appears to occur more frequently in patients over 40 years of age than in younger patients. In almost half of the reported cases, the recommended maximum somatropin dose had been exceeded. In the majority of cases, the condition resolved spontaneously or with a decrease in dosage, interruption of treatment, or discontinuation of treatment. The maximum recommended dosage should not be exceeded.

Pregnant women: There are no adequate and well controlled studies of HUMATROPE treatment in pregnant women. Therefore, the safety of HUMATROPE has not been established in this subpopulation. It is not known whether HUMATROPE can cause fetal harm when administered to a pregnant woman. HUMATROPE should be given to a pregnant woman only if the benefits clearly outweigh the risks and only under medical supervision.

Female patients should be advised to inform their doctor if they are, or become pregnant, or are contemplating pregnancy.

Nursing women: There are no studies of HUMATROPE treatment in nursing women. It is not known whether somatropin is excreted in human milk. Due to its large molecular weight, it is unlikely that somatropin would be passed intact into human breast milk, and absorption of intact protein from the gastrointestinal tract of the infant is also unlikely. However, secretion of breakdown products of somatropin in breast milk has not been studied. Therefore, somatropin should be used with caution in nursing women.

Geriatrics (≥ 65 years of age): The safety and effectiveness of somatropin have not been established in patients aged ≥ 65 years.

Older patients may be at greater risk of adverse reactions. A lower starting dose and smaller dose increments should be considered for older patients.

Obese patients: Obese individuals are more likely to manifest adverse effects when treated with a weight-based regimen (see DOSAGE AND ADMINISTRATION).

Monitoring and Laboratory Tests

It is recommended that insulin-like growth factor-I (IGF-I) concentrations be monitored regularly and maintained within the normal range for age and sex (see WARNINGS AND PRECAUTIONS, General).

Patients with Prader-Willi syndrome should be evaluated for signs of upper airway obstruction and sleep apnea before initiation of treatment with somatropin. If a somatropin-treated patient shows signs of upper airway obstruction (including onset of or increased snoring) and/or new onset of sleep apnea, treatment should be interrupted. All patients with Prader-Willi syndrome treated with somatropin should also have effective weight control and be monitored for signs of respiratory infection, which should be diagnosed as early as possible and treated aggressively (see CONTRAINDICATIONS and WARNINGS AND PRECAUTIONS, Congenital Disorders).

Patients with Turner syndrome should be evaluated carefully for otitis media and other ear disorders before and during treatment with somatropin because these patients have an increased risk of ear and hearing disorders (see ADVERSE REACTIONS).

Patients with Turner syndrome are at risk for cardiovascular disorders (e.g. hypertension, stroke, and aortic dilatation, aneurysm and dissection) and these patients should be monitored closely for development or worsening of these conditions before and during treatment with somatropin.

Patients with Turner syndrome have an inherently increased risk of developing autoimmune thyroid disease. Therefore, these patients should have periodic thyroid function tests performed and be treated appropriately (see Endocrine and Metabolism).

Because somatropin may induce a state of insulin resistance, patients should be closely monitored during somatropin therapy for evidence of glucose intolerance (see Endocrine and Metabolism).

In patients with hypopituitarism standard hormonal replacement therapy should be monitored closely when somatropin therapy is administered (see Endocrine and Metabolism).

Because inadequate treatment of hypothyroidism may prevent optimal response to somatropin, thyroid function should be evaluated before starting somatropin therapy and should be monitored regularly during treatment, not less frequently than annually (see Endocrine and Metabolism).

Bone age should be monitored periodically during somatropin administration.

Patients with growth hormone deficiency secondary to an intracranial lesion should be examined frequently for progression or recurrence of the underlying disease process.

Patients with an intra- or extra-cranial neoplasm in remission who are receiving treatment with somatropin should be examined carefully and at regular intervals by the physician. Patients who develop neoplasia should be reported to Health Canada by the treating physician.

For patients receiving somatropin therapy, physicians should be aware of the potential for development of neoplasia, or for recurrence of a previous neoplasm. Treatment should be discontinued if a new tumour or signs of relapse are detected.

In short children born SGA, it is recommended that IGF-I concentrations should be measured before initiation of treatment and monitored regularly thereafter. If on repeated measurements IGF-I concentrations exceed +2 SD compared to references for age and pubertal status, the IGF-I/IGFBP-3 ratio could be taken into account to consider dose adjustment.

In case of persistent edema or severe paraesthesia, the dosage should be decreased in order to avoid the development of carpal tunnel syndrome (see ADVERSE REACTIONS).

Intracranial hypertension has been recognized as a complication early in somatropin treatment. The diagnosis is made on the basis of clinical symptoms such as severe, persistent or recurrent

headache, visual problems, nausea and/or vomiting, papilledema and temporal relationship to somatropin. Physicians and parents should be attentive to these symptoms. Funduscopy examination should be performed routinely before initiating treatment with somatropin to exclude pre-existing papilledema and should be repeated if there is any clinical suspicion of intracranial hypertension. If papilledema is confirmed by funduscopy, somatropin treatment should be stopped. Intracranial hypertension usually resolves rapidly when somatropin treatment is withdrawn. If symptoms and signs of intracranial hypertension resolve somatropin treatment can be restarted at a lower dose. If somatropin treatment is restarted, careful monitoring for symptoms of intracranial hypertension is necessary, and treatment should be discontinued if intracranial hypertension recurs. At present, there is insufficient evidence to guide clinical decision making in patients with resolved intracranial hypertension.

ADVERSE REACTIONS

Adverse Drug Reaction Overview

The data presented below reflect the findings from clinical trials and post-marketing experience of treatment with HUMATROPE (somatropin).

Clinical Trial Adverse Drug Reactions

Because clinical trials are conducted under very specific conditions, the adverse reaction rates observed in the clinical trials may not reflect the rates observed in practice and should not be compared to the rates in the clinical trials of another drug. Adverse drug reaction information from clinical trials is useful for identifying drug-related adverse events and for approximating rates.

Table 1
Adverse Reactions from All Clinical Trial Sources by Body System

Body System	Adverse Reactions	Frequency
<i>Body as a whole</i>	Injection site reaction	≥ 1% and < 10%
	Hypersensitivity to diluent	≥ 1% and < 10%
	Localized muscle pain	≥ 0.01% and < 0.1% (pediatric) ≥ 1% and < 10% (adults)
	Benign intracranial hypertension	≤ 0.1%
<i>Endocrine</i>	Hypothyroidism	≥ 10%
<i>Metabolic</i>	Edema	≥ 1% and < 10% (pediatric); ≥ 10% (adults)
	Hyperglycemia	< 1% (pediatric); ≥ 1% and < 10% (adults)
<i>Musculoskeletal</i>	Arthralgia	≥ 10% (adults)
	Progression of scoliosis	≥ 1% and < 10% (pediatric)
<i>Nervous</i>	Carpal tunnel syndrome	≥ 1% and < 10% (adults)
	Paresthesias	≥ 1% and < 10% (adults)

Healthy Adult Volunteers: In clinical studies in which high doses of HUMATROPE were administered to healthy adult volunteers, the following events occurred infrequently: headache, localized muscle pain, weakness, mild hyperglycemia and glucosuria.

Growth Hormone-deficient Pediatric Patients: As with all protein pharmaceuticals, a small percentage of patients may develop antibodies to the protein. During the first six months of HUMATROPE (somatropin) therapy in 314 naive patients, only 1.6% developed specific antibodies to HUMATROPE (binding capacity ≥ 0.02 mg/L) and none had antibody concentrations that exceeded 2 mg/L. Over the course of 8 years of this study 2 patients (0.6%) had an antibody binding capacity of > 2 mg/L. It has been reported that growth attenuation from pituitary-derived growth hormone may occur when antibody concentrations are > 1.5 mg/L, however, neither patient demonstrated a decrease in growth velocity at or near the time of increased antibody production.

In studies with growth hormone-deficient pediatric patients, injection site pain was reported infrequently. Mild and transient edema, (either localized or generalized) was observed in 2.5% of patients during the course of treatment in the study described above.

Leukemia has been reported in a small number of pediatric patients who have been treated with growth hormone, including growth hormone of pituitary origin, and recombinant somatrem and somatropin. The relationship, if any, between leukemia and growth hormone is uncertain.

Growth Hormone-deficient Adult Patients: In the first 6 months of placebo-controlled, blinded trials, adult-onset growth hormone deficient patients who received somatropin [HUMATROPE] experienced a statistically significant increase in edema (HUMATROPE 17.3% vs. placebo 4.4%, ($p = 0.043$) and peripheral edema, relative to patients who received placebo injections (11.5% vs. 0% respectively, ($p = 0.017$).

In patients with adult-onset growth hormone deficiency, edema, muscle pain, and joint pain and joint disorder were reported early in therapy and tended to be transient or responsive to dosage titration.

Two of 113 adult onset patients developed carpal tunnel syndrome after beginning maintenance therapy without a low dose (0.00625 mg/kg/day) lead-in phase. Symptoms abated in these patients after dosage reduction.

In growth hormone-deficient adults, treatment-emergent adverse events reported after 18 months of therapy, which were possibly related to replacement therapy but were not statistically significant during the first 6 months, included: carpal tunnel syndrome, edema, arthralgia, paresthesia, hypesthesia, myalgia, peripheral edema, back pain, headache and joint disorder.

Adult patients treated with somatropin, following diagnosis of growth hormone deficiency in childhood, reported side effects less frequently than those with adult onset growth hormone deficiency.

Patients with Turner Syndrome: Patients with Turner syndrome have an increased risk of ear or hearing disorders. In a randomized, concurrently controlled clinical trial, patients who received somatropin [HUMATROPE] had statistically significantly greater rates of otitis media, (43% vs. 26%) ear disorders (18% vs. 5%) and surgical procedures (45% vs. 27%) than patients who received no treatment (see WARNINGS AND PRECAUTIONS, Congenital Disorders).

Patients with Idiopathic Short Stature: In a placebo-controlled study, there were no significant differences between the HUMATROPE-treated (0.222 mg/kg/week) and placebo-treated groups for any of the non-serious, clinically significant treatment-emergent adverse events (see Table 2). Mean serum glucose concentration did not change during HUMATROPE treatment. Mean fasting serum insulin concentrations increased 10% in the HUMATROPE treatment group at the end of treatment relative to baseline values, but remained within the normal reference range. For the same duration of treatment, the mean fasting serum insulin concentration decreased by 2% in the placebo group. The occurrence of above-range values for glucose, insulin, and HbA_{1c} were similar in the HUMATROPE and placebo-treated groups. No patient developed diabetes mellitus. Consistent with the known mechanism of growth hormone action, HUMATROPE-treated patients had greater mean increases, relative to baseline, in serum insulin-like growth factor-I (IGF-I) than placebo-treated patients at each study observation. However, there was no significant difference between the HUMATROPE and placebo treatment groups in the proportion of patients who had at least one serum IGF-I concentration more than 2.0 SD above the age- and gender-appropriate mean (HUMATROPE: 9 of 35 patients [26%]; placebo: 7 of 28 patients [25%]). There is no available information regarding IGF-I concentrations at the recommended dose of 0.37 mg/kg/week.

Table 2
Nonserious Clinically Significant Treatment-Emergent Adverse Events* by Treatment Group in Idiopathic Short Stature

Adverse Event	Treatment Group	
	HUMATROPE	Placebo
Total Number of Patients	37	31
Scoliosis	7 (18.9%)	4 (12.9%)
Otitis media	6 (16.2%)	2 (6.5%)
Hyperlipidemia	3 (8.1%)	1 (3.2%)
Gynecomastia	2 (5.4%)	1 (3.2%)
Hypothyroidism	0	2 (6.5%)
Aching joints	0	1 (3.2%)
Hip pain	1 (2.7%)	0
Arthralgia	4 (10.8%)	1 (3.2%)
Arthrosis	4 (10.8%)	2 (6.5%)
Myalgia	9 (24.3%)	4 (12.9%)
Hypertension	1 (2.7%)	0

* Coding of adverse events was performed using the Medical Dictionary for Regulatory Activities (MedDRA).

The adverse events observed in the dose-response study (239 patients treated for 2 years) did not indicate a pattern suggestive of a somatropin dose effect. Among HUMATROPE dose groups, mean fasting blood glucose, mean glycosylated hemoglobin, and the occurrence rates of elevated fasting blood glucose concentrations were similar. One patient developed abnormalities of carbohydrate metabolism (glucose intolerance and slightly elevated HbA_{1c}) on treatment, which resolved when treatment was discontinued.

Five patients discontinued from the clinical trials because of adverse events. One patient discontinued from the placebo-controlled study following diagnosis of Stage 3B Hodgkin disease after 19 weeks of HUMATROPE treatment. It was subsequently determined on the basis of clinical, radiographic and laboratory findings that subclinical Hodgkin disease was likely present at study entry. One placebo-treated patient discontinued the study after an accidental injury. One patient in the dose-response study discontinued following diagnosis of a desmoplastic small round cell tumour after 6.4 years of HUMATROPE treatment and died 4 years later. It was subsequently determined that the tumour had an abnormal karyotype typically associated with this type of tumour. Neither case of neoplasia in the ISS studies was considered causally related to HUMATROPE exposure. Two additional patients discontinued from the dose-response study due to adverse events: one patient discontinued after diagnosis of a slipped capital femoral epiphysis following trauma; one patient was withdrawn from the study due to decreased glucose tolerance. Both events have been previously reported in patients receiving somatotropin.

The impact of ethnicity was not evaluated in the clinical trials for idiopathic short stature.

Patients with SHOX Deficiency: Clinically significant adverse events (adverse events previously observed in association with growth hormone treatment in general) were assessed prospectively during the 2-year randomized, open-label study; those observed are presented in Table 3. In both treatment groups, the mean fasting plasma glucose concentration at the end of the first year was similar to the baseline value and remained in the normal range. No patient developed diabetes mellitus or had an above normal value for fasting plasma glucose at the end of one-year of treatment. During the 2 year study period, the proportion of patients who had at least one IGF-I concentration greater than 2.0 SD above the age- and gender-appropriate mean was 10 of 27 [37.0%] for the HUMATROPE-treated group vs. 0 of 24 patients [0.0%] for the untreated group. The proportion of patients who had at least one IGFBP-3 concentration greater than 2.0 SD above the age and gender appropriate mean was 16 of 27 [59.3%] for the HUMATROPE treated group vs. 7 of 24 [29.2%] for the untreated group. There were no discontinuations due to adverse events in this study. No serious adverse events were reported for patients with SHOX Deficiency.

Table 3
Clinically Significant Treatment-Emergent Adverse Events^{a,b} by Treatment Group in Patients with SHOX Deficiency

Adverse Event	Treatment Group	
	Untreated	HUMATROPE
Total Number of Patients	25	27
Patients with at least one event	2	5
Arthralgia	2 (8.0%)	3 (11.1%)
Gynecomastia ^c	0 (0.0%)	1 (8.3%)
Excessive number of cutaneous nevi	0 (0.0%)	2 (7.4%)
Scoliosis	0 (0.0%)	1 (3.7%)

^a All events were non-serious.

^b Events are included only if reported for a greater number of HUMATROPE-treated than Untreated patients.

^c Percentage calculated for males only (1/12).

Patients Born Small for Gestational Age: The safety of HUMATROPE treatment in children born small for gestational age was assessed in 2 clinical trials (Study GDGB and Study 0908) and one observational study (Study GDFC) (see CLINICAL TRIALS, Effects of HUMATROPE on Pediatric Patients Born Small for Gestational Age).

In Study GDGB, a randomized, open label study, 4 patients discontinued due to adverse events, 3 from the Fixed High Dose (FHD) (0.067 mg/kg/day) group (1 patient each for impaired fasting glucose, mood alteration and pain in extremity) and 1 patient from the Individually Adjusted Dose (IAD) (0.035 mg/kg/day, then increased to 0.067 mg/kg/day) group (focal glomerulosclerosis).

Adverse events possibly or probably related to HUMATROPE are provided in Table 4. The most frequently reported of these adverse drug reactions was headache, for which there was a suggestion of a modest dose-response (FHD, 9%; IAD, 3%). There were no clear cut cases of new-onset diabetes mellitus, no children treated for hyperglycemia, and no children whose fasting blood glucose exceeded 7 mmol/L at any time during the study. However, 6 children (4 in the FHD group and 2 in the IAD group whose dose was increased from 0.035 mg/kg/day to 0.067 mg/kg/day [one at Month 3 and one at Year 1]) manifested impaired fasting glucose at Year 2. Two of these six children had impaired fasting glucose during the study as well, and one of them was required to discontinue HUMATROPE at Month 15 as a consequence.

A modestly dose-dependent increase in mean serum IGF-I concentrations within the reference range was observed; of note, 20-25% (depending on treatment group) of the children who had IGF-I results available at study completion had serum IGF-I values above the upper limit of the normal range for age and sex (above +2 SDS). Eight children in the FHD group and 2 in the IAD group required somatropin dose reduction due to high IGF-I (above +2.5 SDS) or the combination of IGF-I above +0.5 SDS and IGFBP-3 below -0.5 SDS.

Table 4 presents adverse drug reactions reported at a frequency of $\geq 1\%$ in Study GDGB, listed in descending order of frequency within system organ class.

Table 4
Adverse Drug Reactions* with Frequency $\geq 1\%$ in Study GDGB

System Organ Class	Preferred Term	FHD (N=99) n (%)	IAD (N=94) n (%)	Total (N=193) n (%)
Ear and labyrinth disorders	Vertigo	1 (1)	1 (1)	2 (1)
Endocrine disorders	Hypothyroidism	2 (2)	2 (2)	4 (2)
General disorders and administration site conditions	Fatigue	2 (2)	1 (1)	3 (2)
	Injection site pain	2 (2)	1 (1)	3 (2)
	Edema	0 (0)	2 (2)	2 (1)
Investigations	Blood insulin increased	4 (4)	3 (3)	7 (4)
	Low density lipoprotein decreased	3 (3)	1 (1)	4 (2)
Musculoskeletal and connective tissue disorders	Pain in extremity	3 (3)	6 (6)	9 (5)
	Arthralgia	1 (1)	2 (2)	3 (2)
	Limb deformity	2 (2)	0 (0)	2 (1)

System Organ Class	Preferred Term	FHD (N=99) n (%)	IAD (N=94) n (%)	Total (N=193) n (%)
Neoplasms benign, malignant and unspecified (including cysts and polyps)	Melanocytic nevus	2 (2)	0 (0)	2 (1)
Nervous system disorders	Headache	9 (9)	3 (3)	12 (6)
	Psychomotor hyperactivity	1 (1)	3 (3)	4 (2)
Psychiatric disorders	Aggression	1 (1)	1 (1)	2 (1)
Respiratory, thoracic and mediastinal disorders	Adenoidal hypertrophy	0 (0)	3 (3)	3 (2)

N = total number in treatment group; n = number for whom event was reported; FHD = fixed high dosage (0.067 mg/kg/day); IAD = individually-adjusted dosage (0.035 to 0.067 mg/kg/day).

*Terms designated by investigator as related to study drug in at least one patient.

In Study 0908, treatment-emergent adverse events (TEAEs) were reported for 30/35 (86%) of study participants. Because of the size of this study, all events were reported at a frequency of > 1%. The most frequently reported non-serious TEAEs were typical childhood illnesses, such as nasopharyngitis (29%) and bronchitis, gastroenteritis, influenza and vomiting (14% for each event). Gynecomastia was reported for 13% of males. In addition, the following events were each reported for 11% of study patients: arthralgia, headache, injection site pain, pyrexia; the following events were reported for 9% of patients: asthenia, cough, eczema, pharyngitis, pharyngolaryngeal pain, rhinitis; the following events were reported for 6% of patients: appendicitis, ear infection, hyperthermia, hypothyroidism, joint sprain, lymphadenopathy, tracheitis, tracheobronchitis. No patient was reported to have discontinued the study because of an adverse event.

In the observational study GDFC, non-serious TEAEs were reported for 76 of 379 (20%) children with a study entry diagnosis of short stature due to small for gestational age birth, who were naïve to treatment at study entry and had at least one post-baseline visit. The majority of these events were typical childhood illnesses or injuries unlikely to have been related to HUMATROPE treatment.

Less Common Clinical Trial Adverse Drug Reactions (< 1%)

The following list provides the adverse events reported with a frequency of < 1% in studies GDGB and GDFC that were designated by the investigators as possibly-related to the study drug, or for which no designation was made: abnormal behaviour, back pain, blood thyroid stimulating hormone increased, cardiovascular disorder, carpal tunnel syndrome, contusion, eyelid edema, epiphysiolysis (slipped capital femoral epiphysis), hyperinsulinemia, hypertension, impaired fasting glucose, injection site bruising, injection site hematoma, injection site induration, injection site pain, injection site vesicles, mood altered, muscle mass, nervousness, periorbital edema, precocious puberty, puberty, tonsillar hypertrophy, type 2 diabetes mellitus, and visual disturbance. In study 0908, there were no events reported with a frequency of < 1%, due to study size (n = 35).

Post-Marketing Adverse Drug Reactions

In addition to the Clinical Trial Adverse Reactions listed in Table 1, the Adverse Reactions shown in Table 5 have been noted in post-marketing studies.

Table 5
Adverse Reactions from Post-Marketing Studies by Body System

Body System	Adverse Reactions	Frequency
Respiratory	Dyspnea	≥ 1% and < 10% (adults)
	Sleep apnea	≥ 1% and < 10% (adults)
Vascular	Hypertension	≥ 1% and < 10% (adults)
Metabolic	Type 2 diabetes mellitus	≥ 0.1% and < 1% (pediatric)*

*Adult cases of type 2 diabetes mellitus were reported spontaneously

DRUG INTERACTIONS

Drug-Drug Interactions

Potential drug interactions are tabulated below (Table 6).

Table 6
Established or Potential Drug-Drug Interactions with HUMATROPE (somatropin)

Therapeutic Class	Effects	Clinical comments
Glucocorticoids	Inhibition of 11β-hydroxysteroid dehydrogenase type 1 (11βHSD-1). Somatropin inhibits the liver enzyme 11βHSD-1 which is required for conversion of administered cortisone and prednisone to their active metabolites, cortisol and prednisolone, respectively. In addition, somatropin may enhance the activity of CYP3A4, a cytochrome P450 enzyme involved in glucocorticoid catabolism. Therefore, by increasing the activity of CYP3A4, somatropin could potentially decrease serum cortisol concentration.	In patients treated with somatropin, previously undiagnosed secondary (central) hypoadrenalism may be unmasked and may require glucocorticoid replacement therapy. In addition, patients treated with glucocorticoid replacement therapy for previously diagnosed hypoadrenalism may require an increase in their maintenance or stress doses. If glucocorticoid replacement therapy is required for newly-diagnosed or preexisting hypoadrenalism, dosage and compliance should be monitored carefully to avoid either inhibition of growth promoting effects of somatropin, or adrenal insufficiency; increases in maintenance or stress doses of glucocorticoids may be required after initiation of somatropin. Because somatropin may both inhibit 11βHSD-1 and induce activity of CYP3A4, careful monitoring of serum cortisol concentrations is required for all patients receiving concomitant glucocorticoid and somatropin therapy.

Therapeutic Class	Effects	Clinical comments
Cytochrome P450 Metabolized Drugs	Somatropin can increase cytochrome P450 (CYP) liver enzyme activity and CYP3A mediated antipyrine clearance in humans and may result in reduced plasma concentrations and decreased effectiveness of drugs metabolized by CYP3A such as sex steroids (for example, estrogen or oral contraceptives), cyclosporine and some anticonvulsants.	Careful monitoring is advised when somatropin is administered in combination with drugs metabolized by CP450 liver enzymes.
Insulin and Anti-hyperglycemic Agents	Patients with diabetes mellitus who receive concomitant somatropin may require adjustment of their doses of insulin and/or other anti-hyperglycemic agents.	Because somatropin may induce a state of insulin resistance, patients who receive somatropin should be monitored for evidence of abnormal glucose metabolism and/or diabetes mellitus. New-onset type 2 diabetes mellitus has been reported in children and adults receiving somatropin.

Drug-Food Interactions

Interactions with food have not been established.

Drug-Herb Interactions

Interactions with herbal products have not been established.

Drug-Laboratory Tests Interactions

For interactions between HUMATROPE and laboratory tests, see WARNINGS AND PRECAUTIONS, Monitoring and Laboratory Tests subsection.

DOSAGE AND ADMINISTRATION

Dosing Considerations

The patient's medical history for hypersensitivity reactions should be carefully evaluated prior to HUMATROPE administration (see WARNINGS AND PRECAUTIONS, Sensitivity).

Adult Patients: Patients with epiphyseal closure who were treated with somatropin therapy in childhood should be re-evaluated according to the criteria in INDICATIONS AND CLINICAL USE before continuation of somatropin therapy at the reduced dose level required for growth hormone-deficient adults.

A lower starting dose and smaller dose increments should be considered for older patients, who are more prone to the adverse effects of somatropin than younger individuals. In addition, obese individuals are more likely to manifest adverse effects when treated with a weight-based regimen. A lower starting dose may be necessary in obese patient

Oral Estrogen: Because oral estrogens may reduce the serum IGF-I response to somatropin treatment, girls and women receiving oral estrogen replacement may require greater

HUMATROPE dosage.

Recommended Dose and Dosage Adjustment

The dosage and administration schedule for HUMATROPE (somatropin) should be individualized for each patient and the condition for which he or she is being treated, and should be determined based on guidance of a physician experienced in the care of patients with growth hormone deficiency and growth disorders (see Table 7). Clinicians should carefully monitor the growth response in all children, and adjust the HUMATROPE dose as necessary.

Table 7
Recommended Dose and Administration Schedule for HUMATROPE

Indication	Recommended dose (mg/kg body weight)	Route	Comments
GH-deficient pediatric patients	0.18 mg/kg/week (Daily equivalent dose of 0.026 mg/kg/day) Maximum: 0.3 mg/kg/week (Daily equivalent dose of 0.043 mg/kg/day)	SC	Divide into equal doses given on: • 3 alternate days OR • 6-7 times/week OR • daily
GH-deficient adult patients	Initiate at not more than 0.006 mg/kg/day Maximum: 0.0125 mg/kg/day	SC	Should be titrated • adverse effects (increasing age or excessive body weight may require dose reductions) • to maintain IGF-I < upper limit of normal for age and sex
Patients with Turner syndrome	Up to 0.375 mg/kg/week (Daily equivalent dose of up to 0.054 mg/kg/day)	SC	Divide into equal doses given: • daily OR • on 3 alternate days
Patients with idiopathic short stature	Up to 0.37 mg/kg/week (Daily equivalent dose of 0.053 mg/kg/day)	SC	Divided into equal doses given 6 to 7 times per week
Patients with SHOX deficiency	0.35 mg/kg/week (Daily equivalent dose of 0.050 mg/kg/day)	SC	Divided into equal doses given 6 to 7 times per week
Patients born small for gestational age**	Up to 0.47 mg/kg/week (Daily equivalent dose of 0.067 mg/kg/day)	SC	Divided into equal doses given 6 to 7 times per week
** It is recommended that treatment be initiated with larger doses of somatropin (e.g. 0.067 mg/kg/day), especially in very short children (i.e. height SDS $\leq$ 3) and/or older pubertal children. A reduction in dosage (e.g. to 0.035 mg/kg/day) should be considered if substantial catch-up growth is observed during the first few years of therapy.			

In younger SGA children (approximately < 4 years of age) with less severe short stature (i.e. baseline height SDS values between -2 and -3), consideration should be given to initiating treatment with a lower dose (e.g. 0.035 mg/kg/day), then titrating the dose as needed.

SC=subcutaneous; SDS= standard deviation score; SHOX = *short stature homeobox-containing gene*

It is recommended that IGF-I concentrations be monitored regularly and maintained within the normal range for age and sex. When IGF-I concentrations are higher than the normal range, a dose reduction should be considered.

Administration

HUMATROPE should be administered subcutaneously and the injection site should be rotated to minimize the risk of lipodystrophy.

HUMATROPE treatment for improvement of linear growth in childhood should be administered to pediatric patients whose epiphyses have not closed. For patients whose height velocity in the first year of treatment does not improve by at least 50% above the pre-treatment height velocity, consideration should be given to the following:

- Is the patient receiving the correct dosage and frequency of the medication?
- Is the growth disorder diagnosis correct?
- Does the patient have a coexistent condition that may impair growth (such as hypothyroidism, a gastrointestinal disorder or severe psychological disturbance)?
- Is the patient receiving adequate nutrition?
- Is the patient receiving a concomitant medication that may impair response to HUMATROPE (such as systemic glucocorticoids or stimulant medications)?

If no underlying reason for a suboptimal response to HUMATROPE treatment can be found, dosage adjustment or discontinuation of treatment should be considered.

In pediatric patients with non-growth hormone deficient growth disorders receiving HUMATROPE for improvement of linear growth, consideration should be given to discontinuation of treatment when growth is nearly complete, as evidenced by:

- Height velocity less than 2.0 cm per year,
- Bone age of 14 years or greater in girls or 16 years or greater in boys.

Reconstitution and Specific Precautions

A puncture resistant container should be used for the disposal of used needles and syringes. Patients and/or caregivers should be thoroughly instructed in the importance of proper needle disposal and cautioned against the reuse of needles and syringes.

HUMATROPE Vials

Reconstitute each vial of HUMATROPE with 1.5 to 5 mL of diluent for HUMATROPE. Inject the diluent for HUMATROPE (metacresol and glycerin solution) into the vial of HUMATROPE aiming the stream of liquid against the glass wall. Following reconstitution, swirl the vial with a GENTLE ROTARY motion until the contents are completely dissolved. DO NOT SHAKE. The resulting solution should be clear, without particulate matter. If the solution is cloudy or contains particulate matter, the contents MUST NOT be injected.

Before and after injections, the septum of the vial should be wiped with rubbing alcohol or another alcoholic antiseptic solution to prevent contamination of the contents by repeated needle insertions. HUMATROPE should be administered using sterile, disposable syringes and needles. The syringes should be of small enough volume that the prescribed dose can be drawn from the vial with reasonable accuracy. If intramuscular injection is intended, the needle should be of sufficient length (usually 1 inch or more) to ensure that the injection reaches the muscular layer.

If sensitivity to the diluent should occur, HUMATROPE in vials may be reconstituted with Sterile Water for Injection, USP. When reconstituted with Sterile Water for Injection, USP, the solution should be used immediately after reconstitution and the unused portion discarded. Although not recommended, the solution can be stored refrigerated (2° to 8°C) but must be used within 24 hours.

HUMATROPE Cartridges

Each HUMATROPE cartridge (for use with the HumatroPen[®]) should be reconstituted using the accompanying diluent syringe. To reconstitute, attach the cartridge to the pre-filled diluent syringe according to the instructions provided with the HUMATROPE Cartridge Kit and slowly inject the entire contents of the pre-filled diluent syringe into the cartridge. The diluent needle aims the stream of liquid against the wall of the cartridge. Following reconstitution, gently invert the cartridge up and down 10 times until the contents are completely dissolved. **DO NOT SHAKE.** The resulting solution should be clear, without particulate matter. If the solution is cloudy or contains particulate matter, the contents **MUST NOT** be injected. If the solution is clear, the cartridge is ready to be attached to the HumatroPen. For complete instructions on the reconstitution of HUMATROPE cartridges, please refer to the reconstitution instruction leaflet provided with all HUMATROPE cartridges.

The diluent syringe is for single use only. Discard it after use in a puncture-resistant container.

HUMATROPE cartridges are designed for use only with the HumatroPen family of pens. A sterile needle should be used for each administration of somatropin.

For complete instructions on the use of the HumatroPen, see the relevant HumatroPen Instruction Manual.

OVERDOSAGE

For management of a suspected drug overdose, contact your regional Poison Control Centre.

Acute overdosage could lead initially to hypoglycemia and subsequently to hyperglycemia. Long-term overdosage could result in signs and symptoms of gigantism or acromegaly, consistent with the known effects of excess endogenous human growth hormone. See Recommended Dose and Dosage Adjustments, Table 7.

ACTION AND CLINICAL PHARMACOLOGY

Mechanism of Action

The following actions have been demonstrated for HUMATROPE (somatropin) and/or human growth hormone of pituitary origin.

1. Tissue Growth:

- a. *Skeletal Growth:* Somatropin stimulates skeletal growth in pediatric patients with growth hormone deficiency. The measurable increase in body length/height after administration of either HUMATROPE or human growth hormone of pituitary origin results from an effect on the growth plates of long bones. Serum concentrations of IGF-I play a role in skeletal growth. Serum IGF-1 concentrations are low in growth hormone-deficient pediatric patients but increase during treatment with HUMATROPE. Elevations in mean serum alkaline phosphatase concentrations are also seen.
- b. *Cell Growth:* It has been shown that there are fewer skeletal muscle cells in short-statured pediatric patients who lack endogenous growth hormone as compared to normal pediatric populations. Treatment with human growth hormone of pituitary origin has been reported to increase both the number and the size of muscle cells.

2. Protein Metabolism:

Linear growth is facilitated in part by increased cellular protein synthesis. Nitrogen retention as demonstrated by decreased urinary nitrogen excretion and serum urea nitrogen, follows the initiation of therapy with human growth hormone of pituitary origin. Treatment with HUMATROPE results in a similar decrease in serum urea nitrogen.

3. Carbohydrate Metabolism:

Pediatric patients with hypopituitarism sometimes experience fasting hypoglycemia, which is improved by treatment with HUMATROPE. Large doses of somatropin may impair glucose tolerance. Untreated patients with Turner syndrome have an increased incidence of glucose intolerance. Administration of somatropin to healthy adults or patients with Turner syndrome resulted in increases in mean serum fasting and postprandial insulin concentrations, although mean values remained in the normal range. In addition, mean fasting and postprandial glucose and hemoglobin A_{1c} concentrations remained in the normal range.

4. Lipid Metabolism:

In growth hormone-deficient patients, long-term administration of human growth hormone of pituitary origin has resulted in lipid mobilization, reduction in body fat stores, and an increase in plasma fatty acids.

5. Mineral Metabolism:

Retention of sodium, potassium and phosphorus is induced by human growth hormone of pituitary origin. Serum concentrations of inorganic phosphate increased in patients with growth hormone deficiency after therapy with HUMATROPE or human growth hormone of pituitary origin. Serum calcium is not significantly altered in patients treated with either human growth hormone of pituitary origin or HUMATROPE.

HUMATROPE stimulates linear growth in pediatric patients who lack adequate normal endogenous growth hormone, and in children with short stature in association with Turner syndrome, idiopathic short stature, SHOX deficiency, and failure to catch up in height after small of gestational age birth. Treatment of growth hormone-deficient pediatric patients and patients with Turner syndrome with HUMATROPE produces increased growth rate and IGF-I concentrations similar to those seen in therapy with human growth hormone of pituitary origin.

As a result of replacement therapy in growth hormone deficient adults, body composition improved, HDL cholesterol values normalized, and health related quality of life measures concerning physical mobility and social isolation improved in placebo-controlled clinical trials. Exercise capacity improved as compared to placebo.

Pharmacokinetics

In vitro, preclinical, and clinical testing have demonstrated that HUMATROPE is therapeutically equivalent to human growth hormone of pituitary origin with equivalent pharmacokinetics in normal adults.

Absorption: HUMATROPE has been studied following intramuscular, subcutaneous and intravenous administration in adult volunteers. The absolute bioavailability of somatropin is 75% and 63% after subcutaneous and intramuscular administration respectively.

Distribution: The volume of distribution of somatropin after intravenous injection is about 0.07 L/kg.

Metabolism: Extensive metabolism studies have not been conducted. The metabolic fate of somatropin involves classical protein catabolism in both the liver and kidneys. In renal cells, at least a portion of the breakdown products of somatropin is returned to the systemic circulation. In normal volunteers, mean clearance is 0.14 L/hr/kg. The mean half-life of intravenous somatropin is 0.36 hours, whereas subcutaneously and intramuscularly administered somatropin have mean half-lives of 3.8 and 4.9 hours, respectively. The longer half-life observed after subcutaneous or intramuscular administration is due to slow absorption from the injection site.

Excretion: Urinary excretion of intact HUMATROPE has not been measured. Small amounts of somatropin have been detected in the urine of pediatric patients following replacement therapy.

STORAGE AND STABILITY

Before Reconstitution: Vials of HUMATROPE (somatropin), HUMATROPE cartridges for use with the HumatroPen and the supplied diluent for HUMATROPE are stable when stored at 2° to 8°C. Avoid freezing the diluent for HUMATROPE. Expiration dates are stated on the labels.

After Reconstitution: When reconstituted with the supplied diluent and stored at 2° to 8°C:

- HUMATROPE vials are stable for up to 21 days and
- HUMATROPE cartridges for use with the HumatroPen are stable for up to 28 days
- Avoid freezing the reconstituted vials and cartridges of HUMATROPE.

If HUMATROPE vials are reconstituted with Sterile Water for Injection, USP, they should be used immediately after reconstitution. Although not recommended, the solution can be stored refrigerated (2° to 8°C) but must be used within 24 hours. Discard any unused portion.

Light: Protect from light.

DOSAGE FORMS, COMPOSITION AND PACKAGING

HUMATROPE (somatropin) is a sterile, white, lyophilized powder of highly purified rhGH, which is intended for subcutaneous or intramuscular use after reconstitution with the supplied diluent. HUMATROPE is available as a vial and cartridges (Table 8).

HUMATROPE Vials

Each vial of HUMATROPE contains 5 mg of somatropin for injection, in addition to mannitol, glycine, and dibasic sodium phosphate. Phosphoric acid and/or sodium hydroxide may have been used for pH adjustment.

Each vial of HUMATROPE is supplied in a combination pack with an accompanying vial of diluting solution. The diluent for HUMATROPE contains water for injection with 1.7% glycerin and 0.3% metacresol as a preservative. At a concentration of 2 mg HUMATROPE per mL diluent, the 1.7% glycerin makes the reconstituted product nearly isotonic. Reconstituted solutions have a pH of approximately 7.5.

HUMATROPE Cartridges

Each cartridge of HUMATROPE (for use with the HumatroPen) contains 6 mg, 12 mg, or 24 mg of somatropin for injection. The cartridge also contains mannitol, glycine, and dibasic sodium phosphate. Phosphoric acid and/or sodium hydroxide may have been added at the time of manufacture to adjust the pH.

Each cartridge is supplied in a combination package with an accompanying syringe containing 3.15 mL of diluting solution. The diluent for 6 mg cartridges contains water for injection, 0.3% metacresol as a preservative; and 1.7% glycerin. The diluent for 12 and 24 mg cartridges contains water for injection, 0.3% metacresol, and 0.29% glycerin. Glycerin is added to the diluent to modify tonicity of the reconstituted solutions. Reconstituted solutions have a pH of approximately 7.5.

Table 8
HUMATROPE Dosage Forms and Packaging

Dosage Form	Combination Packages	
	HUMATROPE	Diluent
Vial	5 mg	5 mL
Cartridges (for use with HumatroPen*)	6 mg 12 mg 24 mg	3.15 mL

*The HumatroPen family of injection devices, each with a HumatroPen User Manual, is available separately

PART II: SCIENTIFIC INFORMATION

PHARMACEUTICAL INFORMATION

Drug Substance

Somatropin [recombinant human growth hormone (rhGH)] is a polypeptide hormone of recombinant DNA origin. Somatropin has 191 amino acid residues and a molecular weight of about 22,125 daltons. The amino acid sequence is identical to that of human growth hormone of pituitary origin. Somatropin is synthesized in a strain of *E. coli* that has been modified by the addition of the gene for somatropin production.

Proper name:	somatropin
Common name:	recombinant human growth hormone (rhGH)
Molecular formula:	191 amino acid residues
Molecular mass:	–22,125 daltons
Structure:	human growth hormone (figure 1)



Product Characteristics

HUMATROPE (somatropin) is a sterile, white, lyophilized powder of highly purified somatropin intended for subcutaneous or intramuscular administration after reconstitution with the supplied diluent.

CLINICAL TRIALS

Effect of HUMATROPE Treatment in Children with Growth Hormone Deficiency

Studies conducted to assess efficacy and safety of somatropin [HUMATROPE] in pediatric patients with growth hormone deficiency were open-label multi-national trials with a combined population of 239 patients assessed in three groups: naïve patients in USA and Canada (n = 158), naïve patients in countries outside North America (n = 29), and previously treated patients (n = 52). Each patient served as their own control comparing height velocity before and after treatment. Patients were administered 0.18 mg/kg/week of HUMATROPE either by subcutaneous or intramuscular injections at a frequency of 3 to 7 times/week.

Growth rates at 1, 3 and 6 month time points were significantly greater ($p < 0.001$) than pretreatment growth rates for all three groups. Table 9 shows the increase in height velocity from pretreatment compared to the patient's last visit.

Table 9
Mean Growth Rates (cm/year) at Baseline (Pretreatment) and Last Visit

	Mean Age at Study Entry (years)	Mean Height Velocity (cm/year)	
		Pretreatment	Last visit
Naïve patients in USA and Canada (n = 158)	8.3	3.51	10.27
Naïve patients in countries outside North America (n = 29)	8.8	3.79	9.05
Previously treated patients (n = 52)	12.3	3.34	8.74

Effect of HUMATROPE Treatment in Adults with Growth Hormone Deficiency

Two multicenter trials in adult-onset growth hormone deficiency (n = 98) and two studies in childhood-onset growth hormone deficiency (n = 67) were designed to assess the effects of replacement therapy with HUMATROPE. The primary efficacy measures were body composition (lean body mass and fat mass), lipid parameters, and the Nottingham Health Profile. The Nottingham Health Profile is a general health-related quality of life questionnaire. These four studies each included a 6-month randomized, blinded, placebo-controlled phase followed by 12 months of open-label therapy for all patients. The HUMATROPE dosages for all four studies were identical: 1 month of therapy at 0.00625 mg/kg/day followed by the maintenance dose of 0.0125 mg/kg/day. Adult-onset patients and childhood-onset patients differed by diagnosis (proportion of patients with organic vs. idiopathic pituitary disease), body size (average vs. small for mean height and weight), and mean age (44 vs. 29 years). Lean body mass was determined by bioelectrical impedance analysis (BIA), validated with potassium 40. Body fat was assessed by BIA and sum of skinfold thickness. Serum lipid subfractions were analyzed by standard assay methods in a central laboratory.

Significantly greater increases in lean body mass and decreases in percent body fat were observed for HUMATROPE-treated adult onset patients compared with placebo-treated patients (lean body mass: +2.59 vs. 0.22 kg, $p < 0.001$; percent body fat: -3.60 vs. 0.19%, $p < 0.001$). Similar changes were seen in childhood-onset growth hormone-deficient patients. These significant changes in lean body mass persisted throughout the 18-month period as compared to baseline for both groups, and for fat mass in the childhood-onset group. Total cholesterol decreased short-term (first 3 months) although the changes did not persist. However, the low HDL cholesterol concentrations observed at baseline (31.0 mg/dL [0.803 mM] and 33.9 mg/dL [0.878 mM] in adult-onset and childhood-onset patients, respectively) normalized by the end of 18 months of therapy (a change of 13.7 mg/dL [0.354 mM] and 11.1 mg/dL [0.287 mM] for the adult-onset and childhood-onset groups, respectively, $p < 0.001$ for within-group change). In patients with adult-onset growth hormone deficiency, those who received HUMATROPE treatment had significantly greater improvements than patients who received placebo injections for 2 of the 6 domains of the Nottingham Health Profile (physical mobility and social isolation; Table 10). Patients with childhood-onset growth hormone deficiency failed to demonstrate

improvements in Nottingham Health Profile outcomes.

Table 10
Changes^a in Nottingham Health Profile Scores^b in Adult-Onset Growth
Hormone-Deficient Patients

Outcome Measure	Placebo (6 Months)	HUMATROPE Therapy (6 months)	Significance
Energy Level	-11.4	-15.5	NS
Physical Mobility	-3.1	-10.5	p < 0.01
Social Isolation	0.5	-4.7	p < 0.01
Emotional Reactions	-4.5	-5.4	NS
Sleep	-6.4	-3.7	NS
Pain	-2.8	-2.9	NS

^a = An improvement in score is indicated by a more negative change in the score.

^b = To account for multiple analyses, appropriate statistical methods were applied and the required level of significance was 0.01. NS=not significant.

Effect of HUMATROPE Treatment in Patients with Turner Syndrome

One long-term, randomized, open-label multicenter concurrently controlled study, and one long-term, randomized, dose-response study were conducted to evaluate the efficacy of HUMATROPE for the treatment of patients with short stature due to Turner syndrome.

In the randomized study, GDCT, comparing HUMATROPE -treated patients to a concurrent control group who received no somatropin, the HUMATROPE -treated patients who received a dose of 0.3 mg/kg/wk given 6 times per week from a mean age of 11.7 years for a mean duration of 4.7 years attained a mean near final height of 146.0 ± 6.2 cm (n = 27, mean $\pm$ SD) as compared to the control group who attained a near final height of 142.1 ± 4.8 cm (n = 19). By analysis of covariance*, the effect of HUMATROPE therapy was a mean height increase of 5.4 cm (p = 0.001).

In a randomized, blinded dose-response study, GDCL, patients were treated from a mean age of 11.1 years for a mean duration of 5.3 years with a weekly HUMATROPE dose of either 0.27 mg/kg or 0.36 mg/kg administered 3 or 6 times weekly. The mean near final height of patients who received HUMATROPE was 148.7 ± 6.5 cm (n = 31). When compared to historical control data, the mean gain in adult height was approximately 5 cm.

The HUMATROPE efficacy data of these studies in patients with Turner syndrome is summarized in Table 11.

* Analysis of covariance includes adjustments for baseline height relative to age and for mid-parental height.

Table 11
Summary Table of Efficacy Results

Study/ Group	Study Design ^a	Number of HUMATROPE -treated at Adult Height	HUMATROPE Age (yr) ^b	Estrogen Age (yr) ^b	HUMATROPE Duration (y)	Adult Height Gain (cm) ^{cb}
GDCT	RCT	27	11.7	13	4.7	5.4
GDCI	RDT	31	11.1	8-13.5	5.3	~5 ^{de}

^a RCT: randomized controlled trial; RDT: randomized dose-response trial.

^b Mean age at initiation of study drug

^c Analysis of covariance vs. controls.

^d Compared with historical data.

Effect of HUMATROPE Treatment in Pediatric Patients with Idiopathic Short Stature

Two randomized, multicenter trials, 1 placebo-controlled and 1 open-label, dose-response, were conducted in pediatric patients with idiopathic short stature. The diagnosis of idiopathic short stature was made after excluding other known causes of short stature, as well as growth hormone deficiency. Limited safety and efficacy data are available below the age of 7 years.

The placebo-controlled study enrolled 71 pediatric patients (55 males, 16 females) 9 to 15 years old (mean age 12.38 ± 1.51 years), with short stature, 68 of whom received study drug. Patients were predominately prepubertal or in early puberty (Tanner stage I [45.1%] and Tanner II [46.5%] at baseline).

In this double-blind trial, patients received subcutaneous injections of either HUMATROPE 0.222 mg/kg/wk or placebo. Study drug was given in divided doses 3 times per week until height velocity decreased to ≤ 1.5 cm/year (“final height”). Final height measurements were available for 33 subjects (22 HUMATROPE, 11 placebo).

After a mean treatment duration of 4.4 years the GH-treated group had achieved a mean final height 0.51 SDS greater than the placebo-treated group (ANCOVA: GH -1.8 SDS vs. placebo -2.3 SDS, $p = 0.017$); this difference translates to approximately 3.7 cm (range 2.8-5.0 cm) (see Table 12). Height gain across the duration of the study and final height SDS minus baseline predicted height SDS were also significantly greater in HUMATROPE-treated patients than in placebo-treated patients (Table 12 and 13). In addition, the number of patients who achieved a final height above the 5th percentile of the general population standards for age and sex was significantly greater in the HUMATROPE group than the placebo group (41% vs. 0%, $p < 0.05$), as was the number of patients who gained at least 1 SDS in height across the duration of the study (50% vs. 0%, $p < 0.05$).

Table 12
Baseline Height Characteristics and Effect of HUMATROPE on Final Height^a

	HUMATROPE (n=22) Mean (SD)	Placebo (n=11) Mean (SD)	Treatment Effect Mean (95% CI)	p-value
Baseline height SDS	-2.7 (0.6)	-2.75 (0.6)	NA	0.77
BPH SDS	-2.1 (0.7)	-2.3 (0.8)	NA	0.53
Final Height SDS^b	-1.8 (0.8)	-2.3 (0.6)	0.51 (0.10, 0.92)	0.017
FH SDS - baseline height SDS	0.9 (0.7)	0.4 (0.2)	0.51 (0.04, 0.97)	0.034
FH SDS - BPH SDS	0.3 (0.6)	-0.1 (0.6)	0.46 (0.02, 0.89)	0.43

^a For final height population.

^b Between-group comparison was performed using analysis of covariance with baseline predicted height SDS as the covariate. Treatment effect is expressed as least squares mean (95% CI). One placebo-treated patient was not included in this analysis because baseline bone age X-ray was not available.

Abbreviations: FH = final height. SDS = standard deviation score. BPH = baseline predicted height. CI = confidence interval. NA= not applicable.

The dose-response study included 239 pediatric patients (158 males, 81 females), 5 to 15 years old, (mean age 9.8 ± 2.3 years). Mean baseline characteristics included: height SDS of -3.21 (± 0.70), predicted adult height SDS of -2.63 (± 1.08), and height velocity SDS of -1.09 (± 1.15). All but 3 patients were Tanner stage I (prepubertal). Patients were randomized to one of three HUMATROPE treatment groups: 0.24 mg/kg/wk; 0.24 mg/kg/wk for 1 year, followed by 0.37 mg/kg/wk; and 0.37 mg/kg/wk.

The primary hypothesis of this study was that treatment with HUMATROPE would increase height velocity during the first 2 years of therapy in a dose-dependent manner. Additionally, after completing the initial 2-year dose-response phase of the study, 50 patients were followed to final height.

Patients receiving 0.37 mg/kg/wk had a significantly greater increase in mean height velocity after 2 years of treatment than patients receiving 0.24 mg/kg/wk (4.04 vs. 3.27 cm/year, $p = 0.003$). The mean difference between final height and baseline predicted height was 7.2 cm for patients receiving 0.37 mg/kg/wk and 5.4 cm for patients receiving 0.24 mg/kg/wk (Table 13). While no patient had height above the 5th percentile in any dose group at baseline, 82% of the patients receiving 0.37 mg/kg/wk and 47% of the patients receiving 0.24 mg/kg/wk achieved a final height above the 5th percentile of the general population height standards ($p = \text{NS}$).

Table 13
Final Height Minus Baseline Predicted Height: Idiopathic Short Stature Trials

	Placebo-controlled Trial 3x per week dosing		Dose Response Trial 6x per week dosing		
	Placebo (N=10)	HUMATROPE 0.22 mg/kg* (n=22)	HUMATROPE 0.24 mg/kg* (n=13)	HUMATROPE 0.24/0.37 mg/kg* (n=13)	HUMATROPE 0.37 mg/kg* (n=13)
FH - Baseline PH Mean cm (95% CI)	-0.7 (3.6, 2.3)	+2.2 (0.4, 3.9)	+5.4 (2.8, 7.9)	+6.7 (4.1, 9.2)	+7.2 (4.6, 9.8)

Abbreviations: PH= predicted height; FH=final height; CI = confidence interval

* Total weekly dosage

Effect of HUMATROPE Treatment in Patients with SHOX Deficiency

SHOX deficiency may result either from a deletion of one copy of the *short stature homeobox-containing* gene (*SHOX*) or from a mutation within or outside one copy of the *SHOX* gene that impairs the production or function of SHOX protein. The *SHOX* gene is located on the pseudoautosomal region of the X chromosome. Haploinsufficiency of the *SHOX* gene causes short stature analogous to the short stature seen in patients who have Turner syndrome, since these patients also lack one copy of the *SHOX* gene, due to absence or structural alterations of the second sex chromosome.

A randomized, controlled, two-year, three-arm, open-label study was conducted to evaluate the efficacy of HUMATROPE treatment of short stature in pediatric patients with SHOX deficiency who were not GH deficient. Fifty-two patients (24 male, 28 female) with SHOX deficiency, 3.0 to 12.3 years of age, were randomized to either a HUMATROPE-treated arm (27 patients; mean age 7.3 ± 2.1 years) or an untreated control arm (25 patients; mean age 7.5 ± 2.7 years). To determine the comparability of treatment effect between patients with SHOX deficiency and patients with Turner syndrome, the third study arm enrolled 26 patients with Turner syndrome, 4.5 to 11.8 years of age (mean age 7.5 ± 1.9 years), to HUMATROPE treatment. All patients were prepubertal at study entry. Patients in the HUMATROPE-treated group(s) received daily subcutaneous injections of 0.05 mg/kg of HUMATROPE. Patients in the untreated group received no injections.

Patients with SHOX deficiency who received Humatrope had significantly greater first-year height velocity than untreated patients (8.7 cm/year vs. 5.2 cm/year, $p < 0.001$, primary efficacy analysis) and similar first-year height velocity to Humatrope-treated patients with Turner syndrome (8.7 cm/year vs. 8.9 cm/year; least-squares mean difference 0.5 cm/year [95% CI, -1.3 to 0.7]). In addition, patients who received Humatrope had significantly greater second year height velocity, and first and second year height gain than untreated patients (Table 12).

At the end of the 2-year study period, 41% of HUMATROPE-treated subjects with SHOX deficiency and 31% of subjects with Turner syndrome had achieved height within the normal range for age and gender (> -2.0 SDS).

Table 14
Summary of Efficacy Results in Patients with SHOX deficiency and Turner Syndrome

	SHOX Deficiency			Turner Syndrome
	Untreated (n=24)	HUMATROPE (n=27)	Treatment Difference ^a Mean (95%CI)	HUMATROPE (n=26)
Height Velocity (cm/yr)				
1 st Year				
Mean (SD)	5.2 (1.1)	8.7 (1.6) ^b	+3.5 (2.8, 4.2)	8.9 (2.0)
2 nd Year				
Mean (SD)	5.4 (1.2)	7.3 (1.1) ^b	+2.0 (1.3, 2.6)	7.0 (1.1)
Height change (cm)				
Baseline to 1 st Year				
Mean (SD)	+5.4 (1.2)	+9.1 (1.5) ^b	+3.7 (2.9, 4.5)	+8.9 (1.9)
Baseline to 2 nd Year				
Mean (SD)	+10.5 (1.9)	+16.4 (2.0) ^b	+5.8 (4.6, 7.1)	+15.7 (2.7)
Height SDS change				
Baseline to 1 st Year				
Mean (SD)	+0.1 (0.5)	+0.7 (0.5) ^b	+0.5 (0.3, 0.8)	+0.8 (0.5)
Baseline to 2 nd Year				
Mean (SD)	+0.2 (0.5)	+1.2 (0.7) ^b	+1.0 (0.7, 1.3)	+1.2 (0.7)
Patients with height SDS > -2.0 at 2 years	1 (4%)	11 (41%) ^c		8 (31%)

^a Positive values favor HUMATROPE

^b Statistically significantly different from untreated with p<0.001.

^c Statistically significantly different from untreated with p<0.05.

Effect of HUMATROPE on Pediatric Patients Born Small for Gestational Age

Data from 2 clinical trials (one randomized, one single-arm) and one observational study demonstrated the efficacy of HUMATROPE treatment of growth failure in children born SGA.

The primary objective of Study GDGB was to demonstrate that the increase from baseline in height SDS after 1 year of treatment would be similar when HUMATROPE is administered according to an individually adjusted dose (IAD) regimen or a fixed high dose (FHD) regimen. This 2-year, open-label, multicenter, European study enrolled 193 prepubertal, non-GH deficient children with mean chronological age 6.8 ± 2.4 years (range: 3.0 to 12.3). Additional study entry criteria included birth weight < 10th percentile and/or birth length SDS < -2.0 for gestational age, and height SDS for chronological age ≤ -3.0 . Exclusion criteria included: syndromal conditions (e.g., Turner syndrome), chronic disease (e.g., diabetes mellitus), and tumour activity.

Study 0908 was an open-label, multicenter, single-arm study conducted in France, during which 35 prepubertal, nonGH-deficient children were treated for 2 years with HUMATROPE 0.067 mg/kg/day (0.47 mg/kg/week). Mean chronological age at baseline was 9.3 ± 0.9 years (range: 6.7 to 10.8). Additional study entry criteria included birth length SDS < -2.0 or < 3rd percentile for gestational age, and height SDS for chronological age < -2.0. Exclusion criteria

included: syndromal conditions (e.g., Turner syndrome), chronic disease (e.g., diabetes mellitus), and any active disease.

Additional safety information was obtained from 379 short children born SGA followed in an observational study (Study GDFC) who received an average HUMATROPE dosage of 0.041 mg/kg/day (maximum dose: 0.084 mg/kg/day) for an average of 3.0 years.

Table 15
Summary of Patient Demographics for Clinical Trials in
Pediatric Patients Born Small for Gestational Age

Study #	Trial design	Dosage, frequency, route of administration and duration	Study subjects (N=number)	Mean age (Range)	Gender
B9R-EW-GDGB	Phase 3b, multi-center, randomized, open-label, 2-arm non-inferiority study of individually-adjusted (IAD) versus fixed high dose (FHD) regimen	FHD: 0.067 mg/kg/d for 2 years; IAD: 0.035 mg/kg/d for 3 months, increased to 0.067 mg/kg/d if predicted or actual 1-year height gain was < 0.75 SDS; Daily, subcutaneous	200 patients entered, 193 received at least 1 dose of drug 175 completed 2 years	6.8 years (3.0-12.3)	M:102 F: 91
B9R-FP-0908	Phase 3b, randomized, open label multi-centre	0.47 mg/kg/wk; Daily; subcutaneous Initial treatment period was 2 yrs, followed by 2 years of untreated observation	35 patients entered, 18 completed	9.3 years (6.7-10.8)	M: 24 F: 11
B9R-EW-GDFC*	Phase 4, open label, observational, multi-center, post-marketing	Dosage regimen and duration of treatment are at the discretion of investigator (mean dose 0.29 mg/kg/wk); Typically daily, subcutaneous Duration: Median duration of treatment: 2.3 yrs (range 0.1 to 15.4)	429 patients entered 379 patients naive to treatment and had at least one post-baseline visit	8.4 years (0.1-16.0)	M: 240 F: 189

Abbreviations: FHD=fixed high dosage (0.067 mg/kg/day); IAD=individually-adjusted dosage (0.035 to 0.067 mg/kg/day).

*Ongoing study, data as of 2009

Study 0908 showed that after 2 years of Humatrope treatment, mean height SDS increased from a baseline value of -2.7 ± 0.5 to -1.5 ± 0.6 .

The primary objective of Study GDGB was to demonstrate that HUMATROPE given according to an individually adjusted dosage (IAD) regimen would result in a 1-year height SDS increase not inferior to that achieved with a fixed high dosage (FHD) regimen. The non-inferiority margin was 0.5 SDS; that is, the height increase for the IAD group would be considered non-inferior if the lower bound of the 95% confidence interval (CI) for the mean difference between the groups (IAD - FHD) was greater than -0.5 height SDS. In this open-label study 193 children with mean

age 6.8 ± 2.4 years (range: 3 to 12) were randomized to either a fixed dosage group (0.067 mg/kg/day [67 µg/kg/day], equivalent to 0.47 mg/kg/week) or an individually-adjusted dosage group and received at least 1 dose of study drug. The initial HUMATROPE dosage for the IAD group was 0.035 mg/kg/day (35 µg/kg/day), equivalent to 0.25 mg/kg/week. The dosage was increased to 0.067 mg/kg/day for those patients whose predicted 1-year height gain assessed at 3 months was < 0.75 SDS (n = 40) or whose actual height gain measured at Year 1 was < 0.75 SDS (n = 11). Patients whose dose was increased at 3 months were approximately 2 years older at baseline than those who remained on the lower dose; a greater proportion of girls had their dosage increased than boys (58% vs. 43%, respectively). One-year efficacy data, available for 179 patients (FHD, n = 93; IAD, n = 86) demonstrated that the individually-adjusted regimen was statistically non-inferior to the fixed dosage regimen. Although the mean 1-year height increase in the IAD group was statistically significantly lower than that observed in the FHD group, the study achieved its primary objective by demonstrating that the increase from baseline in height SDS in the IAD group was clinically similar (noninferior) to that in the FHD group (mean between-group difference = -0.3 SDS [95% CI: -0.4, -0.2 SDS]). The mean changes from baseline in height SDS at the end of the 2-year study were 1.4 and 1.6 SDS in the IAD and FHD groups, respectively.

Efficacy results of this study are summarized in Table 16.

Table 16
Results from Study GDGB for Height SDS and Change from Baseline in Height SDS at Year 1 and Year 2 After HUMATROPE Treatment of Short Children Born SGA Who Fail to Demonstrate Catch-up Growth

	IAD Group Initial dose 0.035 mg/kg/day Mean (SD)	FHD Group 0.067 mg/kg/day Mean (SD)	Between-Group Difference IAD-FHD ^a
Baseline	(n=86) -3.9 (0.6)	(n=93) -3.9 (0.7)	-0.0 ± 0.1 (-0.2, 0.2) p-value = 0.95
Year 1 Height SDS Change from Baseline	(n=86) ^{b,c} -3.0 (0.7) 0.9 (0.4)	(n=93) ^b -2.7 (0.7) 1.1 (0.4)	-0.3 ± 0.1 (-0.4, -0.2) p-value <0.001
Year 2 Height SDS Change from Baseline	(n=82) ^{b,d} -2.5 (0.8) 1.4 (0.5)	(n=88) ^b -2.2 (0.7) 1.6 (0.5)	-0.3 ± 0.1 (-0.4, -0.1) p-value = 0.003

Abbreviations: IAD=individually adjusted dose; FHD=fixed high dose; SD=standard deviation; SDS=standard deviation score

^a Least squares mean difference ± standard error and 95% confidence interval based on ANCOVA model with treatment and gender as fixed effects, and baseline height SDS, baseline chronological age, baseline bone age, and mid-parental target height SDS as covariates.

^b Only children with actual height measurements were included in the Year 1 and Year 2 analyses.

^c Initial dose 0.035 mg/kg/day, increased at 3 months to 0.067 mg/kg/day for 40 patients

^d 11 additional patients increased dosage at 12 months

DETAILED PHARMACOLOGY

Somatropin (recombinant DNA-derived biosynthetic human growth hormone) has been shown to promote growth of skeletal and soft tissue and to influence the metabolism of carbohydrate, fat,

and protein. Somatropin influences intestinal calcium transport by affecting the metabolism of vitamin D and has an anabolic effect on bone metabolism. Somatropin has a positive influence on the wound healing process of surgically-induced, full-thickness dermal wounds and heat-induced, full-thickness dermal burns in rodents. Studies conducted with somatropin have established that the biologic activities of recombinant DNA-derived hGH are identical to those produced by pituitary-sourced hGH.

When a growing rat is hypophysectomized, it stops gaining weight and growing in length. The bioactivity and biopotency of all somatropin preparations have been determined in a ten-day assay using hypophysectomized rats to measure increased proximal tibial cartilage width and body weight gain. Somatropin (6.25 mg/rat/day for seven days) administered subcutaneously induced elevations in general protein and collagen synthesis within the skin. While collagen synthesis was significantly increased, collagen content was reduced, and the percentage of total collagen that was determined to be Type III Collagen was significantly reduced in somatropin-treated rats.

Somatropin treatment induced a significant increase in general protein content, protein/DNA, and RNA/DNA in the skin of hypophysectomized rats. Elevations in these parameters are indicators of increased protein synthesis and cell size.

The composite of these studies indicates that somatropin, either alone or acting through other mediators (insulin-like growth factors [somatomedins]), significantly contributed to the synthesis and turnover of skin proteins. The changes induced in collagen metabolism are similar to the changes that occur during skin maturation. In the absence of insulin-like growth factors (somatomedins), as in the case of incubation medium (without serum present), somatropin had no direct effect on general protein or collagen synthesis *in vitro*. Therefore, somatropin exerts its pharmacologic effects *in vivo* through the production of insulin-like growth factors (somatomedins).

The Effect of Somatropin on Bone Metabolism in Rats

Growth hormone, acting through the insulin-like growth factors is a major stimulus to new bone formation and has been demonstrated to cause epiphyseal cartilage proliferation. The anabolic effects of somatropin on bone metabolism were tested in adult male rats. Somatropin (400 mg/kg), administered by subcutaneous injection twice daily for 28 days, caused significant increases in bone mineral content (BMC) and bone density (BMC/BW) without causing increased bone width (BW) as measured by single [¹²⁵I] photon absorptiometry. Confirmation of increased BMC was determined by bone ashing techniques. Somatropin treatment also induced significant body weight gain and bone hydroxyproline content. The data reported are consistent with the hypothesis that growth hormone has anabolic effects on bone metabolism.

The Effect of Somatropin on Intestinal Calcium Transport

Growth hormone influences intestinal calcium transport by influencing the metabolism of vitamin D. Cholecalciferol (vitamin D₃) was administered with and without somatropin treatment (5). The inactive form of vitamin D₃ (cholecalciferol) and somatropin administered separately had no significant effect on calcium transport. Simultaneous administration of both substances, however, caused significant elevation in intestinal calcium transport.

TOXICOLOGY

The toxicity/safety of somatropin has been studied in five animal species after single or repeated parenteral injection by the subcutaneous, intramuscular, and intravenous routes. The tests involved young, healthy animals. In vitro tests were performed to investigate possible genetic toxicity of somatropin and to determine the compatibility of somatropin and diluent vehicles for injection with whole blood.

Acute Toxicity Studies

Single doses of somatropin have been studied in mice, rats, dogs, and rhesus monkeys using subcutaneous and intravenous administration.

Mice and rats received a single subcutaneous or intravenous dose of 12.5 mg/kg of body weight. This dose is approximately 200 fold the expected human clinical daily dose for the treatment of dwarfism. These animals appeared normal within two hours after dosing.

Table 17
Acute Toxicity Studies

Species	Animals		Duration of Study	Administration	Dose	Signs of
	M	F	(Days)		(mg/kg)	Toxicity
Rat	50	50	14	SC	12.5	None
Rat	40	40	14	IV	12.5	None
Mouse	40	40	14	SC	12.5	None
Mouse	40	40	14	IV	12.5	Leg weakness
Dog	6	6	14	IV (rapid infusion)	0.125, 1.25, 3.125	No effects on BP, heart and respiratory rates
Monkey	4	4	14	SC	6.25	None

Abbreviations: M=male; F=female; SC=subcutaneous; IV=intravenous; BP=blood pressure

Subacute Toxicity

Somatropin was administered daily for 30 days by intravenous and subcutaneous routes at doses of 0.125, 0.625, and 3.125 mg/kg. There were no deaths and there were no toxicologically significant treatment-related changes in clinical signs, hematology, clinical chemistry, urinalysis, or organ weight parameters.

Rhesus monkeys received somatropin administered intramuscularly daily for 5 weeks at doses of 0.125, 0.375, and 1.25 mg/kg (up to 20 fold the anticipated daily human clinical dose). All of the monkeys survived and there were no treatment-related abnormalities observed in clinical signs, body weight, food consumption, hematology, or urinalysis parameters. Antibodies were not produced against somatropin or possible *E. coli* polypeptide components that could have been produced as a result of production by recombinant technology. In contrast, when monkeys were treated with methionyl growth hormone under similar study conditions, antibodies to the hormone were observed.

Reproduction Studies

Standard reproduction and teratology studies in laboratory animals have not been conducted with somatropin. The value of such studies is questionable considering the compound is identical to human growth hormone.

Genetic Toxicity

Somatropin did not produce any mutagenic effects and is unlikely to pose a genotoxic hazard in human chemotherapy.

REFERENCES

1. Blum Werner F., Crowe BJ., Quigley Charmian A., Jung Heike, Cao Dachuang, Ross Judith L., Braun LeeAnn, and Rappold Gudrun, for the SHOX Study Group. 2007. Growth Hormone Is Effective in Treatment of Short Stature Associated with Short Stature Homeobox-Containing Gene Deficiency: Two-Year Results of a Randomized, Controlled, Multicenter Trial. *The Journal of Clinical Endocrinology & Metabolism* 92(1):219–228.
2. Crowe BJ, Rekers-Mombarg LTM, Robling K, et al. 2006. Effect of growth hormone dose on bone maturation and puberty in children with idiopathic short stature. *J Clin Endocrinol Metab* 91(1):169-175.
3. Evans HM, Simpson ME, Marx W, et al. 1943. Bioassay of pituitary growth hormone: width of the proximal epiphyseal cartilage of the tibia in hypophysectomized rats. *Endocrinology* 32:13-16.
4. Finkelstein JD and Schachter D. 1962. Active transport of calcium by intestine: effects of hypophysectomy and growth hormone. *Am. J. Physiol.* 203:873-880.
5. Frigeri LG, Peterson SM, and Lewis UJ. 1979. The 20,000-Dalton structural variant of human growth hormone: lack of some early insulin-like effects. *Biochem Biophys Res Commun.* 91:778-782.
6. Greenspan FS, Li CH, Simpson ME, and Evans HM. 1949. Bioassay of hypophyseal growth hormone: the tibia test. *Endocrinology* 45:455-463.
7. Hollander DM, Devereux DF, Marafino BJ, and Hoppe H. 1984. Increased wound breaking strength in rats following treatment with synthetic human growth hormone. *Surgical Forum* 35:612-614.
8. Leschek EW, Rose SR, Yanovski JA, et al. 2004. Effect of growth hormone treatment on adult height in peripubertal children with idiopathic short stature: a randomized, double-blind, placebo-controlled trial. *J Clin Endocrinol Metab* 89(7):3140-3148.
9. Mardh G and Lindberg A. 1995. Growth hormone replacement therapy in adult Hypopituitary patients with growth hormone deficiency: Combined clinical safety data from clinical trials in 665 patients. *Endocrinology and Metabolism, Vol 2(B);* 11-16.
10. Marx W, Simpson ME, and Evans HM. 1942. Bioassay of the growth hormone of the anterior pituitary. *Endocrinology* 30:1-10.
11. Parlow AF, Wilhelmi AE, and Reichert LE. 1965. Further studies on the fractionation of human pituitary glands. *Endocrinology* 77:1126-1134.

12. Quigley CA, Crowe BJ, Anglin DG, Chipman JJ and the US Turner Syndrome Study Group. 2002. Growth hormone and low dose estrogen in Turner syndrome: results of a United States multi-center trial to near-final height. *J Clin Endocrinol Metab* 87:2033-2041.
13. Quigley CA, Gill AM, Crowe BJ, et al. 2005. Safety of growth hormone treatment in pediatric patients with idiopathic short stature. *J Clin Endocrinol Metab* 90(9):5188-5196.
14. Rappold G, Blum WF, Shavrikova EP, Crowe BJ, Roathe R, Quigley CA, Ross JL, Niesler B. 2006. Genotypes and phenotypes in children with short stature: clinical indicators of SHOX haploinsufficiency. *J Med. Genet.* 2007; 44:306-313
15. Rappold GA, Fukami M, Niesler B, Schiller S, Zumkeller W, Bettendorf M, Heinrich U, Vlachopapadopoulou E, Reinehr T, Onigata K, Ogata T. 2002a. Deletions of the homeobox gene *SHOX* (Short Stature Homeobox) are an important cause of growth failure in children with short stature. *J Clin Endocrinol Metab* 87:1402-1406.
16. Rappold G, Ross J, Blaschke J and Blum W. 2002b. Understanding SHOX deficiency and its role in growth disorders: a reference guide. Oxfordshire, UK: TMG Health Care Communications Ltd. 121 p.
17. Shaar CJ, Grinnan EL, Short WG, et al. 1986. Hyperglycemic activity in dogs of recombinant DNA-derived 20,000 Dalton variant of methionyl human growth hormone. *Endocrine Research*, 12:21-35.
18. Rosilio M, Carel JC, Ecosse E, Chaussain JL on behalf of the 0908 Lilly Study Group. 2005. Adult height of prepubertal short children born small for gestational age treated with GH. *Eur J Endocrinol* 152(6):835-843.
19. Takala J, Ruokonen E, Webster NR, et al. 1999. Increased mortality associated with growth hormone treatment in critically ill adults. *New England Journal Med.* 341:785-792.
20. The Canadian Growth Hormone Advisory Committee. 2005. Impact of growth hormone supplementation on adult height in Turner syndrome: results of the Canadian randomized controlled trial. *J Clin Endocrinol Metab* 90:3360-3366.
21. Winegrad AJ, Shaw WH, Lukens FD, et al. 1959. Effect of growth hormone in vitro on the metabolism of glucose on rat adipose tissue. *J. Biol. Chem.* 234:1922-1928.
22. Wit JM, Rekers-Mombarg LTM, Cutler GB, et al. 2005. Growth hormone (GH) treatment to final height in children with idiopathic short stature: evidence for a dose effect. *J Pediatr* 146:45-53.

PART III: CONSUMER INFORMATION

^{Pr}**HUMATROPE® Vials** (somatropin for injection) *pronounced HYOO-mah-trope*

This leaflet is for patients and caregivers. It is Part III of a three-part "Product Monograph" published when HUMATROPE was approved for sale in Canada. This leaflet is a summary and will not tell you everything about HUMATROPE. Contact your doctor or pharmacist if you have any questions about the drug.

Please read this information carefully before you start to take your medicine, even if you have just refilled your prescription. Some of the information may have changed. Keep this pamphlet since you may need to refer to it after starting treatment with HUMATROPE.

ABOUT THIS MEDICATION

What the medication is used for:

HUMATROPE is used to treat children and teenagers who are short or growing too slowly due to a medical condition such as growth hormone deficiency, Turner syndrome, idiopathic short stature, SHOX (*short stature homeobox-containing* gene) deficiency, or being born small for gestational age.

HUMATROPE is also used in some adults who had growth hormone deficiency when they were children and still have growth hormone deficiency after they finish growing, or who do not make enough growth hormone as adults for some other reason.

What it does:

HUMATROPE is used to increase growth hormone levels. It stimulates bone growth in children unless the ends of the bones have hardened (closed epiphyses). In both adults and children with growth hormone deficiency, it also increases the growth of muscle and reduces body fat.

When it should not be used:

Treatment should not be started:

- in children to promote growth when the ends of the long bones have hardened (closed epiphyses). Treatment should be stopped when adult height is reached. Reevaluation to find out whether the patient still has growth hormone deficiency will determine if continued treatment with HUMATROPE at a lower dose would be beneficial.
- in patients with any evidence of an active cancer (either newly diagnosed or recurrent).
- while patients have a serious illness following heart or abdominal surgery, or in patients who have just had a serious accident, or those with acute respiratory failure (low level of oxygen in the blood or high level of carbon dioxide in the blood).
- in patients with Prader-Willi syndrome who are very obese or have severe breathing problems. There have

been reports of deaths in children with Prader-Willi syndrome who were treated with growth hormone and had one or more of the following risk factors: severe obesity, breathing problems, colds or lung infections.

Treatment should not be started:

- in patients known to be allergic to somatropin (the active substance in HUMATROPE), or to any of the ingredients in the powder or the diluent (listed below).
- in patients who have undergone kidney transplant, until one year post-transplant.
- in patients with diabetic retinopathy, a complication of diabetes that results from damage to the blood vessels of the light-sensitive tissue at the back of the eye (retina).

What the medicinal ingredient is:

Somatropin (recombinant human growth hormone)

What the important nonmedicinal ingredients are:

The HUMATROPE powder contains freeze-dried somatropin, dibasic sodium phosphate, glycine, and mannitol.

The diluent (solution for dissolving somatropin) contains metacresol and glycerin.

Phosphoric acid and/or sodium hydroxide may have been added at the time of manufacture to adjust the acidity of the liquid.

What dosage forms it comes in:

HUMATROPE is supplied as follows:

Vial: 5 mg vial plus 5 mL diluent

Cartridges: 6 mg, 12 mg, or 24 mg cartridges, each with 3.15 mL of diluent.

HUMATROPE cartridges require the use of a HumatroPen to inject the drug. HumatroPens are supplied separately.

WARNINGS AND PRECAUTIONS

Serious Warnings and Precautions

A doctor trained in hormone and growth disorders must examine the patient to decide if it is safe to use HUMATROPE.

After the HUMATROPE powder has been dissolved it must be water-clear and free of particles.

This medicine has been prescribed for you. Do not pass it on to others. It may harm them, even if their symptoms seem the same as yours.

When medicine is injected into the same place over a long time, it can cause loss of fat tissue under the skin. It is therefore important to keep changing the injection site, and the doctor or nurse can tell you how.

Before using HUMATROPE, the patient or caregiver should tell the doctor:

- if the patient has an active brain tumour or any other tumour (either benign or cancerous). However, the

doctor may prescribe HUMATROPE if the patient has had a brain tumour and needs no more anti-tumour treatment for it. The patient should be re-examined frequently to make sure that the tumour has not come back or started to grow

- if the patient is a survivor of childhood cancer.
- if the patient is very ill after a serious operation, or after being treated for multiple injuries from an accident, or if the patient has sudden serious breathing problems.
- if the patient has diabetes (because more or less insulin may be needed when taking HUMATROPE).
- if a member of the patient's family has diabetes.
- if the patient is taking a steroid medication (glucocorticoid) such as cortisone or prednisone. This is because the combination may reduce the success of the HUMATROPE treatment or because more of the steroid medication may be needed when the patient is also taking HUMATROPE.
- if the patient is taking a medication known to be metabolized by certain liver enzymes (e.g., cyclosporine, some anticonvulsants, and hormones such as estrogen and birth control pills). This is because the treatment with HUMATROPE may reduce the effectiveness of these drugs.
- if the patient, especially a child, develops abdominal pain.
- if the patient is or plans to become pregnant, or is breast-feeding.
- if the patient has hypothyroidism (low levels of thyroid hormone), because HUMATROPE may reduce the levels of thyroid hormone. The patient may require a change in dosage of his or her thyroid hormone medication.
- if the patient suffers from a bad headache or frequent headaches, or from problems with eyesight, vomiting or feeling sick. Very rarely, swelling of the brain may develop, and the doctor may want to examine the patient to look for signs of brain swelling. If this occurs it may be necessary to stop HUMATROPE treatment.
- if the patient develops a limp, or has hip or knee pain while being treated with HUMATROPE.

If the patient is sensitive to any component of the diluent (the liquid used to mix with the HUMATROPE powder), Sterile Water for Injection, USP, may be used to dissolve the HUMATROPE supplied in vials (not cartridges). Refer to How to Store It section for storage instructions.

If the patient has Turner syndrome and develops an ear infection or headaches her doctor should be told about these problems.

If the patient is growth hormone-deficient and also has Prader-Willi syndrome (a genetic disorder), the doctor should examine the patient for breathing problems and airway infections before starting HUMATROPE treatment, especially if the patient is overweight, has previously experienced severe breathing problems (especially during sleep), or suffered infection of the lungs or airways. If during treatment the patient has signs of breathing problems (snoring), treatment should be interrupted

and the cause assessed by the doctor.

Treatment with HUMATROPE can change blood sugar levels.

The doctor should check the patient's blood sugar regularly while taking HUMATROPE, especially if there are risk factors for diabetes. Patients who have diabetes or impaired glucose tolerance should have their blood sugar closely monitored during HUMATROPE therapy.

Leukemia has been reported in a small number of pediatric patients who have been treated with growth hormone, including growth hormone of pituitary origin, and man-made growth hormone products such as somatrem and somatropin. The relationship, if any, between leukemia and growth hormone is uncertain.

Progression of pre-existing scoliosis (curvature of the spine) can occur in children who have rapid growth. HUMATROPE has not been shown to increase the occurrence of scoliosis.

If the patient has hypopituitarism and is receiving standard hormone replacement therapy, the doctor should monitor the hormone replacement therapy closely during HUMATROPE treatment.

If the patient has a growth disorder associated with being born small for gestational age, the blood sugar and insulin levels should be checked before starting treatment and regularly during treatment.

Patients over 65 years of age may be more sensitive to HUMATROPE and may require lower dose of HUMATROPE.

INTERACTIONS WITH THIS MEDICATION

Tell the doctor if the patient is taking any of the following drugs:

- Steroid medications such as glucocorticoids (e.g. cortisone or prednisone)
- Medications known to be metabolized by certain liver enzymes (e.g., cyclosporine, some anticonvulsants, and hormones such as estrogen and birth control pills)
- Insulin and anti-hyperglycemic agents

Because HUMATROPE may affect how some hormones, such as cortisol and cortisone, are processed in the body, people may discover that they have an underactive adrenal gland after starting HUMATROPE therapy. In these cases, glucocorticoid replacement therapy would need to be started. If already on glucocorticoid therapy, dosage may need to be adjusted.

PROPER USE OF THIS MEDICATION

Be sure to change the injection site frequently to help prevent lipatrophy (loss of fat tissue under the skin).

In general, HUMATROPE should be injected in the evening or before bedtime.

Usual dose:

The doctor will instruct you on what is the best dose of HUMATROPE for you (or your child) based on individual needs. Use HUMATROPE exactly as the doctor tells you to.

Reconstitution Instructions:

Please refer to the enclosed reconstitution instructions.

Overdose:

Long-term overdosage or using HUMATROPE after the growth plates in the long bones have closed (hardened) may result in joint pain and continued growth of fingers, toes, nose, ears or jaw. If you think this is happening, tell the doctor.

Overdose may change blood sugar levels, and patients may experience symptoms of hypoglycemia (low blood sugar), such as feeling shaky, dizzy and unwell or hyperglycemia (high blood sugar), such as increased urination or thirst.

In case of drug overdose, contact a health care practitioner, hospital emergency department or regional Poison Control Centre immediately, even if there are no symptoms.

Missed Dose:

Contact your physician or pharmacist if you have missed a dose.

SIDE EFFECTS AND WHAT TO DO ABOUT THEM

Some people may be allergic to the diluent (liquid used to mix with the HUMATROPE powder). If there is any pain or redness at the injection site, or if there is any swelling, tell your doctor.

Rarely, more severe allergic reactions may occur. Seek immediate medical help if you (or your child) experience any sudden trouble breathing, with swelling of the hands, feet or face.

Children treated with HUMATROPE may have an increased risk of developing an inflammation of the pancreas called pancreatitis. If your child develops severe abdominal pain, contact your doctor.

It is also important to have blood glucose checked if the patient has diabetes or a family history of diabetes.

HUMATROPE may affect the way the body handles sugars from food and drink. The doctor may need to check the amount of sugar in the urine or blood.

HUMATROPE can affect the amount of thyroid hormone in the blood, so patients must have thyroid function tests from time to time. If the thyroid is not working properly, HUMATROPE may not work as well as it should.

Any child who begins to limp must be examined by a doctor.

HUMATROPE may cause intracranial hypertension (increased pressure within the skull). Call the doctor if the patient has: a headache that doesn't go away or is severe, or has headaches that become more frequent; problems with vision; nausea (feeling sick in the stomach) or vomiting.

Other possible side effects include headaches, muscle or joint pains (in hips or knees), swelling associated with tingling sensations in the hands, feeling weak, rarely high blood pressure, shortness of breath, and sleep apnea (pauses in breathing during sleep). If the headaches are bad or frequent, and accompanied by sickness or vision problems, tell the doctor immediately.

For patients with Turner syndrome, HUMATROPE therapy may increase the already high frequency of ear infections. Your child should see her doctor if you think she has an ear infection.

This is not a complete list of side effects. If any of the side effects gets serious, or if you notice any unexpected side effects while taking HUMATROPE, contact your doctor or healthcare professional.

HOW TO STORE IT

Before it has been reconstituted (mixed):

Store HUMATROPE vial and diluent in the refrigerator at 2-8°C (36-46°F).

After it has been reconstituted (mixed):

When the vial is prepared with the supplied diluent, it may be stored in the refrigerator at 2-8°C (36-46°F) and **MUST** be used within 21 DAYS. Do NOT freeze.

When the vial is prepared with Sterile Water for Injection, USP, it should be used immediately. Although not recommended, it may be stored in the refrigerator at 2-8°C (36-46°F), but must be used within 24 HOURS. Do NOT freeze.

Keep out of reach of children.

REPORTING SUSPECTED SIDE EFFECTS

You can report any suspected adverse reactions associated with the use of health products to the Canada Vigilance Program by one of the following 3 ways:

- Report online at www.healthcanada.gc.ca/medeffect
- Call toll-free at 1-866-234-2345
- Complete a Canada Vigilance Reporting Form and:
 - Fax toll-free to 1-866-678-6789, or
 - Mail to: Canada Vigilance Program
Health Canada
Postal Locator 0701D
Ottawa, Ontario
K1A 0K9

Postage paid labels, Canada Vigilance Reporting Form and the adverse reaction reporting guidelines are available on the MedEffect™ Canada website at www.healthcanada.gc.ca/medeffect.

NOTE: Should you require information related to the management of side effects, contact your health care professional. The Canada Vigilance Program does not provide medical advice.

MORE INFORMATION

For more information, please contact your healthcare

professional or pharmacist first, or Eli Lilly Canada Inc. at:
1-888-545-5972, or visit the website at: www.lilly.ca

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revision date shown below. For the most current information
please visit our website or contact us directly.

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This leaflet was prepared by Eli Lilly Canada Inc., Toronto,
Ontario, M1N 2E8

Last Revised: August 19, 2013

Reconstitution Instructions for ^{Pr}HUMATROPE® Vials

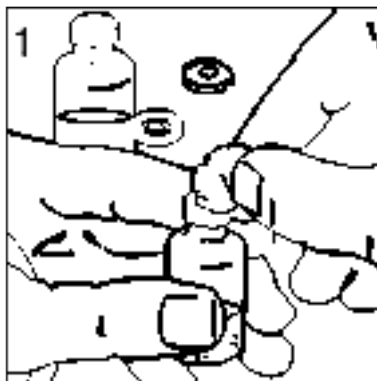
Do not mix (reconstitute) the drug or inject it until you have been thoroughly trained in the proper techniques by your doctor. Use sterile techniques as instructed by your doctor. Discard syringes and/or needles after each use.

When the vial has been prepared with the supplied diluent, it may be stored in the refrigerator at 2 - 8°C (36 - 46°F) and **MUST** be used within 21 DAYS. Do **NOT** freeze.

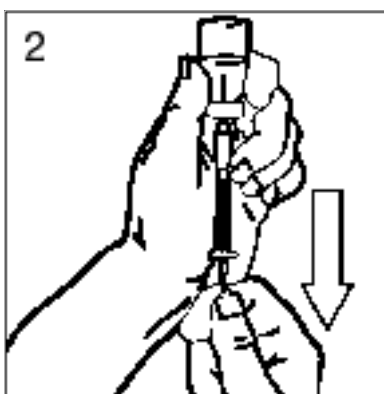
Reconstituting the Vial of HUMATROPE

Reconstitute HUMATROPE *only* with Diluent for HUMATROPE. Do not use other solutions for reconstitution unless instructed to do so by your doctor. Your doctor will also tell you what size syringe and needle to use and how much diluent to add to the vial of HUMATROPE.

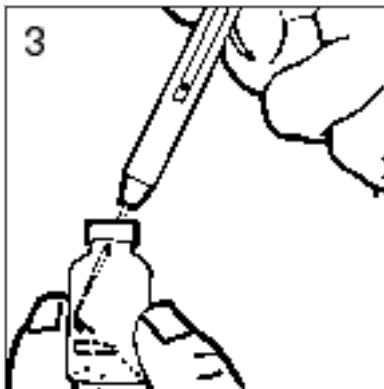
Always start by washing your hands.



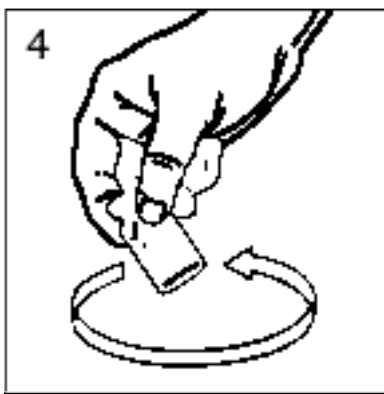
1. Remove and discard plastic caps from tops of vials of diluent and HUMATROPE. Wipe tops of both vials with an alcohol swab (Figure 1). Remove needle cover and save. Pull back on syringe plunger to draw up an amount of air equal to the amount of diluent your doctor has prescribed. Insert needle in stopper of diluent vial, and inject air into vial.



2. Hold vial upside down and, making sure needle tip remains in solution, withdraw the amount of diluent your doctor has prescribed (Figure 2). After making sure that no air bubbles are in the syringe, turn vial upright and, holding barrel, remove syringe.



3. Insert same needle into vial of HUMATROPE and gently aim needle tip toward wall of vial. Slowly inject the diluent by aiming the stream of liquid against the wall of vial (Figure 3). *Do not aim it at the white powder at the bottom of the vial.* To equalize the pressure, withdraw a volume of air equal to the amount of diluent added before removing the syringe from the vial. If the needle can be removed from the barrel of the syringe remove and discard the needle. If the needle and syringe are made as 1 unit, discard the entire unit.



4. Swirl the vial with a gentle rotary motion until contents are completely dissolved (Figure 4). *Do not shake.*

Preparing the Injection

1. Do not use reconstituted HUMATROPE if it is cloudy or contains particles.
2. If the needle can be removed from the type of syringe you are using, a new needle should be placed on the syringe before the injection. If the syringe and needle are made as 1 unit, another unit should be used for the injection.
3. Before and after injection, the rubber stopper of the vial should be wiped with rubbing alcohol or an alcoholic antiseptic solution to prevent contamination of the contents by repeated needle insertions.
4. Remove the needle cover and draw an amount of air into the syringe equal to your dose of HUMATROPE.
5. Insert needle into vial of reconstituted HUMATROPE and inject the air into the vial. Turn the vial upside down, and, making sure needle tip is in solution, withdraw your correct dose (see Figure 2). Make sure that no air bubbles are in the syringe.
6. Remove syringe and replace needle cover. Write date of reconstitution on vial label, and discard unused diluent.
7. Return unused portion of reconstituted HUMATROPE to refrigerator and use within 21 days.
8. Dispose of needle or the needle and syringe after use.

Injecting HUMATROPE

1. Gently tap injection site several times with fingers.
2. Wipe the area thoroughly with an alcohol swab. Use a circular motion and work outward from the inside of the circle.
3. **Subcutaneous Injection:** With the thumb and forefinger, stabilize the skin by spreading or pinching up a large area of skin.

- Holding the syringe at a 90-degree angle to injection site, quickly insert the needle all the way into the skin.
 - Slowly inject the solution.
 - Remove the needle quickly, and apply pressure over the injection site with a dry gauze pad or cotton ball. Rub for several seconds.
 - Dispose of needle or the needle and syringe after use.
4. **Intramuscular Injection:** With the thumb and first 2 fingers, press the skin down firmly against a large muscle mass, such as the thigh.
- Holding the syringe at a 90-degree angle to injection site, quickly insert the needle all the way into the skin.
 - When the needle is in place, slowly pull back on the plunger. If blood enters the syringe, remove needle, discard syringe and drug, and prepare another injection.
 - If no blood enters the syringe, slowly inject the solution.
 - Dispose of needle or the needle and syringe after use as per your doctor's instructions.

For more information, please contact your healthcare professional or pharmacist first, or Eli Lilly Canada Inc. at: 1-888-545-5972 or visit the website at www.lilly.ca

The information in this document is current as of the last revision date shown below. For the most current information please visit our website or contact us directly.

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This leaflet was prepared by Eli Lilly Canada Inc., Toronto, Ontario, M1N 2E8.

Last revised: August 19, 2013

PART III: CONSUMER INFORMATION

Pr **HUMATROPE® Cartridges**
(somatropin for injection)
pronounced HYOO-mah-trope

This leaflet is for patients and caregivers. It is Part III of a three-part "Product Monograph" published when HUMATROPE was approved for sale in Canada. This leaflet is a summary and will not tell you everything about HUMATROPE. Contact your doctor or pharmacist if you have any questions about the drug.

Please read this information carefully before you start to take your medicine, even if you have just refilled your prescription. Some of the information may have changed. Keep this pamphlet since you may need to refer to it after starting treatment with HUMATROPE.

ABOUT THIS MEDICATION

What the medication is used for:

HUMATROPE is used to treat children and teenagers who are short or growing too slowly due to a medical condition such as growth hormone deficiency, Turner syndrome, idiopathic short stature, SHOX (*short stature homeobox-containing gene*) deficiency, or being born small for gestational age.

HUMATROPE is also used in some adults who had growth hormone deficiency when they were children and still have growth hormone deficiency after they finish growing, or who do not make enough growth hormone as adults for some other reason.

What it does:

HUMATROPE is used to increase growth hormone levels. It stimulates bone growth in children unless the ends of the bones have hardened (closed epiphyses). In both adults and children with growth hormone deficiency, it also increases the growth of muscle and reduces body fat.

When it should not be used:

Treatment should not be used:

- in children to promote growth when the ends of the long bones have hardened (closed epiphyses). Treatment should be stopped when adult height is reached. Reevaluation to find out whether the patient still has growth hormone deficiency will determine if continued treatment with HUMATROPE at a lower dose would be beneficial.
- in patients with any evidence of an active cancer (either newly diagnosed or recurrent).
- while patients have a serious illness following heart or abdominal surgery, or in patients who have just had a serious accident, or those with acute respiratory failure (low level of oxygen in the blood or high level of carbon dioxide in the blood).
- in patients with Prader-Willi syndrome who are very obese or have severe breathing problems. There have been reports of deaths in children with Prader-Willi

syndrome who were treated with growth hormone and had one or more of the following risk factors: severe obesity, breathing problems, colds or lung infections.

Treatment should not be started:

- in patients known to be allergic to somatropin (the active substance in HUMATROPE), or to any of the ingredients in the powder or the diluent (listed below).
- in patients who have undergone kidney transplant, until one year post-transplant.
- in patients with diabetic retinopathy, a complication of diabetes that results from damage to the blood vessels of the light-sensitive tissue at the back of the eye (retina).

What the medicinal ingredient is:

Somatropin (recombinant human growth hormone)

What the important nonmedicinal ingredients are:

The HUMATROPE powder contains freeze-dried somatropin, dibasic sodium phosphate, glycine, and mannitol.

The diluent (solution for dissolving somatropin) contains metacresol and glycerin.

Phosphoric acid and/or sodium hydroxide may have been added at the time of manufacture to adjust the acidity of the liquid.

What dosage forms it comes in:

HUMATROPE is supplied as follows:

Vial: 5 mg vial plus 5 mL diluent

Cartridges: 6 mg, 12 mg, or 24 mg cartridges, each with 3.15 mL of diluent.

HUMATROPE cartridges require the use of a HumatroPen to inject the drug. HumatroPens are supplied separately.

WARNINGS AND PRECAUTIONS

Serious Warnings and Precautions

A doctor trained in hormone and growth disorders must examine the patient to decide if it is safe to use HUMATROPE.

After the HUMATROPE powder has been dissolved it must be water-clear and free of particles.

This medicine has been prescribed for you. Do not pass it on to others. It may harm them, even if their symptoms seem the same as yours.

When medicine is injected into the same place over a long time, it can cause loss of fat tissue under the skin. It is therefore important to keep changing the injection site, and the doctor or nurse can tell you how.

Before using HUMATROPE, the patient or caregiver should tell the doctor:

- if the patient has an active brain tumour or any other tumour (either benign or cancerous). However, the doctor may prescribe HUMATROPE if the patient has

had a brain tumour and needs no more anti-tumour treatment for it. The patient should be re-examined frequently to make sure that the tumour has not come back or started to grow

- if the patient is a survivor of childhood cancer.
- if the patient is very ill after a serious operation, or after being treated for multiple injuries from an accident, or if the patient has sudden serious breathing problems.
- if the patient has diabetes (because more or less insulin may be needed when taking HUMATROPE).
- if a member of the patient's family has diabetes.
- if the patient is taking a steroid medication (glucocorticoid) such as cortisone or prednisone. This is because the combination may reduce the success of the HUMATROPE treatment or because more of the steroid medication may be needed when the patient is also taking HUMATROPE.
- if the patient is taking a medication known to be metabolized by certain liver enzymes (e.g., cyclosporine, some anticonvulsants, and hormones such as estrogen and birth control pills). This is because the treatment with HUMATROPE may reduce the effectiveness of these drugs.
- if the patient, especially a child, develops abdominal pain.
- if the patient is or plans to become pregnant, or is breast-feeding.
- if the patient has hypothyroidism (low levels of thyroid hormone), because HUMATROPE may reduce the levels of thyroid hormone. The patient may require a change in dosage of his or her thyroid hormone medication.
- if the patient suffers from a bad headache or frequent headaches, or from problems with eyesight, vomiting or feeling sick. Very rarely, swelling of the brain may develop, and the doctor may want to examine the patient to look for signs of brain swelling. If this occurs it may be necessary to stop HUMATROPE treatment.
- if the patient develops a limp, or has hip or knee pain while being treated with HUMATROPE.

If the patient is sensitive to any component of the diluent (the liquid used to mix with the HUMATROPE powder), Sterile Water for Injection, USP, may be used to dissolve the HUMATROPE supplied in vials (not cartridges). Refer to How to Store It section for storage instructions.

If the patient has Turner syndrome and develops an ear infection or headaches her doctor should be told about these problems.

If the patient is growth hormone-deficient and also has Prader-Willi syndrome (a genetic disorder), the doctor should examine the patient for breathing problems and airway infections before starting HUMATROPE treatment, especially if the patient is overweight, has previously experienced severe breathing problems (especially during sleep), or suffered infection of the lungs or airways. If during treatment the patient has signs of breathing problems (snoring), treatment should be interrupted and the cause assessed by the doctor.

Treatment with HUMATROPE can change blood sugar levels.

The doctor should check the patient's blood sugar regularly while taking HUMATROPE, especially if there are risk factors for diabetes. Patients who have diabetes or impaired glucose tolerance should have their blood sugar closely monitored during HUMATROPE therapy.

Leukemia has been reported in a small number of pediatric patients who have been treated with growth hormone, including growth hormone of pituitary origin, and man-made growth hormone products such as somatrem and somatropin. The relationship, if any, between leukemia and growth hormone is uncertain.

Progression of pre-existing scoliosis (curvature of the spine) can occur in children who have rapid growth. HUMATROPE has not been shown to increase the occurrence of scoliosis.

If the patient has hypopituitarism and is receiving standard hormone replacement therapy, the doctor should monitor the hormone replacement therapy closely during HUMATROPE treatment.

If the patient has a growth disorder associated with being born small for gestational age, the blood sugar and insulin levels should be checked before starting treatment and regularly during treatment.

Patients over 65 years of age may be more sensitive to HUMATROPE and may require lower dose of HUMATROPE.

INTERACTIONS WITH THIS MEDICATION

Tell the doctor if the patient is taking any of the following drugs:

- Steroid medications such as glucocorticoids (e.g. cortisone or prednisone)
- Medications known to be metabolized by certain liver enzymes (e.g., cyclosporine, some anticonvulsants, and hormones such as estrogen and birth control pills)
- Insulin and anti-hyperglycemic agents

Because HUMATROPE may affect how some hormones, such as cortisol and cortisone, are processed in the body, people may discover that they have an underactive adrenal gland after starting HUMATROPE therapy. In these cases, glucocorticoid replacement therapy would need to be started. If already on glucocorticoid therapy, dosage may need to be adjusted.

PROPER USE OF THIS MEDICATION

Be sure to change the injection site frequently to help prevent lipatrophy (loss of fat tissue under the skin).

In general, HUMATROPE should be injected in the evening or before bedtime.

Usual dose:

The doctor will instruct you on what is the best dose of HUMATROPE for you (or your child) based on individual needs. Use HUMATROPE exactly as the doctor tells you to.

Reconstitution Instructions:

Please refer to the enclosed reconstitution instructions.

Overdose:

Long-term overdosage or using HUMATROPE after the growth plates in the long bones have closed (hardened) may result in joint pain and continued growth of fingers, toes, nose, ears or jaw. If you think this is happening, tell the doctor.

Overdose may change blood sugar levels, and patients may experience symptoms of hypoglycemia (low blood sugar), such as feeling shaky, dizzy and unwell or hyperglycemia (high blood sugar), such as increased urination or thirst.

In case of drug overdose, contact a health care practitioner, hospital emergency department or regional Poison Control Centre immediately, even if there are no symptoms.

Missed Dose:

Contact your physician or pharmacist if you have missed a dose.

SIDE EFFECTS AND WHAT TO DO ABOUT THEM

Some people may be allergic to the diluent (liquid used to mix with the HUMATROPE powder). If there is any pain or redness at the injection site, or if there is any swelling, tell your doctor.

Rarely, more severe allergic reactions may occur. Seek immediate medical help if you (or your child) experience any sudden trouble breathing, with swelling of the hands, feet or face.

Children treated with HUMATROPE may have an increased risk of developing an inflammation of the pancreas called pancreatitis. If your child develops severe abdominal pain, contact your doctor.

It is also important to have blood glucose checked if the patient has diabetes or a family history of diabetes.

HUMATROPE may affect the way the body handles sugars from food and drink. The doctor may need to check the amount of sugar in the urine or blood.

HUMATROPE can affect the amount of thyroid hormone in the blood, so patients must have thyroid function tests from time to time. If the thyroid is not working properly, HUMATROPE may not work as well as it should.

Any child who begins to limp must be examined by a doctor.

HUMATROPE may cause intracranial hypertension (increased pressure within the skull). Call the doctor if the patient has: a headache that doesn't go away or is severe, or has headaches that become more frequent; problems with vision; nausea (feeling sick in the stomach) or vomiting.

Other possible side effects include headaches, muscle or joint pains (in hips or knees), swelling associated with tingling sensations in the hands, feeling weak, rarely high blood pressure, shortness of breath, and sleep apnea (pauses in breathing during sleep). If the headaches are bad or frequent, and accompanied by sickness or vision problems, tell the doctor immediately.

For patients with Turner syndrome, HUMATROPE therapy may increase the already high frequency of ear infections. Your child should see her doctor if you think she has an ear infection.

This is not a complete list of side effects. If any of the side effects gets serious, or if you notice any unexpected side effects while taking HUMATROPE, contact your doctor or healthcare professional.

HOW TO STORE IT

Before it has been reconstituted (mixed):

Store HUMATROPE cartridges and diluent in the refrigerator at 2-8°C (36-46°F).

After it has been reconstituted (mixed):

When the cartridge is prepared with the supplied diluent, it may be stored in the refrigerator at 2-8°C (36-46°F) and **MUST** be used within 28 DAYS. Do **NOT** freeze.

Keep out of reach of children.

REPORTING SUSPECTED SIDE EFFECTS

You can report any suspected adverse reactions associated with the use of health products to the Canada Vigilance Program by one of the following 3 ways:

- Report online at www.healthcanada.gc.ca/medeffect
- Call toll-free at 1-866-234-2345
- Complete a Canada Vigilance Reporting Form and:
 - Fax toll-free to 1-866-678-6789, or
 - Mail to: Canada Vigilance Program
Health Canada
Postal Locator 0701D
Ottawa, Ontario
K1A 0K9

Postage paid labels, Canada Vigilance Reporting Form and the adverse reaction reporting guidelines are available on the MedEffect™ Canada website at www.healthcanada.gc.ca/medeffect.

NOTE: Should you require information related to the management of side effects, contact your health care professional. The Canada Vigilance Program does not provide medical advice.

MORE INFORMATION

For more information, please contact your healthcare professional or pharmacist first, or Eli Lilly Canada Inc. at: 1-888-545-5972, or visit the website at: www.lilly.ca

The information in this document is current as of the last revision date shown below. For the most current information

please visit our website or contact us directly.

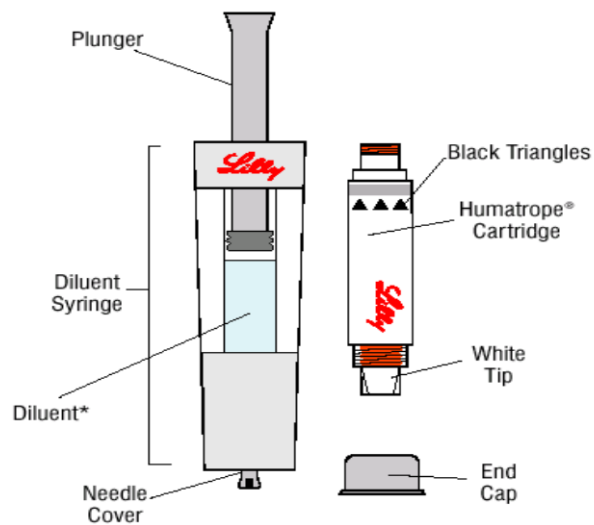
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This leaflet was prepared by Eli Lilly Canada Inc., Toronto, Ontario, M1N 2E8

Last Revised: August 19, 2013

Reconstitution Instructions for ^{Pr}HUMATROPE® Cartridges

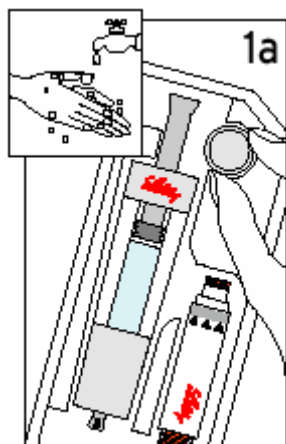
Parts



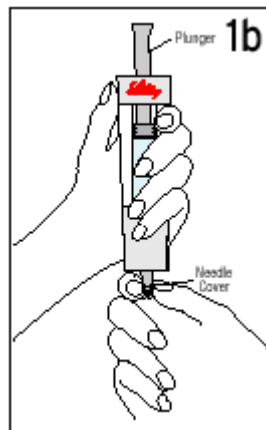
Only use parts from this kit to prepare the drug cartridge.

*Note: The liquid is colorless.
It is shown here as blue for illustration purposes only.

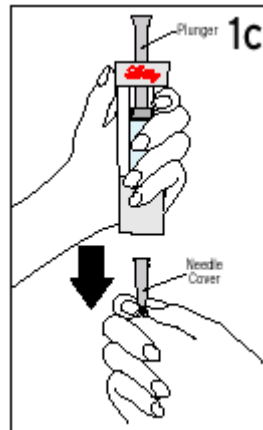
Preparing Your New Cartridge



Remove **ALL** contents from the tray.
Note: This product is designed for left or right handed use. Please feel free to use whichever hand is most comfortable for you.



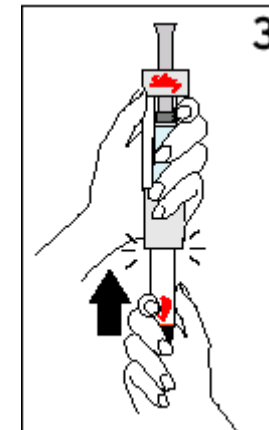
Grasp Needle Cover, which is at the bottom of the Diluent Syringe.



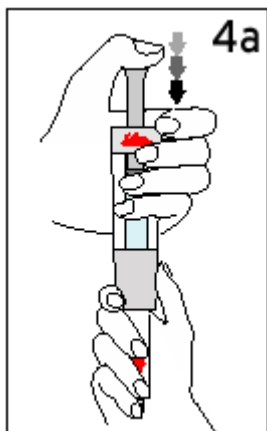
Remove Needle Cover and discard. **DO NOT** depress Plunger yet. It is okay if a drop of fluid is lost. It is not necessary to release air from the Diluent Syringe.



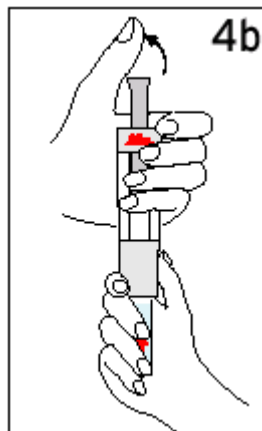
Hold cartridge, Black Triangles towards the Diluent Syringe. Align the cartridge and Diluent Syringe in a straight line. **DO NOT** insert the cartridge at an angle.



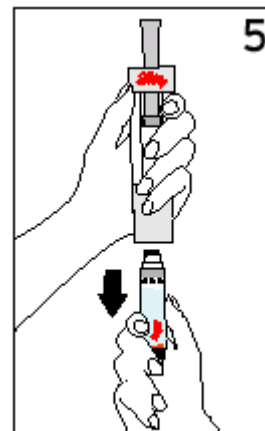
PUSH the cartridge **STRAIGHT** in until it stops **AND** the Black Triangles **ARE COVERED**. You may hear or feel a click. **DO NOT** twist the cartridge.



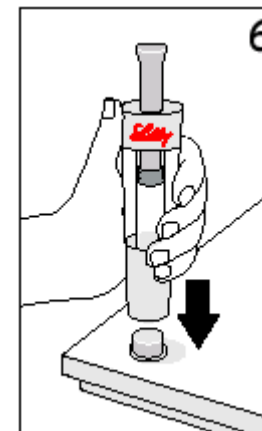
Hold the Diluent Syringe and the cartridge together with **TWO HANDS**. Push and release the Plunger 2 or 3 times until the Diluent is in the cartridge.



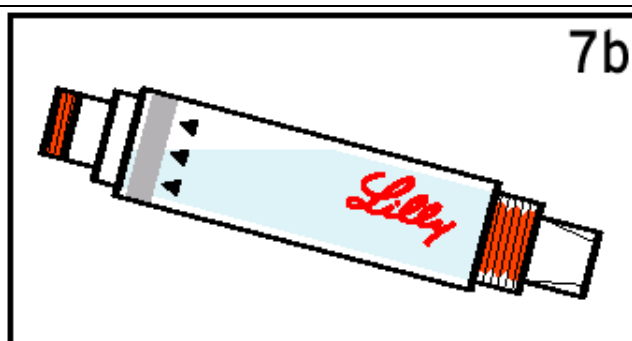
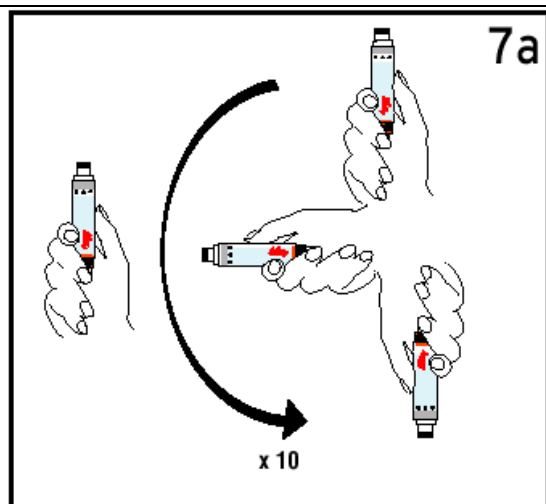
Remove thumb from the Plunger and check that the Diluent Syringe is empty (it is normal for small drops of Diluent to remain in the Diluent Syringe).



With thumb **OFF** the plunger, pull the cartridge away from the Diluent Syringe.



Place the End Cap on a hard, flat surface. Push the Diluent Syringe onto the End Cap and immediately discard the Diluent Syringe as instructed by your healthcare professional.



Mix the cartridge by gently inverting 10 times and let sit for 3 minutes,
DO NOT SHAKE.

Inspect the solution. The HUMATROPE solution should be clear .
If the solution is clear, your cartridge is now prepared and ready to be attached to your HUMATROPEN (see the User Manual for your HUMATROPEN).

After the cartridge has been reconstituted (mixed): with the supplied diluent, it may be stored in the refrigerator at 2-8°C (36-46°F) and **MUST** be used within 28 DAYS.
Do NOT freeze

If the solution is cloudy or contains particles, gently invert the cartridge 10 additional times. Let the cartridge sit for 5 more minutes. If the solution remains cloudy or contains particles, **DO NOT USE THE CARTRIDGE.**

For more information, please contact your healthcare professional or pharmacist first, or Eli Lilly Canada Inc. at: 1-888-545-5972 or visit the website at www.lilly.ca

The information in this document is current as of the last revision date shown below. For the most current information please visit our website or contact us directly.

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