



HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use Somatuline® Depot safely and effectively. See full prescribing information for Somatuline® Depot.

SOMATULINE® DEPOT (lanreotide) INJECTION

Initial U.S. Approval: 2007

RECENT MAJOR CHANGES

Dosage and Administration (2) 03/2011

INDICATIONS AND USAGE

Somatuline® Depot (lanreotide) Injection is a somatostatin analog indicated for:

- the long-term treatment of acromegalic patients who have had an inadequate response to or cannot be treated with surgery and/or radiotherapy (1)

DOSAGE AND ADMINISTRATION

- Dose range of 60 mg to 120 mg every 4 weeks (2)
- Recommended dose is 90 mg every 4 weeks for 3 months. Adjust thereafter based on GH and/or IGF-1 levels (2)
- Renal and Hepatic Impairment: Initial dose is 60 mg every 4 weeks for 3 months in moderate and severe renal or hepatic impairment. Adjust thereafter based on GH and/or IGF-1 levels (2, 12.3)
- Injected in the superior external quadrant of the buttock. Injection site should be alternated (2)
- Store at 2-8°C (36-46°F) in the original package (16)

DOSAGE AND STRENGTHS

Single use syringe: 60, 90, and 120 mg (3)

CONTRAINDICATIONS

None

WARNINGS AND PRECAUTIONS

- Gallbladder: Gallstones may occur; consider periodic monitoring (5.1)
- Glucose Metabolism: Hypo- and/or hyperglycemia may occur. Glucose monitoring is recommended and anti-diabetic treatment adjusted accordingly (5.2)
- Cardiac Function: Decrease in heart rate may occur. Use with caution in at-risk patients (5.4)

ADVERSE REACTIONS

Most common adverse reactions are diarrhea, cholelithiasis, abdominal pain, nausea, and injection site reactions (6)

To report SUSPECTED ADVERSE REACTIONS, contact Ipsen Biopharmaceuticals, Inc. at 1-866-837-2422 or the FDA at 1-800-FDA-1088 or www.fda.gov/medwatch

DRUG INTERACTIONS

- Hypoglycemia agents: Hypo- and/or hyperglycemia may occur. Glucose monitoring is recommended and anti-diabetic treatment adjusted accordingly (7.1)
- Cyclosporine: Somatuline® may decrease the bioavailability of cyclosporine. Cyclosporine dose may need to be adjusted (7.2)
- Drugs affecting heart rate: Somatuline® may decrease heart rate. Dose adjustment of coadministered drugs that decrease heart rate may be necessary (7.3)

USE IN SPECIFIC POPULATIONS

- Renal Impairment: Start dose is 60 mg in moderate and severe renal impairment (2, 8.6, 12.3)
- Hepatic Impairment: Start dose is 60 mg in moderate and severe hepatic impairment (2, 8.7, 12.3)

See 17 for PATIENT COUNSELING INFORMATION and FDA-approved patient labeling

Revised: 02/2012

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FULL PRESCRIBING INFORMATION

1 INDICATIONS AND USAGE

Somatuline® Depot (lanreotide) Injection 60 mg, 90 mg, and 120 mg is indicated for the long-term treatment of acromegalic patients who have had an inadequate response to surgery and/or radiotherapy, or for whom surgery and/or radiotherapy is not an option.

The goal of treatment in acromegaly is to reduce growth hormone (GH) and insulin growth factor-1 (IGF-1) levels to normal.

2 DOSAGE AND ADMINISTRATION

Patients should begin treatment with Somatuline® Depot 90 mg given via the deep subcutaneous route, at 4-week intervals for 3 months.

After 3 months dosage may be adjusted as follows:

- GH > 1 to ≤2.5 ng/mL, IGF-1 normal and clinical symptoms controlled: maintain Somatuline® Depot dose at 90 mg every 4 weeks.
- GH > 2.5 ng/mL, IGF-1 elevated and/or clinical symptoms uncontrolled: increase Somatuline® Depot dose to 120 mg every 4 weeks.
- GH ≤ 1 ng/mL, IGF-1 normal and clinical symptoms controlled: reduce Somatuline® Depot dose to 60 mg every 4 weeks.

Thereafter, the dose should be adjusted according to the response of the patient as judged by a reduction in serum GH and/or IGF-1 levels; and/or changes in symptoms of acromegaly.

Patients who are controlled on Somatuline® Depot 60 mg or 90 mg may be considered for an extended dosing interval of Somatuline® Depot 120 mg every 6 or 8 weeks. GH and IGF-1 levels should be obtained 6 weeks after this change in dosing regimen to evaluate persistence of patient response.

Continued monitoring of patients' response with dose adjustments for biochemical and clinical symptom control, as necessary, is recommended.

Somatuline® Depot should be injected via the deep subcutaneous route in the superior external quadrant of the buttock. The skin should not be folded and the needle should be inserted perpendicular to the skin, rapidly and to its full length. The injection site should alternate between the right and left side.

The starting dose in patients with moderate and severe renal or moderate and severe hepatic impairment should be 60 mg via the deep subcutaneous route, at 4-week intervals for 3 months followed by dose adjustment as described above [see *Clinical Pharmacology* (12.3)].

3 DOSAGE FORMS AND STRENGTHS

60, 90, and 120 mg sterile, single-use, prefilled syringes. The prefilled syringes contain a white to pale yellow, semi-solid formulation.

4 CONTRAINDICATIONS

None

5 WARNINGS AND PRECAUTIONS

5.1 Cholelithiasis and Gallbladder Sludge

Lanreotide may reduce gallbladder motility and lead to gallstone formation; therefore, patients may need to be monitored periodically [see *Adverse Reactions* (6.1), *Clinical Pharmacology* (12.2)].

5.2 Hyperglycemia and Hypoglycemia

Pharmacological studies in animals and humans show that lanreotide, like somatostatin and other somatostatin analogs, inhibits the secretion of insulin and glucagon. Hence, patients treated with Somatuline® Depot may experience hypoglycemia or hyperglycemia. Blood glucose levels should be monitored when lanreotide treatment is initiated, or when the dose is altered, and anti-diabetic treatment should be adjusted accordingly [see *Adverse Reactions* (6.1)].

5.3 Thyroid Function Abnormalities

Slight decreases in thyroid function have been seen during treatment with lanreotide in acromegalic patients, though clinical hypothyroidism is rare (<1%). Thyroid function tests are recommended where clinically indicated.

5.4 Cardiovascular Abnormalities

The most common overall cardiac adverse reactions observed in three pooled Somatuline® Depot cardiac studies in patients with acromegaly were sinus bradycardia (12/217, 5.5%), bradycardia (6/217, 2.8%), and hypertension (12/217, 5.5%) [see *Adverse Reactions* (6.1)].

In patients without underlying cardiac disease, lanreotide may lead to a decrease in heart rate without necessarily reaching the threshold of bradycardia. In patients suffering from cardiac disorders prior to lanreotide treatment, sinus bradycardia may occur. Care should be taken when initiating treatment with lanreotide in patients with bradycardia.

5.5 Drug Interactions

The pharmacological gastrointestinal effects of Somatuline® Depot may reduce the intestinal absorption of concomitant drugs.

Lanreotide may decrease the relative bioavailability of cyclosporine. Concomitant administration of Somatuline® Depot and cyclosporine may necessitate the adjustment of cyclosporine dose to maintain therapeutic levels [see *Drug Interactions* (7.2)].

5.6 Monitoring: Laboratory Tests

Serum GH and IGF-1 levels are useful markers of the disease and the effectiveness of treatment [see *Dosage and Administration* (2)].

6 ADVERSE REACTIONS

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

6.1 Clinical Studies Experience

The data described below reflect exposure to Somatuline® Depot in 416 acromegalic patients in seven studies. One study was a fixed-dose pharmacokinetic study. The other six studies were open-label or extension studies, one had a placebo-controlled run-in period and another had an active control. The population was mainly Caucasian (329/353, 93%) with a median age of 53.0 years of age (range 19-84 years). Fifty-four subjects (13%) were age 66-74 and 18 subjects (4.3%) were ≥ 75 years of age. Patients were evenly matched for gender (205 males and 211 females). The median average monthly dose was 91.2 mg (e.g., 90 mg injected via the deep subcutaneous route every 4 weeks) over 385 days with a median cumulative dose of 1290 mg. Of the patients reporting acromegaly severity at baseline (N=265), serum GH levels were <10 ng/mL for 69% (183/265) of the patients and ≥ 10 ng/mL for 31% (82/265) of the patients.

The most commonly reported adverse reactions reported by > 5% of patients who received Somatuline® Depot (N=416) in the overall pooled safety studies in acromegalic patients were gastrointestinal disorders (diarrhea, abdominal pain, nausea, constipation, flatulence, vomiting, loose stools), cholelithiasis, and injection site reactions.

Tables 1 and 2 present adverse reaction data from clinical studies with Somatuline® Depot in acromegalic patients. The tables include data from a single clinical study and pooled data from seven clinical studies.

Adverse Reactions in Parallel Fixed-Dose Phase of Study 1:

The incidence of treatment-emergent adverse reactions for Somatuline® Depot 60 mg, 90 mg, and 120 mg by dose as reported during the first 4 months (fixed-dose phase) of Study 1 [see *Clinical Studies* (14)] are provided in Table 1.

In Study 1, the adverse reactions of diarrhea, abdominal pain, and flatulence increased in incidence with increasing dose of Somatuline® Depot.

Adverse Reactions in Long-Term Clinical Trials:

Table 2 provides the most common adverse reactions that occurred in 416 acromegalic patients treated with Somatuline® Depot in seven studies. The analysis of safety compares adverse reaction rates of patients at baseline from the two efficacy studies to the overall pooled data from seven studies. Patients with elevated GH and IGF-1 levels were either naïve to somatostatin analog therapy or had undergone a 3-month washout [see *Clinical Studies* (14)].

In addition to the adverse reactions listed in Table 2, the following reactions were also seen:

- Sinus bradycardia occurred in 7% (12) of patients in the pooled Study 1 and 2 and in 3% (13) of patients in the overall pooled studies.
- Hypertension occurred in 7% (11) of patients in the pooled Study 1 and 2 and in 5% (20) of patients in the overall pooled studies.
- Anemia occurred in 7% (12) of patients in the pooled Study 1 and 2 and in 3% (14) of patients in the overall pooled studies.

Gastrointestinal Adverse Reactions

In the pooled clinical studies of Somatuline® Depot therapy, a variety of gastrointestinal reactions occurred, the majority of which were mild to moderate in severity. One percent of acromegalic patients treated with Somatuline® Depot in the pooled clinical studies discontinued treatment because of gastrointestinal reactions.

Pancreatitis was reported in < 1% of patients.

TABLE 2: ADVERSE REACTIONS AT AN INCIDENCE > 5.0% IN OVERALL GROUP REPORTED IN CLINICAL STUDIES				
System Organ Class	Number and Percentage of Patients			
	Studies 1 & 2		Overall Pooled Data	
	(N=170)		(N=416)	
	N	%	N	%
Patients With Any Adverse Reactions	157	92	356	86
Gastrointestinal Disorders	121	71	235	57
Diarrhea	81	48	155	37
Abdominal pain	34	20	79	19
Nausea	15	9	46	11
Constipation	9	5	33	8
Flatulence	12	7	30	7
Vomiting	8	5	28	7
Loose stools	16	9	23	6
Hepatobiliary Disorders	53	31	99	24
Cholelithiasis	45	27	85	20
General Disorders and Administration Site Conditions	51	30	91	22
(Injection site pain/mass/induration/nodule/pruritus)	28	17	37	9
Musculoskeletal and Connective Tissue Disorders	44	26	70	17
Arthralgia	17	10	30	7
Nervous System Disorders	34	20	80	19
Headache	9	5	30	7

Dictionary - MedDRA 7.1

Gallbladder Adverse Reactions

In clinical studies involving 416 acromegalic patients treated with Somatuline® Depot, cholelithiasis and gallbladder sludge were reported in 20% of the patients. Among 167 acromegalic patients treated with Somatuline® Depot who underwent routine evaluation with gallbladder ultrasound, 17.4% had gallstones at baseline. New cholelithiasis was reported in 12.0% of patients. Cholelithiasis may be related to dose or duration of exposure [see *Cholelithiasis and Gallbladder Sludge* (5.1)].

Injection Site Reactions

In the pooled clinical studies, injection site pain (4.1%) and injection site mass (1.7%) were the most frequently reported local adverse drug reactions that occurred with the administration of Somatuline® Depot. In a specific analysis, 20 of 413 patients (4.8%) presented indurations at the injection site. Injection site adverse reactions were more commonly reported soon after the start of treatment and were less commonly reported as treatment continued. Such adverse reactions were usually mild or moderate but did lead to withdrawal from clinical studies in two subjects.

Glucose Metabolism Adverse Reactions

In the clinical studies in acromegalic patients treated with Somatuline® Depot, adverse reactions of dysglycemia (hypoglycemia, hyperglycemia, diabetes) were reported by 14% (47/332) of patients and were considered related to study drug in 7% (24/332) of patients [see *Hyperglycemia and Hypoglycemia* (5.2)].

Cardiac Adverse Reactions

In the pooled clinical studies, sinus bradycardia (3.1%) was the most frequently observed heart rate and rhythm disorder. All other cardiac adverse drug reactions were observed in < 1% of patients. The relationship of these events to Somatuline® Depot could not be established because many of these patients had underlying cardiac disease [see *Cardiovascular Abnormalities* (5.4)].

A comparative echocardiography study of lanreotide and another somatostatin analog demonstrated no difference in the development of new or worsening valvular regurgitation between the two treatments over one year. The occurrence of clinically significant mitral regurgitation (i.e., moderate or severe in intensity) or of clinically significant aortic regurgitation (i.e., at least mild in intensity) was low in both groups of patients throughout the study.

Other Adverse Reactions

For the most commonly occurring adverse reactions in the pooled analysis, diarrhea, abdominal pain and cholelithiasis, there was no apparent trend for increasing incidence with age. GI disorders and renal and urinary disorders were more common in patients with documented hepatic impairment; however, the incidence of cholelithiasis was similar between groups.

Laboratory investigations of acromegalic patients treated with Somatuline® Depot in clinical studies show that the percentage of patients with putative antibodies at any time point after treatment is low (< 1% to 4% of patients in specific studies whose antibodies were tested). The antibodies did not appear to affect the efficacy or safety of Somatuline® Depot.

6.2 Postmarketing Experience

As adverse reactions experienced post-approval use are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

The profile of reported adverse reactions for Somatuline® Depot was consistent with that observed for treatment-related adverse reactions in the clinical studies. Those reported most frequently being gastrointestinal disorders (abdominal pain and diarrhea) and general disorders and administration site conditions (injection site reactions). Occasional cases of pancreatitis have also been observed.

7 DRUG INTERACTIONS

7.1 Insulin and Oral Hypoglycemic Drugs

Lanreotide, like somatostatin and other somatostatin analogs, inhibits the secretion of insulin and glucagon. Therefore, blood glucose levels should be monitored when lanreotide treatment is initiated or when the dose is altered and anti-diabetic treatment should be adjusted accordingly.

7.2 Cyclosporine

Concomitant administration of cyclosporine with lanreotide may decrease the relative bioavailability of cyclosporine and, therefore, may necessitate adjustment of cyclosporine dose to maintain therapeutic levels.

7.3 Other Concomitant Drug Therapy

The pharmacological gastrointestinal effects of Somatuline® Depot may reduce the intestinal absorption of concomitant drugs. Limited published data indicate that concomitant administration of a somatostatin analog and bromocriptine may increase the availability of bromocriptine.

TABLE 1: ADVERSE REACTIONS AT AN INCIDENCE > 5% LANREOTIDE OVERALL AND OCCURRING AT HIGHER RATE IN DRUG THAN PLACEBO: PLACEBO-CONTROLLED AND FIXED-DOSE PHASE OF STUDY 1 BY DOSE						
Body System	Placebo-Controlled Double-Blind Phase		Fixed-Dose Phase			
	Weeks 0 to 4		Double-Blind + Single-Blind Weeks 0 to 20			
Preferred Term	Placebo (N=25) N (%)	Lanreotide Overall (N=83) N (%)	Lanreotide 60 mg (N=34) N (%)	Lanreotide 90 mg (N=36) N (%)	Lanreotide 120 mg (N=37) N (%)	Lanreotide Overall (N=107) N (%)
Gastrointestinal System Disorders	1 (4%)	30 (36%)	12 (35%)	21 (58%)	27 (73%)	60 (56%)
Diarrhea	0	26 (31%)	9 (26%)	15 (42%)	24 (65%)	48 (45%)
Abdominal pain	1 (4%)	6 (7%)	3 (9%)	6 (17%)	7 (19%)	16 (15%)
Flatulence	0	5 (6%)	0 (0%)	3 (8%)	5 (14%)	8 (7%)
Application Site Disorders	0 (0%)	5 (6%)	3 (9%)	4 (11%)	8 (22%)	15 (14%)
(Injection site mass/pain/reaction/inflammation)						
Liver and Biliary System Disorders	1 (4%)	3 (4%)	9 (26%)	7 (19%)	4 (11%)	20 (19%)
Cholelithiasis	0	2 (2%)	5 (15%)	6 (17%)	3 (8%)	14 (13%)
Heart Rate & Rhythm Disorders	0	8 (10%)	7 (21%)	2 (6%)	5 (14%)	14 (13%)
Bradycardia	0	7 (8%)	6 (18%)	2 (6%)	2 (5%)	10 (9%)
Red Blood Cell Disorders	0	6 (7%)	2 (6%)	5 (14%)	2 (5%)	9 (8%)
Anemia	0	6 (7%)	2 (6%)	5 (14%)	2 (5%)	9 (8%)
Metabolic & Nutritional Disorders	3 (12%)	13 (16%)	8 (24%)	9 (25%)	4 (11%)	21 (20%)
Weight decrease	0	7 (8%)	3 (9%)	4 (11%)	2 (5%)	9 (8%)

A patient is counted only once for each body system and preferred term.

Dictionary - WHOART.

Concomitant administration of bradycardia-inducing drugs (e.g., beta-blockers) may have an additive effect on the reduction of heart rate associated with lanreotide. Dose adjustments of concomitant medication may be necessary. Vitamin K absorption was not affected when concomitantly administered with lanreotide.

7.4 Drug Metabolism Interactions

The limited published data available indicate that somatostatin analogs may decrease the metabolic clearance of compounds known to be metabolized by cytochrome P450 enzymes, which may be due to the suppression of growth hormone. Since it cannot be excluded that lanreotide may have this effect, other drugs mainly metabolized by CYP3A4 and which have a low therapeutic index (e.g. quinine, terfenadine) should therefore be used with caution. Drugs metabolized by the liver may be metabolized more slowly during lanreotide treatment and dose reductions of the concomitantly administered medications should be considered.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Pregnancy Category C

Lanreotide has been shown to have an embryocidal effect in rats and rabbits. There are no adequate and well-controlled studies in pregnant women. Somatuline® Depot (lanreotide) Injection should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. Reproductive studies in pregnant rats given 30 mg/kg by subcutaneous injection every 2 weeks (five times the human dose based on body surface area comparisons) resulted in decreased embryo/fetal survival. Studies in pregnant rabbits given subcutaneous injections of 0.45 mg/kg/day, two times the human therapeutic exposures at the maximum recommended dose of 120 mg based on comparisons of relative body surface area show decreased fetal survival and increased fetal skeletal/soft tissue abnormalities.

8.3 Nursing Mothers

It is not known whether lanreotide is excreted in human milk. Many drugs are excreted in human milk. As a result of serious adverse reactions in animals and potential in nursing infants from Somatuline®, a decision should be made whether to discontinue nursing or discontinue the drug taking into account the importance of the drug to the mother.

8.4 Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

8.5 Geriatric Use

No overall differences in safety or effectiveness were observed between elderly patients compared with younger patients, and the other reported clinical experience has not identified differences in responses between the elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out. It is not necessary to alter the starting dose in elderly patients as expected lanreotide serum concentrations in the elderly are well within the range of serum concentrations safely tolerated in healthy young subjects. Similarly, it is not necessary to alter the titration or maintenance doses of Somatuline® Depot as dose selection is based on therapeutic response [*See Dosage and Administration (2) and Clinical Pharmacology (12.3)*].

8.6 Renal Impairment

Lanreotide has been studied in patients with end-stage renal function on dialysis, but has not been studied in patients with mild, moderate, and severe renal impairment. It is recommended that patients with moderate and severe renal impairment receive a starting dose of lanreotide of 60 mg. Caution should be exercised when considering patients with moderate or severe renal impairment for an extended dosing interval of Somatuline® Depot 120 mg every 6 or 8 weeks [*see Dosage and Administration (2) and Clinical Pharmacology (12.3)*].

8.7 Hepatic Impairment

It is recommended that patients with moderate and severe hepatic impairment receive a starting dose of lanreotide of 60 mg. Caution should be exercised when considering patients with moderate or severe hepatic impairment for an extended dosing interval of Somatuline® Depot 120 mg every 6 or 8 weeks [*see Dosage and Administration (2) and Clinical Pharmacology (12.3)*].

10 OVERDOSAGE

If overdose occurs, symptomatic management is indicated.

There are no confirmed postmarketing cases of overdose with lanreotide that were serious or led to an adverse reaction.

Up-to-date information about the treatment of overdose can often be obtained from the National Poison Control Center at phone number 1-800-222-1222.

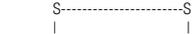
11 DESCRIPTION

Somatuline® Depot (lanreotide) Injection 60, 90, and 120 mg is a prolonged-release formulation for deep subcutaneous injection containing the drug substance lanreotide acetate, a synthetic octapeptide with a biological activity similar to naturally occurring somatostatin, and water for injection.

Somatuline® Depot is available as sterile, ready-to-use, prefilled syringes containing lanreotide supersaturated bulk solution of 24.6% w/w lanreotide base.

Each syringe contains:	Somatuline® Depot 60 mg	Somatuline® Depot 90 mg	Somatuline® Depot 120 mg
Lanreotide acetate	79.8 mg	116.4 mg	155.5 mg
Water for injection	186.2 mg	271.6 mg	363 mg

Lanreotide acetate is a synthetic cyclical octapeptide analog of the natural hormone, somatostatin. Lanreotide acetate is chemically known as [cyclo S-S]-3-[2-(2-naphthyl)-D-alanyl-L-cysteinyl-L-tyrosyl-D-tryptophyl-L-lysyl-L-valyl-L-cysteinyl-L-threoninamide, acetate salt. Its molecular weight is 1096.34 (base) and its amino acid sequence is:



D-βNal-Cys-Tyr-D-Trp-Lys-Val-Cys-Thr-NH₂, x(CH₂COOH) where x = 1.6 to 3.4

For appearance of the formulation, see *Dosage Forms and Strengths (3)*.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

Lanreotide, the active component of Somatuline® Depot, is an octapeptide analog of natural somatostatin. The mechanism of action of lanreotide is believed to be similar to that of natural somatostatin.

12.2 Pharmacodynamics

Lanreotide has a high affinity for human somatostatin receptors (SSTR) 2 and 5 and a reduced binding affinity for human SSTR1, 3, and 4. Activity at human SSTR 2 and 5 is the primary mechanism believed responsible for GH inhibition. Like somatostatin, lanreotide is an inhibitor of various endocrine, neuroendocrine, exocrine, and paracrine functions.

The primary pharmacodynamic effect of lanreotide is a reduction of GH and/or IGF-1 levels enabling normalization of levels in acromegalic patients [*see Clinical Studies (14)*]. In acromegalic patients, lanreotide reduces GH levels in a dose-dependent way. After a single injection of Somatuline® Depot, plasma GH levels fall rapidly and are maintained for at least 28 days.

Lanreotide inhibits the basal secretion of motilin, gastric inhibitory peptide, and pancreatic polypeptide, but has no significant effect on the secretion of secretin. Lanreotide inhibits post-prandial secretion of pancreatic polypeptide, gastrin, and cholecystokinin (CCK). In healthy subjects, lanreotide produces a reduction and a delay in post-prandial insulin secretion, resulting in transient, mild glucose intolerance.

Lanreotide inhibits meal-stimulated pancreatic secretions, and reduces duodenal bicarbonate and amylase concentrations, and produces a transient reduction in gastric acidity.

Lanreotide has been shown to inhibit gallbladder contractility and bile secretion in healthy subjects [*see Warnings and Precautions (5)*].

In healthy subjects, lanreotide inhibits meal-induced increases in superior mesenteric artery and portal venous blood flow, but has no effect on basal or meal-stimulated renal blood flow. Lanreotide has no effect on renal plasma flow or renal vascular resistance. However, a transient decrease in glomerular filtration rate (GFR) and filtration fraction has been observed after a single injection of lanreotide.

In healthy subjects, non-significant reductions in glucagon levels were seen after lanreotide administration. In diabetic non-acromegalic subjects receiving a continuous infusion (21 day) of lanreotide, serum glucose concentrations were temporarily decreased by 20-30% after the start and end of the infusion. Serum glucose concentrations returned to normal levels within 24 hours. A significant decrease in insulin concentrations was recorded between baseline and Day 1 only [*see Warnings and Precautions (5)*].

Lanreotide inhibits the nocturnal increase in thyroid-stimulating hormone (TSH) seen in healthy subjects. Lanreotide reduces prolactin levels in acromegalic patients treated on a long-term basis.

12.3 Pharmacokinetics

Somatuline® Depot is thought to form a drug depot at the injection site due to the interaction of the formulation with physiological fluids. The most likely mechanism of drug release is a passive diffusion of the precipitated drug from the depot

towards the surrounding tissues, followed by the absorption to the bloodstream.

After a single deep, subcutaneous administration, the mean absolute bioavailability of Somatuline® Depot in healthy subjects was 73.4, 69.0, and 78.4%, for the 60, 90, and 120 mg doses, respectively. Mean C_{max} values ranged from 4.3 to 8.4 ng/mL during the first day. Single-dose linearity was demonstrated with respect to AUC and C_{max}, and showed high inter-subject variability. Somatuline® Depot showed sustained release of lanreotide with a half-life of 23 to 30 days. Mean serum concentrations were > 1 ng/mL throughout 28 days at 90 mg and 120 mg and > 0.9 ng/mL with 60 mg.

In a repeat-dose administration pharmacokinetics (PK) study in acromegalic patients, rapid initial release was seen giving peak levels during the first day after administration. At doses of Somatuline® Depot between 60 and 120 mg linear pharmacokinetics were observed in acromegalic patients. At steady state mean C_{max} values were 3.8 ± 0.5, 5.7 ± 1.7 and 7.7 ± 2.5 ng/mL increasing linearly with dose. The mean accumulation ratio index was 2.7 which is in line with the range of values for the half-life of Somatuline® Depot. The steady-state trough serum lanreotide concentrations in patients receiving Somatuline® Depot every 28 days were 1.8 ± 0.3, 2.5 ± 0.9 and 3.8 ± 1.0 ng/mL at 60, 90, and 120 mg doses respectively. A limited initial burst effect and a low peak to trough fluctuation (81% to 108%) of the serum concentration at the plateau were observed.

For the same doses, similar values were obtained in clinical studies after at least four administrations (2.3 ± 0.9, 3.2 ± 1.1, and 4.0 ± 1.4 ng/mL, respectively).

Pharmacokinetic data from studies evaluating extended dosing use of Somatuline® Depot 120 mg demonstrated mean steady state, C_{min} values between 1.6 and 2.3 ng/mL for the 8- and 6-week treatment intervals, respectively.

Specific Populations

Somatuline® Depot has not been studied in specific populations. The pharmacokinetics of lanreotide in renal-impaired, hepatic-impaired, and geriatric subjects was evaluated after IV administration of lanreotide immediate-release formulation (IRF) at 7 mcg/kg dose.

Renal Impairment

An approximate two-fold decrease in total serum clearance of lanreotide with a consequent two-fold increase in half-life and AUC was observed. Patients with moderate to severe renal impairment should begin treatment with Somatuline® Depot 60 mg. Caution should be exercised when considering patients with moderate or severe renal impairment for an extended dosing interval of Somatuline® Depot 120 mg every 6 or 8 weeks.

Geriatric

Studies in healthy elderly subjects showed an 85% increase in half-life and a 65% increase in mean residence time (MRT) of lanreotide compared to those seen in healthy young subjects; however, there was no change in either AUC or C_{max} of lanreotide in elderly as compared to healthy young subjects.

Hepatic Impairment

In subjects with moderate to severe hepatic impairment, a 30% reduction in clearance of lanreotide was observed. Patients with moderate to severe hepatic impairment should begin treatment with Somatuline® Depot 60 mg. Caution should be exercised when considering patients with moderate or severe hepatic impairment for an extended dosing interval of Somatuline® Depot 120 mg every 6 or 8 weeks.

In studies evaluating excretion, < 5% of lanreotide was excreted in urine and less than 0.5% was recovered unchanged in feces, indicative of some biliary excretion.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenicity, Mutagenicity, Impairment of Fertility

Standard lifetime carcinogenicity bioassays were conducted in mice and rats. Mice were given daily subcutaneous doses of lanreotide acetate at 0.5, 1.5, 5, 10, and 30 mg/kg for 104 weeks. Cutaneous and subcutaneous tumors of fibrous connective tissues at the injection sites were observed at the high dose of 30 mg/kg/day. Fibrosarcomas in both genders and malignant fibrous histiocytomas were observed in males at 30 mg/kg/day resulting in exposures three times higher than the clinical therapeutic exposure at the maximum therapeutic dose of 120 mg given by monthly subcutaneous injection based on the AUC values. Rats were given daily subcutaneous doses of lanreotide acetate at 0.1, 0.2, and 0.5 mg/kg for 104 weeks. Increased cutaneous and subcutaneous tumors of fibrous connective tissues at the injection sites were observed at the dose of 0.5 mg/kg/day resulting in exposures less than the clinical therapeutic exposure at 120 mg given by monthly subcutaneous injection. The increased incidence of injection site tumors in rodents is likely related to the increased dosing frequency (daily) in animals compared to monthly dosing in humans and therefore may not be clinically relevant.

Lanreotide was not genotoxic in tests for gene mutations in a bacterial mutagenicity (Ames) assay, or mouse lymphoma cell assay with or without metabolic activation. Lanreotide was not genotoxic in tests for the detection of chromosomal aberrations in a human lymphocyte and in vivo mouse micronucleus assay.

Subcutaneous dosing (30 mg/kg/2 weeks) before mating and continuing into gestation in rats at doses five times the human clinical exposure (120 mg every 4 weeks) based on mg/m² had reduced fertility. Gestation length was statistically significantly increased, suggesting some delay in parturition at three times human exposure. The reduction in fertility in non-acromegalic animals is likely related to the pharmacologic activity (decreased growth hormone secretion) of lanreotide acetate.

14 CLINICAL STUDIES

The effect of Somatuline® Depot on reducing GH and IGF-1 levels and control of symptoms in patients with acromegaly was studied in two long-term, multiple-dose, randomized multicenter studies.

Study 1

This 1-year study included a 4-week double-blind, placebo-controlled phase, a 16-week single-blind, fixed-dose phase, and a 32-week open-label dose-titration phase. Patients with active acromegaly based on biochemical tests and medical

history entered a 12-week washout period if there was previous treatment with a somatostatin analog or a dopaminergic agonist.

Upon entry, patients were randomly allocated to receive a single deep subcutaneous injection of Somatuline® Depot 60, 90, or 120 mg or placebo. Four weeks later, patients entered a fixed-dose phase where they received four injections of Somatuline® Depot followed by a dose-titration phase of eight injections for a total of 13 injections over 52 weeks (including the placebo phase). Injections were given at 4-week intervals. During the dose-titration phase of the study, the dose was titrated twice (every fourth injection), as needed, according to individual GH and IGF-1 levels.

A total of 108 patients (51 males, 57 females) were enrolled in the initial placebo-controlled phase of the study. Half (54/108) of the patients had never been treated with a somatostatin analog or dopamine agonist, or had stopped treatment for at least 3 months prior to their participation in the study and were required to have a mean GH level > 5 ng/mL at their first visit. The other half of the patients had received prior treatment with a somatostatin analog or a dopamine agonist before study entry and at study entry were to have a mean GH concentration > 3 ng/mL and at least a 100% increase in mean GH concentration after washout of medication.

One hundred and seven (107) patients completed the placebo-controlled phase, 105 patients completed the fixed-dose phase and 99 patients completed the dose-titration phase. Patients not completing withdrew due to adverse events (5) or lack of efficacy (4).

In the double-blind phase of study 1, a total of 52 (63%) of the 83 lanreotide-treated patients had a >50% decrease in mean GH from baseline to Week 4 including 52%, 44%, and 90% of patients in the 60, 90, and 120 mg groups, respectively, compared to placebo (0%, 0/25). In the fixed-dose phase at Week 16, 72% of all 107 lanreotide-treated patients had a decrease from baseline in mean GH of > 50% including 68% (23/34), 64% (23/36), and 84% (31/37) of patients in the 60, 90, and 120 mg lanreotide treatment groups, respectively. Efficacy achieved in the first 16 weeks was maintained for the duration of the study (*see Table 3*).

Study 2

This was a 48-week, open-label, uncontrolled multicenter study which enrolled patients who had an IGF-1 concentration ≥ 1.3 times the upper limit of the age-adjusted normal range. Patients receiving treatment with a somatostatin analog (other than Somatuline® Depot) or a dopaminergic agonist had to attain this IGF-1 concentration after a washout period of up to 3 months.

Patients were initially enrolled in a 4-month fixed-dose phase where they received four deep subcutaneous injections of Somatuline® Depot, 90 mg, at 4-week intervals. Patients then entered a dose-titration phase where the dose of Somatuline® Depot was adjusted based on GH and IGF-1 levels at the beginning of the dose-titration phase and, if necessary, again after another four injections. Patients titrated up to the maximum dose (120 mg) were not allowed to titrate down again.

A total of 63 patients (38 males, 25 females) entered the fixed-dose phase of the trial and 57 patients completed 48 weeks of treatment. Six patients withdrew due to adverse reactions (3), other reasons (2), or lack of efficacy (1).

After 48 weeks of treatment with Somatuline® Depot at 4-week intervals, 43% (27/63) of the acromegalic patients in this study achieved normal age-adjusted IGF-1 concentrations. Mean IGF-1 concentrations after treatment completion were 1.3 ± 0.7 times the upper limit of normal compared to 2.5 ± 1.1 times the upper limit of normal at baseline.

The reduction in IGF-1 concentrations over time correlated with a corresponding marked decrease in mean GH concentrations. The proportion of patients with mean GH concentrations <2.5 ng/mL increased significantly from 35% to 77% after the fixed-dose phase and 85% at the end of the study. At the end of treatment, 24/63 (38%) of patients had both normal IGF-1 concentrations and a GH concentration of ≤ 2.5 ng/mL (*see Table 4*) and 17/63 patients (27%) had both normal IGF-1 concentrations and a GH concentration of < 1 ng/mL.

Examination of age and gender subgroups did not identify differences in response to Somatuline® Depot among these subgroups. The limited number of patients in the different racial subgroups did not raise any concerns regarding efficacy of Somatuline® Depot in these subgroups.

16 HOW SUPPLIED/STORAGE AND HANDLING

Somatuline® Depot is supplied in strengths of 60 mg, 90 mg, and 120 mg in a single, sterile, prefilled, ready-to-use, polypropylene syringe fitted with a 20 mm needle covered by a dry natural rubber sheath. Each prefilled syringe is sealed in a laminated pouch and packed in a carton.

NDC 15054-0060-1 60-mg, sterile, prefilled syringe
NDC 15054-0090-1 90-mg, sterile, prefilled syringe
NDC 15054-0120-1 120-mg, sterile, prefilled syringe

Storage and Handling

Somatuline® Depot must be stored in a refrigerator at 2°C to 8°C (36°F to 46°F) and protected from light in its original packaging. Thirty (30) minutes prior to injection, remove sealed pouch of Somatuline® Depot from refrigerator and allow it to come to room temperature. Keep pouch sealed until injection.

Each syringe is intended for single use. Do not use beyond the expiration date on the packaging.

17 PATIENT COUNSELING INFORMATION

The physician should provide a copy of the FDA-Approved Patient Labeling and review the contents with the patient. Patients should be advised to inform their doctor or pharmacist if they develop any unusual symptoms, or if any known symptom persists or worsens.

Patients should be advised that response to Somatuline® Depot should be monitored by periodic measurements of GH and IGF-1 levels, with a goal of decreasing these levels to the normal range.

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TABLE 3: OVERALL EFFICACY RESULTS BASED ON GH AND IGF-1 LEVELS BY TREATMENT PHASE IN STUDY 1					
		Baseline N=107	Before Titration 1 (16 weeks) N=107	Before Titration 2 (32 weeks) N=105	Last Value Available* N=107
GH					
≤5.0 ng/mL	Number of Responders (%)	20 (19%)	72 (67%)	76 (72%)	74 (69%)
≤2.5 ng/mL	Number of Responders (%)	0 (0%)	52 (49%)	59 (56%)	55 (51%)
≤1.0 ng/mL	Number of Responders (%)	0 (0%)	15 (14%)	18 (17%)	17 (16%)
Median GH	ng/mL	10.27	2.53	2.20	2.43
GH Reduction	Median % Reduction	--	75.5	78.2	75.5
IGF-1					
Normal[‡]	Number of Responders (%)	9 (8%)	58 (54%)	57 (54%)	62 (58%)
Median IGF-1	ng/mL	775.0	332.0 ¹	316.5 ²	326.0
IGF-1 Reduction	Median % Reduction	--	52.3 ¹	54.5 ²	55.4
IGF-1 Normal[§] + GH ≤2.5 ng/mL	Number of Responders (%)	0 (0%)	41 (38%)	46 (44%)	44 (41%)

¹n=105, ²n=102, ³Age-adjusted, ⁴Last observation carried forward

TABLE 4: OVERALL EFFICACY RESULTS BASED ON GH AND IGF-1 LEVELS BY TREATMENT PHASE IN STUDY 2					
		Baseline N=63	Before Titration 1 (12 weeks) N=63	Before Titration 2 (28 weeks) N=59	Last Value Available* N=63
IGF-1					
Normal¹	Number of Responders (%)	0 (0%)	17 (27%)	22 (37%)	27 (43%)
Median IGF-1	ng/mL	689.0	382.0	334.0	317.0
IGF-1 Reduction	Median % Reduction	--	41.0	51.0	50.3
GH					
≤5.0 ng/mL	Number of Responders (%)	40 (64%)	59 (94%)	57 (97%)	62 (98%)
≤2.5 ng/mL	Number of Responders (%)	21 (33%)	47 (75%)	47 (80%)	54 (86%)
≤1.0 ng/mL	Number of Responders (%)	8 (13%)	19 (30%)	18 (31%)	28 (44%)
Median GH	ng/mL	3.71	1.65	1.48	1.13
GH Reduction	Median % Reduction	--	63.2	66.7	78.6 ²
IGF-1 Normal¹ + GH ≤2.5 ng/mL	Number of Responders (%)	0 (0%)	14 (22%)	20 (34%)	24 (38%)

¹Age-adjusted, ²N= 62, ³Last observation carried forward

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