

PRODUCT MONOGRAPH  
INCLUDING PATIENT MEDICATION INFORMATION

**Pr Glatiramer Acetate Injection**

20 mg / mL

Pre-filled syringes for Subcutaneous Injection

Immunomodulator

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## RECENT MAJOR LABEL CHANGES

Not Applicable

## TABLE OF CONTENTS

<b>RECENT MAJOR LABEL CHANGES</b> .....	<b>2</b>
<b>TABLE OF CONTENTS</b> .....	<b>2</b>
<b>PART I: HEALTH PROFESSIONAL INFORMATION</b> .....	<b>4</b>
<b>1 INDICATIONS</b> .....	<b>4</b>
1.1 Pediatrics .....	4
1.2 Geriatrics .....	4
<b>2 CONTRAINDICATIONS</b> .....	<b>4</b>
<b>4 DOSAGE AND ADMINISTRATION</b> .....	<b>4</b>
4.1 Dosing Considerations .....	4
4.2 Recommended Dose and Dosage Adjustment .....	5
4.3 Administration .....	5
4.5 Missed Dose .....	5
<b>5 OVERDOSAGE</b> .....	<b>5</b>
<b>6 DOSAGE FORMS, STRENGTHS, COMPOSITION AND PACKAGING</b> .....	<b>5</b>
<b>7 WARNINGS AND PRECAUTIONS</b> .....	<b>5</b>
7.1 Special Populations .....	8
7.1.1 Pregnant Women .....	8
7.1.2 Breast-feeding .....	8
7.1.3 Pediatrics .....	9
7.1.4 Geriatrics .....	9
<b>8 ADVERSE REACTIONS</b> .....	<b>9</b>
8.1 Adverse Reaction Overview .....	9
8.2 Clinical Trial Adverse Reactions .....	10
8.3 Other Clinical Trial Adverse Reactions .....	14
8.4 Abnormal Laboratory Findings: Hematologic, Clinical Chemistry and Other Quantitative Data .....	17
8.6 Post-Market Adverse Reactions .....	17

<b>9</b>	<b>DRUG INTERACTIONS</b> .....	<b>19</b>
	9.2 Overview.....	19
<b>10</b>	<b>ACTION AND CLINICAL PHARMACOLOGY</b> .....	<b>19</b>
	10.1 Mechanism of action .....	19
	10.3 Pharmacokinetics.....	19
<b>11</b>	<b>STORAGE, STABILITY AND DISPOSAL</b> .....	<b>20</b>
<b>PART II: SCIENTIFIC INFORMATION</b> .....		<b>21</b>
<b>13</b>	<b>PHARMACEUTICAL INFORMATION</b> .....	<b>21</b>
<b>14</b>	<b>CLINICAL TRIALS</b> .....	<b>22</b>
<b>15</b>	<b>PHARMACOLOGY</b> .....	<b>25</b>
<b>16</b>	<b>NON-CLINICAL TOXICOLOGY</b> .....	<b>26</b>
<b>17</b>	<b>SUPPORTING PRODUCT MONOGRAPHS</b> .....	<b>28</b>
<b>PATIENT MEDICATION INFORMATION</b> .....		<b>29</b>

## PART I: HEALTH PROFESSIONAL INFORMATION

### 1 INDICATIONS

Glatiramer Acetate Injection (glatiramer acetate) 20 mg/mL is indicated for:

#### **20 mg/mL once-daily:**

Treatment of ambulatory patients with Relapsing Remitting Multiple Sclerosis (RRMS), including patients who have experienced a single demyelinating event and have lesions typical of multiple sclerosis on brain MRI:

- To decrease the frequency of clinical exacerbations
- To reduce the number and volume of active brain lesions identified on Magnetic Resonance Imaging (MRI) scans.

The safety and efficacy of glatiramer acetate in chronic progressive MS have not been established.

#### 1.1 Pediatrics

**Pediatrics (under 18 years of age):** No data are available to Health Canada; therefore, Health Canada has not authorized an indication for pediatric use.

#### 1.2 Geriatrics

**Geriatrics (over 65 years of age):** No data are available to Health Canada; therefore, Health Canada has not authorized an indication for geriatric use.

### 2 CONTRAINDICATIONS

Glatiramer Acetate Injection is contraindicated in patients who are hypersensitive to this drug or to any ingredient in the formulation, including any non-medicinal ingredient, or component of the container. For a complete listing, see [Dosage Forms, Strengths, Composition and Packaging](#).

### 4 DOSAGE AND ADMINISTRATION

#### 4.1 Dosing Considerations

*Glatiramer Acetate Injection should only be prescribed by (or following consultation with) clinicians who are experienced in the diagnosis and management of Multiple Sclerosis.*

The only recommended route of administration of Glatiramer Acetate Injection is the subcutaneous route. Glatiramer Acetate Injection should not be administered by the intravenous route.

## 4.2 Recommended Dose and Dosage Adjustment

Glatiramer Acetate Injection 20 mg/mL should be administered once per day.

Glatiramer Acetate Injection 20 mg/mL is not interchangeable with Glatiramer Acetate Injection 40 mg/mL.

Health Canada has not authorized an indication for pediatric use (see [Section 1.1: Pediatrics](#)).

## 4.3 Administration

Please see [Patient Medication Information \(Instructions for Use\)](#) for instructions on the preparation and injection of Glatiramer Acetate Injection.

## 4.5 Missed Dose

If a dose is missed it should be taken as soon as possible. If, however, it is closer to the time of the next dose, skip the missed dose and resume at the usual dosing schedule, avoid giving 2 injections of Glatiramer Acetate Injection 20 mg/mL in the same 12-hour period.

## 5 OVERDOSAGE

Cases of overdose with glatiramer acetate (up to 300 mg glatiramer acetate) have been reported. These cases were not associated with any adverse reactions other than those mentioned in [ADVERSE REACTIONS](#). In case of overdose, patients should be monitored and the appropriate symptomatic and supportive therapy instituted.

For management of a suspected drug overdose, contact your regional poison control centre.
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## 6 DOSAGE FORMS, STRENGTHS, COMPOSITION AND PACKAGING

Table 1: Dosage Forms, Strengths, Composition and Packaging

Route of Administration	Dosage Form / Strength/Composition	Nonmedicinal Ingredients
Subcutaneous	20 mg/ mL Prefilled syringe	40 mg mannitol in sterile water for injection

- Glatiramer Acetate Injection single-use **20 mg/ mL** pre-filled syringes have grey plunger rods. Each pre-filled syringe contains glatiramer acetate, mannitol and sterile water for injection. Available in packs of 30 single-use 20 mg/ mL pre-filled glass syringes.

## 7 WARNINGS AND PRECAUTIONS

The only recommended route of administration of Glatiramer Acetate Injection is the subcutaneous route. Glatiramer Acetate Injection should not be administered by the intravenous

or intramuscular routes.

## General

Patients should be instructed in aseptic self-injection techniques to assure the safe administration of Glatiramer Acetate Injection, including a careful review of the [Patient Medication Information](#). The first injection should be performed under the supervision of an appropriately qualified health care professional. Patient understanding and use of aseptic self-injection techniques and procedures should be periodically re-evaluated. Patients should be cautioned against the re-use of needles or syringes and instructed in safe disposal procedures. A puncture-resistant container for disposal of used needles and syringes should be used by the patient. Patients should be instructed on the safe disposal of full containers.

### **Localized Adverse Reactions Associated with Subcutaneous Use**

At injection sites, localized lipoatrophy and, rarely, injection site skin necrosis have been reported during clinical trials and post-marketing experience (see [ADVERSE REACTIONS](#)). Lipoatrophy may occur after treatment onset (sometimes as early as several months) and may be permanent. There is no known therapy for lipoatrophy. To assist in possibly minimizing these events the patient should be advised to follow proper injection technique and to rotate injection areas and sites on a regular basis (see [Patient Medication Information](#)).

### **Carcinogenesis and Mutagenesis**

Preclinical studies to assess the carcinogenic potential of glatiramer acetate in mice and rats do not suggest any evidence of carcinogenic potential related to glatiramer acetate administered subcutaneously at dose levels of up to 30 mg/kg/day in rats and 60 mg/kg/day in mice (see [NON-CLINICAL TOXICOLOGY: Carcinogenicity](#)). The relevance of these findings for humans is unknown (see [WARNINGS AND PRECAUTIONS: Immune - Considerations Involving the Use of a Product Capable of Modifying Immune Responses](#)).

### **Cardiovascular**

Symptoms of Potentially Cardiac Origin: A number of patients exposed to either glatiramer acetate 20 mg/mL once per day in 4 placebo-controlled trials, or glatiramer acetate 40 mg/mL three times per week in a single placebo-controlled trial, experienced at least one episode of what was described as transient chest pain (see [ADVERSE REACTIONS](#)). While some of these episodes occurred in the context of the Immediate Post-Injection Reaction (see [ADVERSE REACTIONS](#)), many did not. The pathogenesis of this symptom is unknown. Patients in controlled clinical trials were free of significant cardiovascular problems (New York Heart Association Class I and II) and thus the risks associated with glatiramer acetate treatment for Multiple Sclerosis patients with comorbid cardiovascular disease are unknown.

Immediate Post-Injection Reaction: Glatiramer acetate has been associated with a constellation of symptoms appearing immediately after injection that included at least two of the following: flushing, chest pain, palpitations, anxiety, dyspnea, constriction of the throat and urticaria (see [ADVERSE REACTIONS: Immediate Post-Injection Reaction](#)).

## Hepatic

Very rare cases of severe liver injury, including liver failure, hepatitis with jaundice, and extremely rare cases of fulminant hepatitis leading to liver transplant, have been reported with glatiramer acetate during postmarketing experience in patients with and without relevant risk factors in their medical history, such as history of drug induced liver events with other disease modifying therapies (DMTs) indicated for the treatment of multiple sclerosis, concomitant treatment with drugs with known Drug Induced Liver Injury (DILI) risk or medical history of liver impairment. Hepatic adverse events have occurred from days to years after initiating treatment with glatiramer acetate suggesting idiosyncratic drug induced liver injury in most cases. Some cases, reported in patients who previously experienced liver injury during treatment with other immunomodulatory therapies used to treat multiple sclerosis, were suggestive of autoimmune hepatitis. Most events resolved with discontinuation of treatment and a relationship to glatiramer acetate could not be excluded (see [ADVERSE REACTIONS, Post-Market Adverse Reactions](#)).

Caution is recommended when considering treatment with Glatiramer Acetate Injection in patients who have pre-existing liver disease or who have experienced liver injury previously during treatment with other drugs, including other disease modifying therapies (DMTs) for treatment of multiple sclerosis or with concomitant (DILI) risk drugs.

Prior to initiating treatment with Glatiramer Acetate Injection, serum aminotransferase, alkaline phosphatase and total bilirubin levels should be obtained (within 6 months) for all patients. Patients should be monitored during treatment for signs of hepatic injury. Evaluation of transaminases is recommended during treatment, as clinically relevant (see [WARNINGS AND PRECAUTIONS, Monitoring and Laboratory Tests](#)). Patients should be advised to immediately report any signs or symptoms of hepatotoxicity (e.g., jaundice, dark urine, abdominal pain, nausea, vomiting, loss of appetite, weight loss, unusual fatigue). Discontinue treatment if clinically significant liver injury induced by Glatiramer Acetate Injection is suspected.

## Immune

**Considerations Involving the Use of a Product Capable of Modifying Immune Responses:** Glatiramer acetate is an antigenic substance and thus it is possible that detrimental host responses can occur with its use. Whether glatiramer acetate can alter normal human immune responses, such as the recognition of foreign antigens is unknown. It is therefore possible that treatment with glatiramer acetate may undermine the body's defenses against infections and tumor surveillance. Systematic assessments of these risks have not been done. Continued alteration of cellular immunity due to chronic treatment with glatiramer acetate might result in untoward effects.

Glatiramer acetate-reactive antibodies are formed in practically all patients exposed to treatment with the recommended dose. Studies in both the rat and monkey have suggested that immune complexes are deposited in the renal glomeruli. Furthermore, in a controlled clinical trial of 125 RRMS patients given glatiramer acetate 20 mg for 2 years, serum IgG levels reached at least 3 times baseline values in 80% of patients by 3 months of initiation of treatment. By 12 months of treatment, however, 30% of patients still had IgG levels at least 3 times baseline values, and 90% had levels above baseline by 12 months. The antibodies are exclusively of the IgG subtype - and predominantly of the IgG-1 subtype. No IgE type antibodies could be detected in any of the 94 sera tested.

Nevertheless, anaphylaxis can be associated with the administration of almost any foreign substance and, therefore, this risk cannot be excluded.

Glatiramer acetate has not been studied in patients with a history of severe anaphylactoid reactions, obstructive pulmonary disease or asthma, nor in patients under treatment for either of these two latter conditions. Particular caution is therefore advised regarding the use of Glatiramer Acetate Injection in such patients.

Anaphylactoid reactions associated with the use of glatiramer acetate have been reported in rare instances (<1/1000) during the post-marketing period. Some cases required treatment with epinephrine and other appropriate medical treatment.

## **Monitoring and Laboratory Tests**

### **Renal**

The pharmacokinetics of glatiramer acetate in patients with impaired renal function have not been determined. In patients with renal impairment, renal function should be monitored while they are treated with Glatiramer Acetate Injection. While there is no evidence of glomerular deposition of immune complexes in patients, the possibility cannot be excluded.

### **Liver function**

Liver transaminases should be checked (within 6 months) before initiating treatment with Glatiramer Acetate Injection. Evaluation of transaminases is recommended during treatment, as clinically relevant (see [WARNINGS AND PRECAUTIONS, Hepatic](#); [ADVERSE REACTIONS, Post-Market Adverse Reactions](#)).

## **7.1 Special Populations**

### **7.1.1 Pregnant Women**

There are no adequate and well-controlled studies in pregnant women. No evidence of reproductive toxicity was observed in preclinical studies (see [NON-CLINICAL TOXICOLOGY: Reproduction and Teratology](#)). The potential risk for humans is not fully known (See [ADVERSE REACTIONS, Post-Market Adverse Reactions](#)). However, since animal reproduction studies are not always predictive of human response and there are no adequate and well controlled studies in pregnant women with MS, Glatiramer Acetate Injection should be used during pregnancy only when, in the judgment of the physician, the potential benefits outweigh the possible hazards.

During pre-marketing clinical trials with glatiramer acetate (20 mg/mL once per day), seven women conceived while being treated with the active drug. One case was lost to follow-up. Three of the patients electively discontinued pregnancy. Three patients stopped treatment 1, 1.5 and 2 months after learning they were pregnant; all delivered healthy babies. In a 12-month placebo-controlled trial with glatiramer acetate (40 mg/mL three times per week) a total of nine pregnancies were reported. Of these, one patient experienced a spontaneous abortion at 13 weeks gestation and three patients had elective abortions. Five pregnancies were carried to term and all delivered healthy babies. Patients stopped treatment with glatiramer acetate prior to or upon learning that they were pregnant.

### **7.1.2 Breast-feeding**

It is not known whether glatiramer acetate is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when Glatiramer Acetate Injection is administered to a nursing woman. No significant effects on offspring growth and development



were observed in preclinical studies (see [NON-CLINICAL TOXICOLOGY: Reproduction and Teratology](#)).

### 7.1.3 Pediatrics

**Pediatrics (under 18 years of age):** No data are available to Health Canada; therefore, Health Canada has not authorized an indication for pediatric use.

### 7.1.4 Geriatrics

**Geriatrics (over 65 years of age):** No data are available to Health Canada; therefore, Health Canada has not authorized an indication for geriatric use.

## 8 ADVERSE REACTIONS

Most glatiramer acetate safety data were accumulated for glatiramer acetate 20 mg/mL administered as a subcutaneous injection once daily. This section presents accumulated safety data from 4 placebo-controlled trials with glatiramer acetate 20 mg/mL administered once daily, and from one placebo-controlled trial with glatiramer acetate 40 mg/mL administered three times a week.

### 8.1 Adverse Reaction Overview

In 4 placebo-controlled clinical trials, the most commonly observed adverse events associated with the use of glatiramer acetate occurring at an incidence of at least 10% and at least 1.5 times higher than in placebo treated patients were: injection site reactions, vasodilatation, rash, dyspnea and chest pain.

In the placebo-controlled clinical trials approximately 5% discontinued treatment due to an adverse event compared to 1% for placebo treated patients. The adverse events most commonly associated with discontinuation were (in order of descending frequency): injection site reactions, dyspnea, urticaria, vasodilatation and hypersensitivity. Treatment discontinuation due to a serious adverse event considered by investigators to be related to glatiramer acetate treatment included a case of life-threatening serum sickness.

**Immediate Post-Injection Reaction:** Approximately 14% of Multiple Sclerosis patients exposed to glatiramer acetate in 4 placebo-controlled studies reported a post-injection reaction immediately following subcutaneous injection of glatiramer acetate compared to 2% for placebo treated patients. An immediate post-injection reaction is a constellation of symptoms occurring immediately after injection that includes at least two of the following: flushing, chest pain, palpitations, anxiety, dyspnea, constriction of the throat and urticaria (individual symptoms are listed separately in Table 2 below). These symptoms were invariably transient, self-limited, did not require specific treatment and in general, arose several months after initiation of treatment, although they may occur earlier in the course of treatment. A given patient may experience one or several episodes of these symptoms during treatment with Glatiramer Acetate Injection. Whether these episodes are mediated by an immunologic or non-immunologic mechanism, and whether several similar episodes seen in a given patient have identical mechanisms is unknown. In fact, whether or not this constellation of symptoms actually represents a specific syndrome is unknown. During the post-marketing period, there have been reports of patients with similar

symptoms who received emergency medical care (see [WARNINGS AND PRECAUTIONS, Cardiovascular, Symptoms of Potentially Cardiac Origin](#)).

**Chest Pain:** Approximately 13% of glatiramer acetate patients in 4 placebo-controlled studies (compared to 5% of placebo patients) experienced at least one episode of what was described as transient chest pain. While some of these episodes occurred in the context of the Immediate Post-Injection Reaction described above, many did not. The temporal relationship of the chest pain to an injection of glatiramer acetate was not always known, although the pain was transient (usually lasting only a few minutes), often unassociated with other symptoms, and appeared to have no important clinical sequelae. Some patients experienced more than one such episode, and episodes usually began at least 1 month after the initiation of treatment. The pathogenesis of this symptom is unknown. Patients in clinical trials were free of significant cardiovascular disease (New York Heart Association Class I or II); therefore, the risks associated with glatiramer acetate treatment for Multiple Sclerosis patients with comorbid cardiovascular disease are unknown (see [WARNINGS AND PRECAUTIONS, Cardiovascular, Symptoms of Potentially Cardiac Origin](#)).

## 8.2 Clinical Trial Adverse 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.*

### Glatiramer acetate injection 20 mg/mL (administered once daily)

The adverse reaction data in this section is derived from 4 pivotal, double-blind, placebo-controlled clinical trials which were conducted during pre-marketing and post-marketing periods in a total of 512 patients treated with glatiramer acetate and 509 patients treated with placebo for up to 36 months. Three trials were conducted in RRMS. The fourth trial was in patients presenting with a first clinical event and MRI features suggestive of MS and included 243 patients treated with glatiramer acetate and 238 patients treated with placebo.

All adverse events were recorded by the clinical investigators, using terminology of their own choosing. To provide a meaningful estimate of the proportion of individuals having adverse events, similar types of events were grouped into standardized categories using MedDRA dictionary terminology.

The following table lists treatment-emergent signs and symptoms that occurred in at least 2% of patients treated with glatiramer acetate in the placebo-controlled trials. These signs and symptoms were numerically more common in patients treated with glatiramer acetate than in patients treated with placebo. Lipoatrophy occurred in approximately 2% of patients exposed to glatiramer acetate 20 mg/mL once per day in the multicentre controlled trials (compared to none on placebo).

**Table 2: Controlled Trials (Glatiramer Acetate Injection 20 mg/mL per day): Incidence of Glatiramer Acetate Adverse Reactions  $\geq 2\%$  and More Frequent than Placebo**

MedDRA Version 10.0		GA 20 mg (N=512)	Placebo (N=509)
		% of Patients	% of Patients
Blood And Lymphatic System Disorders	Lymphadenopathy	7.2	2.9
Cardiac Disorders	Palpitations	7.6	3.3
	Tachycardia	4.7	1.6
Eye Disorders	Eye Disorder	3.3	1.2
	Diplopia	2.9	1.8
Gastrointestinal Disorders	Nausea	14.5	10.4
	Vomiting	7.4	4.3
	Constipation	7.0	6.3
	Dyspepsia	6.6	6.5
	Dysphagia	2.3	1.2
	Faecal Incontinence	2.3	2.0
General Disorders and Administration Site Conditions	Injection Site Erythema	46.1	10.6
	Injection Site Pain	36.3	17.1
	Injection Site Mass	25.8	5.9
	Injection Site Pruritus	24.4	2.8
	Asthenia	23.8	23.2
	Injection Site Edema	20.9	4.5
	Pain	18.9	16.7
	Chest Pain	12.5	4.9
	Injection Site Inflammation	8.2	1.6
	Injection Site Reaction	8.2	1.4
	Pyrexia	6.4	5.7
	Injection Site Hypersensitivity	4.1	0.0
	Local Reaction	3.7	1.4
	Face Edema	3.3	0.6
	Edema Peripheral	3.3	2.4
	Chills	2.9	0.4
	Injection Site Atrophy*	2.0	0.0
Injection Site Fibrosis	2.0	0.6	
Immune System Disorders	Hypersensitivity	3.3	1.8
Infections and Infestations	Infection	31.8	30.8
	Influenza	15.4	14.5

MedDRA Version 10.0		GA 20 mg (N=512)	Placebo (N=509)
		% of Patients	% of Patients
	Rhinitis	7.4	5.9
	Bronchitis	6.4	5.7
	Gastroenteritis	6.3	4.3
	Vaginal Candidiasis	4.9	2.6
	Otitis Media	3.7	2.9
	Herpes Simplex	2.5	1.8
	Tooth Abscess	2.3	2.2
Metabolism and Nutrition Disorders	Weight Increased	2.9	0.8
	Anorexia	2.3	2.2
Musculoskeletal and Connective Tissue Disorders	Back Pain	13.5	11.2
	Arthralgia	10.4	9.4
	Neck Pain	4.5	3.9
Nervous System Disorders	Headache	30.9	29.1
	Hypertonia	7.8	7.3
	Tremor	4.1	1.8
	Migraine	3.7	2.4
	Syncope	3.1	1.8
Psychiatric Disorders	Depression	13.1	12.0
	Anxiety	11.1	8.8
	Nervousness	2.3	1.0
Renal and Urinary Disorders	Micturition Urgency	5.1	4.3
	Pollakiuria	4.7	4.5
Respiratory, Thoracic and Mediastinal Disorders	Dyspnoea	13.3	2.8
	Cough	6.6	5.3
Skin and Subcutaneous Tissue Disorders	Rash	13.7	9.0
	Hyperhidrosis	6.6	4.7
	Pruritus	5.1	4.3
	Ecchymosis	3.5	3.3
	Urticaria	3.1	1.6
	Skin Disorder	2.9	0.8
Vascular Disorders	Vasodilatation**	18.0	4.7

\* "Injection site atrophy" comprises terms relating to localized lipoatrophy at injection site

\*\* "Vasodilatation" includes the terms "feeling hot", "flushing", "hot flush", "hyperaemia" and "vasodilatation".

In the fourth trial noted above, an open-label treatment phase followed the placebo-controlled period. No new safety signals were observed during the open-label follow-up period of up to 5 years.

Data on adverse events occurring in the 4 controlled clinical trials were analyzed to evaluate sex-related differences. No clinically significant differences were identified. In these clinical trials 96% of patients were Caucasian. This percentage reflects the higher representation of Caucasian in the MS population, even though it does not reflect the exact world racial distribution among MS

patients. In addition, the vast majority of patients treated with glatiramer acetate were between the ages of 18 and 45. Consequently, inadequate data are available to perform an analysis of the incidence of adverse events related to clinically relevant age subgroups.

Glatiramer acetate 40 mg/mL (administered three times per week)

The safety of glatiramer acetate 40 mg/mL was assessed based on a double-blind, placebo-controlled clinical trial in RRMS patients with a total of 943 patients treated for 12 months with glatiramer acetate 40 mg/mL three times per week, and 461 patients treated with placebo. Among the 943 patients treated with glatiramer acetate 40 mg/mL, approximately 3% of the subjects discontinued treatment because of an adverse event. The most common adverse events were injection site reactions, which were also the most common cause of discontinuation.

No new adverse events were seen in patients treated with glatiramer acetate 40 mg/mL administered three times per week as compared to subjects treated with glatiramer acetate 20 mg/mL administered daily.

Injection site reactions were reported by 36% of the patients on glatiramer acetate 40 mg/mL compared to 5% on placebo. Immediate post-injection reaction was reported by approximately 2% of the patients on glatiramer acetate 40 mg/mL compared to none on placebo. Approximately 2% of patients exposed to glatiramer acetate 40 mg/mL three times per week in single placebo-controlled trial (compared to 1% of placebo patients) experienced at least one episode of what was described as transient chest pain.

Table 3 lists treatment-emergent AEs that occurred in at least 2% of patients treated with glatiramer acetate 40 mg/mL three times per week in the blinded, placebo-controlled trial. These AEs were numerically more common in patients treated with glatiramer acetate 40 mg/mL than in patients treated with placebo. Adverse events were usually mild in intensity.

**Table 3: Controlled Trial (Glatiramer Acetate Injection 40 mg/mL three times per week): Incidence of Glatiramer Acetate Adverse Events ≥2% and More Frequent than Placebo**

MedDRA Version 15.0		GA 40 mg (N=943)	Placebo (N=461)
		% of Patients	% of Patients
Gastrointestinal Disorders	Nausea	2.3	1.3
General Disorders and Administration Site Conditions	Injection Site Erythema	20.9	1.5
	Injection Site Pain	10.4	2.0
	Injection Site Pruritus	5.9	0.0
	Injection Site Swelling	4.0	0.4
	Influenza Like Illness	3.2	1.5
	Injection Site Induration	3.1	0.0
	Pyrexia	2.4	1.3
	Chills	2.0	0.0
Infections and Infestations	Nasopharyngitis	10.6	8.5

MedDRA Version 15.0		GA 40 mg (N=943)	Placebo (N=461)
		% of Patients	% of Patients
	Influenza	3.8	3.7
	Respiratory Tract Infection Viral	2.5	1.5
	Pharyngitis	2.0	1.1
Musculoskeletal and Connective Tissue Disorders	Pain in Extremity	2.1	1.7
Respiratory, Thoracic and Mediastinal Disorders	Dyspnea	3.2	0.4

Data on adverse events occurring in the controlled clinical trial were analyzed to evaluate differences based on sex. Injection site reactions, mainly erythema, pain and pruritus occurred with a higher incidence ( $\geq 5\%$ ) in females (13.7%) than males (8.1%) in patients treated with glatiramer acetate 40 mg/mL three times per week; the majority of patients in this trial were female (68%).

### 8.3 Other Clinical Trial Adverse Reactions

#### Glatiramer acetate 20 mg/mL (administered once daily)

In the pre-marketing clinical trials, approximately 900 individuals received at least one dose of glatiramer acetate in controlled and uncontrolled clinical trials. Total patient exposure to glatiramer acetate in these clinical trials ranged from 6 months (693 patients) to 2 years (306 patients), with a subset of patients continuing to 20 years (n=63) in an open-label extension at a daily dose of 20 mg.

During these trials, all adverse events were recorded by clinical investigators using terminology of their own choosing. To provide a meaningful estimate of the proportion of individuals having adverse events, similar types of events were grouped into a smaller number of standardized categories using COSTART II dictionary terminology. All reported events that occurred at least twice and potentially important events occurring once, are included except those already listed in the previous table, those too general to be informative, trivial events, and other events which occurred in at least 2% of treated patients and were present at equal or greater rates in the placebo group.

Events are further classified within body system categories and enumerated in order of decreasing frequency using the following definitions: *Frequent* adverse events are defined as those occurring in at least 1/100 patients; *infrequent* adverse events are those occurring in 1/100 to 1/1000 patients.

#### **Body as a whole:**

*Frequent:* Injection site edema, injection site atrophy, abscess and injection site hypersensitivity.

*Infrequent:* Injection site hematoma, injection site fibrosis, moon face, cellulitis, generalized edema, hernia, injection site abscess, serum sickness, suicide attempt, injection site hypertrophy, injection site melanosis, lipoma, and photosensitivity reaction.

**Cardiovascular:**

*Frequent:* Hypertension.

*Infrequent:* Hypotension, midsystolic click, systolic murmur, atrial fibrillation, bradycardia, fourth heart sound, postural hypotension and varicose veins.

**Digestive:**

*Frequent:* Liver function abnormality

*Infrequent:* Dry mouth, stomatitis, burning sensation on tongue, cholecystitis, colitis, esophageal ulcer, esophagitis, gastrointestinal carcinoma, gum hemorrhage, hepatomegaly, increased appetite, melena, mouth ulceration, pancreas disorder, pancreatitis, rectal hemorrhage, tenesmus, tongue discoloration and duodenal ulcer.

**Endocrine:**

*Infrequent:* Goiter, hyperthyroidism, and hypothyroidism.

**Gastrointestinal:**

*Frequent:* Bowel urgency, oral moniliasis, salivary gland enlargement, tooth caries, and ulcerative stomatitis.

**Hemic and Lymphatic:**

*Infrequent:* Leukopenia, anemia, cyanosis, eosinophilia, hematemesis, lymphedema, pancytopenia, and splenomegaly.

**Metabolic and Nutritional:**

*Infrequent:* Weight loss, alcohol intolerance, Cushing's syndrome, gout, abnormal healing, and xanthoma.

**Musculoskeletal:**

*Infrequent:* Arthritis, muscle atrophy, bone pain, bursitis, kidney pain, muscle disorder, myopathy, osteomyelitis, tendon pain, and tenosynovitis.

**Nervous:**

*Frequent:* Abnormal dreams, emotional lability and stupor.

*Infrequent:* Aphasia, ataxia, convulsion, circumoral paresthesia, depersonalization, hallucinations, hostility, hypokinesia, coma, concentration disorder, facial paralysis, decreased libido, manic reaction, memory impairment, myoclonus, neuralgia, paranoid reaction, paraplegia, psychotic depression and transient stupor.

**Respiratory:**

*Frequent:* Hyperventilation, hay-fever.

*Infrequent:* Asthma, pneumonia, epistaxis, hypoventilation, and voice alteration.

**Skin and Appendages:**

*Frequent:* Eczema, herpes zoster, pustular rash, skin atrophy and warts.

*Infrequent:* Dry skin, skin hypertrophy, dermatitis, furunculosis, psoriasis, angioedema, contact dermatitis, erythema nodosum, fungal dermatitis, maculopapular rash, pigmentation, benign skin neoplasm, skin carcinoma, skin striae, and

vesiculobullous rash.

**Special Senses:**

*Frequent:* Visual field defect.

*Infrequent:* Dry eyes, otitis externa, ptosis, cataract, corneal ulcer, mydriasis, optic neuritis, photophobia, and taste loss.

**Urogenital:**

*Frequent:* Amenorrhea, hematuria, impotence, menorrhagia, suspicious Papanicolaou smear, urinary frequency and vaginal hemorrhage.

*Infrequent:* Vaginitis, flank pain (kidney), abortion, breast engorgement, breast enlargement, breast pain, carcinoma cervix in situ, fibrocystic breast, kidney calculus, nocturia, ovarian cyst, priapism, pyelonephritis, abnormal sexual function, and urethritis.

In the post-marketing clinical trials, more than 5500 individuals were exposed to glatiramer acetate (20 mg/day) as part of the clinical development program. Safety data collected in these trials have shown an adverse event profile similar to that presented above.

Glatiramer acetate 40 mg/mL (administered three times per week)

The following is a list of adverse events reported by glatiramer acetate-treated patients at an incidence rate of less than 2% and  $\geq 0.3\%$  higher than placebo, and including potentially important events that occurred at least once in the double-blind phase and open-label extension of the clinical trial. Events that were already included in Table 3 have been excluded. Although the events reported occurred during treatment with glatiramer acetate, they were not necessarily caused by glatiramer acetate.

Events are listed by body system in decreasing order of incidence in glatiramer acetate-treated patients.

**Blood and Lymphatic System Disorders:** lymphadenopathy (0.6%)

**Cardiac Disorders:** tachycardia (1.2%), palpitations (1%)

**Ear and Labyrinth Disorders:** tinnitus (0.3%)

**Eye Disorders:** vision blurred (0.3%)

**Gastrointestinal Disorders:** abdominal pain (1.2%), vomiting (0.7%), gastroesophageal reflux disease (0.4%), pancreatitis (0.3%)

**General Disorders and Administration Site Conditions:** injection site oedema (1.8%), injection site mass (1.7%), asthenia (1.6%), injection site inflammation (1.6%), injection site extravasation (1.5%), injection site reaction (1.5%), feeling hot (1.3%), injection site rash (1.1%), chest pain (0.8%), injection site haematoma (0.7%), injection site hypertrophy (0.7%), oedema peripheral (0.7%), chest discomfort (0.5%), injection site atrophy (0.4%), injection site irritation (0.4%), pain (0.4%), spinal pain (0.4%), discomfort (0.3%), hyperthermia (0.3%), injection site anaesthesia (0.3%), localised oedema (0.3%)

**Hepatobiliary Disorders:** hepatic steatosis (0.2%), drug-induced liver injury (0.1%), hepatitis toxic (0.1%)

**Immune System Disorders:** drug hypersensitivity (0.3%), anaphylactic reaction (0.2%), anaphylactic shock (0.1%)



**Infections and Infestations:** cystitis (1.7%), viral infection (0.8%), gastroenteritis viral (0.6%), oral herpes (0.5%), pyelonephritis chronic (0.5%), vulvovaginal mycotic infection (0.4%), herpes simplex (0.3%), papilloma viral infection (0.3%), pneumonia (0.3%), vaginitis bacterial (0.3%)

**Injury, Poisoning and Procedural Complications:** fall (0.8%), limb injury (0.3%), thermal burn (0.3%)

**Investigations:** weight decreased (0.7%), neutrophil count decreased (0.3%), red blood cell count decreased (0.3%)

**Metabolism and Nutrition Disorders:** hypercholesterolaemia (0.3%)

**Musculoskeletal and Connective Tissue Disorders:** myalgia (0.5%), musculoskeletal chest pain (0.4%), arthritis (0.3%), osteopenia (0.3%)

**Neoplasms Benign, Malignant and Unspecified (including Cysts and Polyps):** fibroadenoma of the breast (0.1%), intraductal papilloma of breast (0.1%)\*, invasive ductal breast carcinoma (0.1%)\*, breast neoplasm (0.1%)\*

**Nervous System Disorders:** paraesthesia (1.4%), syncope (1%), trigeminal neuralgia (0.4%), tremor (0.3%)

**Renal and Urinary Disorders:** leukocyturia (1.1%), haematuria (0.6%)

**Reproductive System and Breast Disorders:** breast disorder (0.1%), breast discharge (0.1%), menstrual disorder (0.4%), breast calcifications (0.1%)\*, breast dysplasia (0.1%)\*

**Respiratory, Thoracic and Mediastinal Disorders:** cough (1.8%)

**Skin and Subcutaneous Tissue Disorders:** erythema (1.8%), hyperhidrosis (0.5%), skin reaction (0.5%), angioedema (0.4%), acne (0.3%), generalised erythema (0.3%), lipoatrophy (0.1%)

**Surgical and Medical Procedures:** mastectomy (0.1%)\*

**Vascular Disorders:** flushing (1.0%), hypotension (0.7%), hyperaemia (0.6%), hot flush (0.3%)

\*Events occurred during the open-label extension of the clinical trial

#### **8.4 Abnormal Laboratory Findings: Hematologic, Clinical Chemistry and Other Quantitative Data**

Laboratory analyses were performed on all patients participating in the clinical program for glatiramer acetate. Clinically significant changes in laboratory values for hematology, chemistry, and urinalysis were similar for both glatiramer acetate and placebo groups in blinded clinical trials. No patient receiving glatiramer acetate withdrew from any placebo-controlled trial due to abnormal laboratory findings which were assessed as possibly related to glatiramer acetate.

#### **8.6 Post-Market Adverse Reactions**

##### ***Adverse Events Reported Post-Marketing and Not Previously Noted in Clinical Trials***

Post-marketing experience has shown an adverse event profile similar to that presented above. Reports of adverse reactions occurring under treatment with glatiramer acetate in clinical trials or from spontaneous reports that have been received since market introduction and that may have or not have causal relationship to the drug, include the following:

**Body as a Whole:**

Sepsis, SLE syndrome, hydrocephalus, enlarged abdomen, injection site hypersensitivity, allergic reaction, anaphylactoid reaction, bacterial infection, fever, infection.

**Cardiovascular:**

Thrombosis, peripheral vascular disease, pericardial effusion, myocardial infarct, deep thrombophlebitis, coronary occlusion, congestive heart failure, cardiomyopathy, cardiomegaly, arrhythmia, angina pectoris, tachycardia.

**Digestive:**

Tongue edema, stomach ulcer hemorrhage, liver damage, hepatitis, eructation, cirrhosis of the liver, cholelithiasis, diarrhea, gastrointestinal disorder.

**Hemic and Lymphatic:**

Thrombocytopenia, lymphoma-like reaction, acute leukemia.

**Metabolic and Nutritional:**

Hypercholesteremia.

**Musculoskeletal:**

Rheumatoid arthritis, generalized spasm.

**Nervous:**

Myelitis, meningitis, CNS neoplasm, cerebrovascular accident, brain edema, abnormal dreams, aphasia, convulsion, neuralgia, anxiety, foot drop, nervousness, speech disorder, vertigo.

**Respiratory:**

Pulmonary embolus, pleural effusion, carcinoma of lung, hay fever, laryngismus.

**Skin and Appendages:**

Herpes simplex, pruritis, rash, urticaria.

**Special Senses:**

Glaucoma, blindness, visual field defect.

**Urogenital:**

Urogenital neoplasm, urine abnormality, ovarian carcinoma, nephrosis, kidney failure, breast carcinoma, bladder carcinoma, urinary frequency.

Post-market safety analysis demonstrated that the safety profile of glatiramer acetate 40 mg/mL (administered three times per week) is compatible with the safety profile glatiramer acetate 20 mg/mL (administered once daily).

***Localized Adverse Reactions Associated with Subcutaneous Use***

At injection sites, localized lipoatrophy and, rarely, injection site skin necrosis have been reported during post-marketing experience. Lipoatrophy may occur after treatment onset (sometimes as early as several months) and may be permanent. There is no known therapy for lipoatrophy. To assist in possibly minimizing these events the patient should be advised to follow

proper injection technique and to rotate injection areas and sites on a regular basis (see [Patient Medication Information](#)).

To date, post-market information was received on more than 2,000 prospectively reported pregnancies with known outcome in patients exposed to conventional dose regimens of glatiramer acetate. In this cohort, the reported rates of fetal loss and congenital anomalies or disorders were found to be within the range found in a normal pregnant population, indicating no malformative or fetoneonatal toxicity of glatiramer acetate. However, since there are no adequate and well controlled studies in pregnant women with MS, Glatiramer Acetate Injection should be used during pregnancy only if clearly needed.

### **Severe Liver Injury**

Very rare cases of severe liver injury (including liver failure, hepatitis with jaundice, fulminant hepatitis leading to liver transplant) have been reported with glatiramer acetate injection. Most instances of severe liver injury resolved with discontinuation of treatment and a relationship to glatiramer acetate could not be excluded (see [WARNINGS AND PRECAUTIONS, Hepatic](#); [WARNINGS AND PRECAUTIONS, Monitoring and Laboratory Tests](#)).

## **9 DRUG INTERACTIONS**

### **9.2 Overview**

Interactions between glatiramer acetate and other drugs have not been fully evaluated. Results from existing clinical trials do not suggest any significant interactions of glatiramer acetate with therapies commonly used in MS patients. This includes the concurrent use of corticosteroids for up to 28 days.

## **10 ACTION AND CLINICAL PHARMACOLOGY**

### **10.1 Mechanism of action**

Glatiramer acetate is a sterile, lyophilized mixture of synthetic polypeptides containing four naturally occurring amino acids: L-glutamic acid, L-alanine, L-tyrosine and L-lysine with an average molar fraction of 0.141, 0.427, 0.095 and 0.338, respectively.

The precise mechanism by which glatiramer acetate exerts therapeutic effects in MS patients is not fully elucidated, but may involve immunomodulation by inducing a regulatory phenotype of antigen presenting cells (e.g., dendritic cells, monocytes, and B cells), which may exert direct effects and/or support regulatory and anti-inflammatory T cell populations.

Because the immunological profile of glatiramer acetate remains to be fully elucidated, concerns exist about its potential to alter naturally occurring immune responses, but this has not been systematically evaluated (see [WARNINGS AND PRECAUTIONS: Immune](#)).

### **10.3 Pharmacokinetics**

Results obtained in pharmacokinetic studies performed in humans (healthy volunteers) and animals support the assumption that a substantial fraction of the therapeutic dose delivered to patients subcutaneously is hydrolyzed locally. Nevertheless, larger fragments of glatiramer

acetate can be recognized by glatiramer acetate reactive antibodies. Some fraction of the injected material, either intact or partially hydrolyzed, is presumed to enter the lymphatic circulation, enabling it to reach regional lymph nodes, and some, may enter the systemic circulation intact.

## **11 STORAGE, STABILITY AND DISPOSAL**

The pre-filled syringes of Glatiramer Acetate Injection should be refrigerated immediately upon receipt (2° - 8°C). DO NOT FREEZE.

Glatiramer Acetate Injection prefilled syringes contain no preservative. Do not use if the solution contains any particulate matter.

If you cannot have refrigerator storage, pre-filled syringes of Glatiramer Acetate Injection can be stored at room temperature (15° - 30°C) for up to 1 month. Do not store pre-filled syringes at room temperature for longer than 1 month. Note: this drug is light sensitive, do not expose to light when not injecting. Each pre-filled syringe is for single use only.

Throw out all used syringes in a hard-walled plastic container.

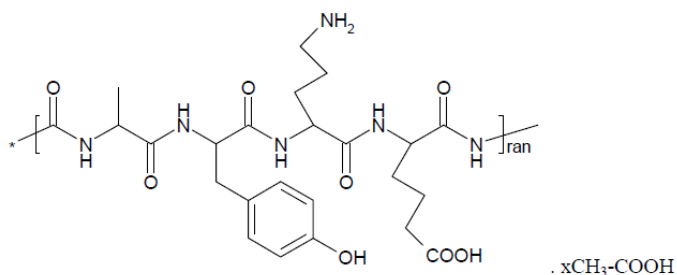
## PART II: SCIENTIFIC INFORMATION

### 13 PHARMACEUTICAL INFORMATION

#### Drug Substance

Proper name:	Glatiramer acetate
Chemical name:	Glatiramer acetate is the acetate salt of synthetic polypeptides.
Molecular formula:	$(C_{23}H_{41}N_5O_{11})_x \cdot X C_2H_4O_2$
Molecular mass:	The average molecular weight of glatiramer acetate is 5,000 to 9,000 daltons. Glatiramer acetate is identified by specific antibodies.
Structural formula:	Poly[L-Glu13-15, L-Ala39-46, L-Tyr8.6-10, L-Lys30-37]•nCH <sub>3</sub> CO <sub>2</sub> H (n=15-24)

#### Drug Substance Chemical Structure



Appearance:	Off white to light brown coloured powder
Solubility:	Freely soluble in water
pH:	Between 5.5 and 7.4
Specific Optical	
Rotation:	Between -70° and -90° on anhydrous basis
Biological activity:	The biological activity of glatiramer acetate injection is determined by its ability to block the induction of experimental autoimmune encephalomyelitis (EAE) in mice.

## 14 CLINICAL TRIALS

### Glatiramer acetate 20 mg/mL (administered once daily)

The efficacy of glatiramer acetate was evaluated in two placebo-controlled trials in patients with Relapsing Remitting MS (RRMS). In a third placebo-controlled study the effects of glatiramer acetate on MRI parameters were assessed.

The first trial was a pilot study (BR-1) which was conducted at a single-center and was a double-blind, randomized, matched-pair, parallel group placebo-controlled trial. Fifty patients with RRMS were randomized to receive 20 mg/day glatiramer acetate (n=25) or placebo (n=25) subcutaneously. The protocol-specified primary outcome measure was the proportion of patients who were relapse free during the 2-year duration of the trial, but two additional relevant outcomes were also specified as endpoints: frequency of attacks during the trial, and the change in the number of attacks compared to the rate of attacks in the 2 years prior to study entry. Results from this study (see Table 4) show that there was a statistically significant effect of glatiramer acetate on number of relapses.

**Table 4 - Trial BR-1: Efficacy Results**

Outcome <sup>a</sup>	Glatiramer acetate n=25	Placebo n=25	p-Value
% Relapse Free Patients	14/25 (56%)	7/25 (28%)	0.085
Mean Relapse Frequency	0.6/2 years	2.4/2 years	0.005
Reduction in Relapse Rate compared to pre-study	3.2	1.6	0.025
Median Time to First Relapse (days)	>700	150	0.03
% of Progression-Free* Patients	20/25 (80%)	13/25 (52%)	0.07

<sup>a</sup> The primary efficacy measure was the proportion of patients who were relapse free during the 2 year duration of the trial (% **Relapse Free**). Analyses were based on the intent-to-treat population.

\* Progression defined as an increase of at least 1 point on the DSS that persists for at least 3 consecutive months.

The second study (01-9001) was a multicenter double-blind, randomized, placebo-controlled trial. Two hundred and fifty-one patients with RRMS were randomized to receive 20 mg/day glatiramer acetate (n=125) or placebo (n=126) subcutaneously. Patients were diagnosed with RRMS by Poser criteria, and had at least 2 exacerbations during the 2 years immediately preceding enrollment. Patients had a score of no more than 5 on the Kurtzke Expanded Disability Scale Score (EDSS), a standard scale ranging from 0 (normal) to 10 (death due to MS). A score of 5 is defined as one at which a patient is still ambulatory but for whom full daily activities are impaired due to disability, a score of 6 is defined as one at which the patient is still ambulatory but requires assistance and a score of 7 on this scale means that the patient requires a wheelchair.

Patients were seen every 3 months for 2 years, as well as within several days of a presumed exacerbation. In order for an exacerbation to be confirmed, a blinded neurologist had to

document objective neurologic signs, as well as document the existence of other criteria (e.g., the persistence of the lesion for at least 48 hours).

The protocol-specified primary outcome measure was the mean number of relapses during treatment.

Table 5 shows results of the analysis of primary as well as several secondary outcome measures at two years based on the intent-to-treat population.

**Table 5 – Trial 01-9001: Core (24-month) Double-Blind Study: Effect on Relapse Rate**

Outcome	Glatiramer Acetate n=125	Placebo n=126	p-Value
Mean No. of Relapses/2 years <sup>b</sup>	1.19	1.68	0.007*
% Relapse Free Patients	42/125 (34%)	34/126 (27%)	0.25
Median Time to First Relapse (days)	287	198	0.23
% of Patients Progression Free <sup>c</sup>	98/125 (78%)	95/126 (75%)	0.48
Mean Change in EDSS	-0.05	+0.21	0.023

<sup>a</sup>The primary efficacy measure was the number of relapses during treatment. Analyses were based on the intent-to-treat population

<sup>b</sup>Baseline adjusted mean

<sup>c</sup>Progression defined as an increase of at least 1 point on the EDSS that persists for at least 3 consecutive months.

\* Analysis of Covariance adjusted for baseline EDSS, prior 2-year relapse rate and study centers. ANCOVA or analysis of covariance is a statistical test used to adjust for covariate differences between the treatment and control groups which may confound the true treatment effect when one or more factors are not balanced across treatment groups.

The effects of glatiramer acetate on relapse severity were not evaluated in either trial.

Both studies showed a beneficial effect of glatiramer acetate on relapse rate, and on this basis glatiramer acetate is considered effective.

The third study (9003) was a multi-national, multi-center, MRI-monitored study. A total of 239 patients with RRMS (119 on glatiramer acetate and 120 on placebo) were randomized. Inclusion criteria were similar to those in Study 01-9001 with the additional criteria that patients had to have at least one Gd-enhancing lesion on the screening MRI. The patients were treated initially in a double-blind manner for nine months, during which they underwent monthly MRI scanning. The primary endpoint for the double-blind phase was the total cumulative number of T1 Gd-enhancing lesions over nine months. Other MRI parameters were assessed as secondary endpoints. Table 6 summarizes the results for the parameters monitored during the nine-month double-blind phase for the intent-to-treat cohort. Because the link between MRI findings and the clinical status of patients is contentious, the prognostic value of the following statistically significant findings is unknown.

**Table 6 – Trial 9003: Nine-Month Double-Blind Phase: MRI Endpoints - Results**

No.	Outcome	Glatiramer Acetate (n=113)	Placebo (n=115)	p-value
Primary Endpoint				
1	Medians of the Cumulative Number of T1 Gd-Enhancing Lesions	12	17	0.0037
Secondary Endpoints				
2	Medians of the Cumulative Number of New T1 Gd-Enhancing Lesions	9	14	0.0347
3	Medians of the Cumulative Number of New T2 Lesions	5	8	0.01
4	Medians of the Cumulative Change from Baseline in volumes (mL) of T1 Gd-Enhancing Lesions	-0.309	0	0.0248
5	Medians of the Cumulative Change from Baseline in volumes (mL) of T2 Lesions	8.852	13.566	0.0229
6	Medians of the Cumulative Change from Baseline in volumes (mL) of T1 Hypointense Lesions	1.642	1.829	0.7311
7	Proportion of T1 Gd-Enhancing Lesion-Free Patients	46.4%	32.2%	0.0653

The mean number of relapses in this 9 month study was 0.50 for the glatiramer acetate injection group and 0.77 for the placebo group (p = 0.0077).

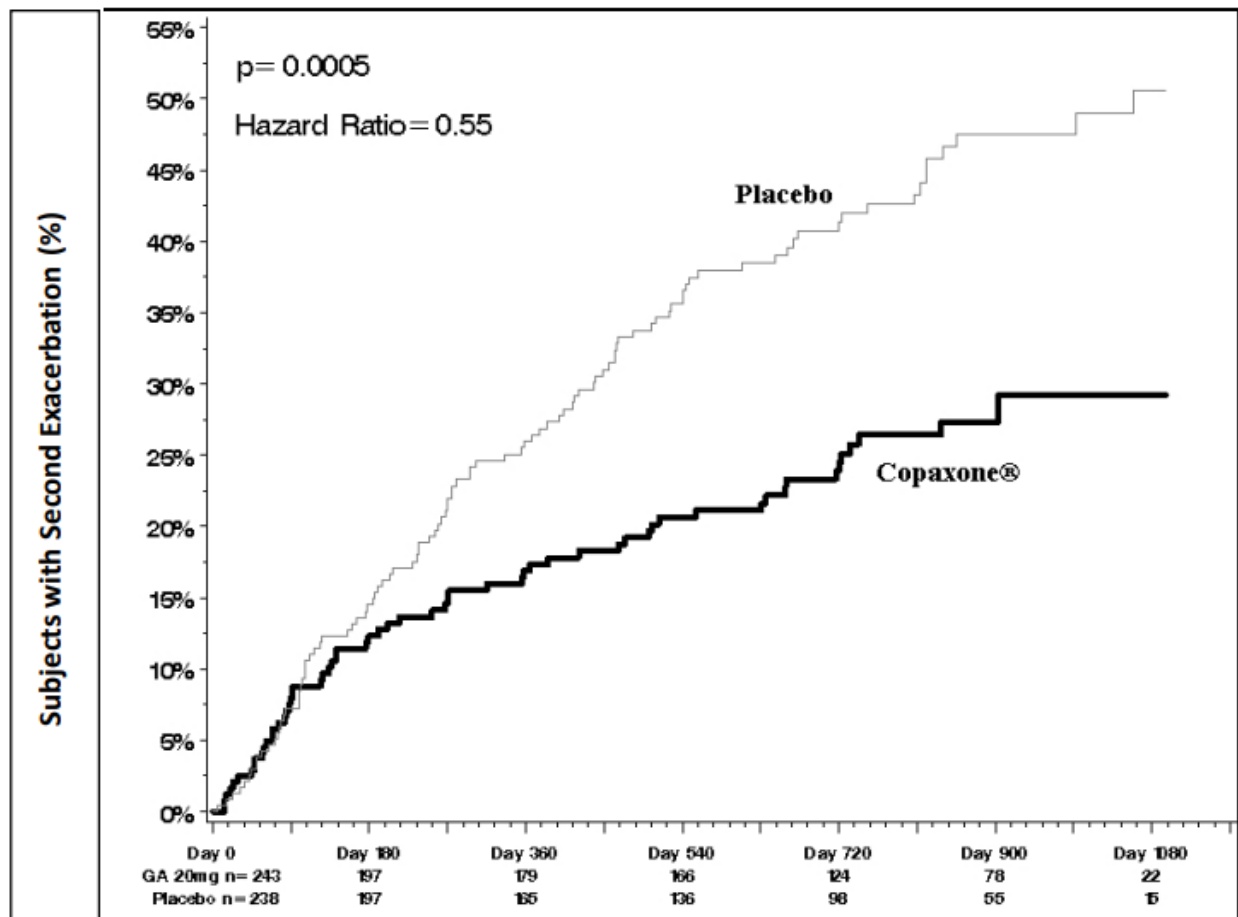
### Patients with early RRMS

A fourth study (GA/9010) was a multicenter, randomized, double-blind, placebo-controlled, parallel group study involving 481 patients for up to three years (glatiramer acetate 20 mg/day: n=243; placebo: n=238). It was performed in patients with a well-defined, single, unifocal neurological presentation and with at least two cerebral lesions on T2-weighted MRI (previously referred to as "clinically isolated syndrome"). The primary outcome measure in the study was the time to development of a second exacerbation according to Poser criteria. Secondary outcomes were brain MRI measures including number of new T2 lesions and T2 lesion volume.

Time to development of a second exacerbation was significantly delayed in the glatiramer acetate group corresponding to a risk reduction of 45% (Hazard Ratio = 0.55; 95% CI [0.40; 0.77], p=0.0005) (Figure 1).



**Figure 1: Trial GA/9010: Time to Second Exacerbation (ITT Analysis)**



Glatiramer acetate prolonged the time to second exacerbation by 386 (115%) days, from 336 days in the placebo group to 722 days in the glatiramer acetate group (based on the 25th percentile; Kaplan-Meier estimates).

A total of 25% of glatiramer acetate patients, and 43% of placebo patients experienced a second exacerbation in an average duration of treatment of 2.4 years.

The benefit of treatment with glatiramer acetate over placebo was also demonstrated in two secondary MRI-based endpoints. The number of new T2 lesions at last observed value (LOV) was significantly lower ( $p < 0.0001$ ) for patients on glatiramer acetate, demonstrating a treatment effect of 58% for glatiramer acetate over placebo (mean number of new T2 lesions at LOV was 0.7 for glatiramer acetate and 1.8 for placebo). Additionally, baseline-adjusted T2 lesion volume at LOV showed a significant reduction ( $p = 0.0013$ ) of 13% for glatiramer acetate over placebo (median change in T2 volume from baseline to LOV was 0.7 mL on glatiramer acetate and 1.3 mL on placebo). However, the impact of early treatment with COPAXONE 20 mg/mL once-daily on the long term evolution of the disease is unknown as the study was mainly designed to assess the time to the second exacerbation event.

## 15 PHARMACOLOGY

Glatiramer acetate is efficacious in suppressing and/or preventing both the clinical and

histological manifestations of the most widely accepted animal model of Multiple Sclerosis, EAE. This effect of glatiramer acetate has been demonstrated in a wide variety of species including mice, rats, guinea pigs, rabbits, and primates (rhesus monkeys and baboons).

Glatiramer acetate partially cross-reacts with myelin basic protein (MBP) on both the humoral and cellular levels. In addition, it competes with myelin-associated peptides including myelin oligodendrocyte glycoprotein (MOG) and proteolipid protein (PLP) for binding to the MHC class II molecules. Glatiramer acetate binds with high affinity to MHC Class II molecules on the surface of antigen presenting cells. *In vitro* studies demonstrate that the affinity of glatiramer acetate is sufficient to competitively displace MBP, MOG and PLP from MHC II. Specificity of glatiramer acetate binding is demonstrated by the observation that anti-MHC II DR antibodies but not anti-MHC I or anti-MHC II DQ antibodies inhibit interaction of glatiramer acetate with MHC II.

Induction of suppressor T-cells has been demonstrated experimentally. T-cell hybridomas established from spleen cells of glatiramer acetate treated animals were shown to adoptively transfer resistance to EAE in untreated animals and to inhibit antigen-specific proliferation and interleukin-2 (IL-2) secretion of an MBP-specific T-cell line. Inhibition of MBP-specific effector T-cells by glatiramer acetate has been demonstrated in several *in vitro* studies. In the presence of antigen presenting cells, glatiramer acetate competitively inhibits proliferation and IL-2 and interferon gamma secretion by human MBP-specific T-cell lines while having no effect on T-cell lines specific for other antigens. Glatiramer acetate alone does not stimulate proliferation, IL-2 secretion or cytotoxic responses in human MBP-specific T-cells. In addition, glatiramer acetate has been shown to inhibit MBP-specific T-cell cytotoxicity.

Attempts have been made to characterize bioavailability using subcutaneously administered <sup>125</sup>I-Glatiramer acetate in animals. Serum samples were qualitatively analyzed by HPLC to estimate the proportion of intact glatiramer acetate and glatiramer acetate-related peptide fragments over time. The HPLC elution pattern was consistent with that for glatiramer acetate three minutes after injection. By 15 minutes, the elution pattern shifted to two distinct smaller species and free iodide. It is unclear if the smaller species represented <sup>125</sup>I-Glatiramer acetate metabolites or other unrelated species iodinated as a result of iodide exchange. These studies have not been repeated in man.

Other *in vitro* and *in vivo* studies in animals demonstrate that <sup>125</sup>I-Glatiramer acetate is rapidly degraded at the site of injection. Tissue homogenate studies suggest this may also be true in man. Due to the possibility of de-iodination, iodide exchange and incorporation of amino acids from glatiramer acetate into other peptides, results from these studies with <sup>125</sup>I-Glatiramer acetate must be cautiously interpreted.

## 16 NON-CLINICAL TOXICOLOGY

### Acute Toxicity

Glatiramer acetate was well tolerated following a single subcutaneous injection at a dose of 400 mg/kg in the rat. No toxic effects were noted.

After intravenous administration of 200 mg/kg in the rat, severe morbidities with about 10% mortalities were recorded. At 40 mg/kg, no mortalities occurred and only transient tremor was noted in one animal.

## **Long-Term Toxicity (Subchronic and Chronic)**

Toxicity and reproductive studies were performed with glatiramer acetate involving 560 rats treated for up to 6 months, 68 rabbits treated for up to 2 weeks, 23 dogs treated for up to 3 months and 32 monkeys treated for up to 1 year. The several deaths that occurred (5 rats in the 6-month study, 2 rats in the 4-week study, 1 rat in the segment III reproduction study and 1 monkey in the 1-year study) were judged as incidental and unrelated to treatment.

Chronic and subchronic daily subcutaneous injections were systemically well tolerated at doses of up to 30 mg/kg/day for periods extending for up to 6 months in the rat and up to one year in the monkey.

In aging male rats (at the end of the life-span carcinogenicity study), there was a small increase in the incidence of glomerulonephritis. The NOAEL for this finding was 7.5 mg/kg/day.

At doses of 30 mg/kg and above some findings such as slight reduction in body weight gain, and occasional minor changes in blood chemistry and hematological parameters were noted. These findings were noted in some studies and not in others, and were without any clinical sequelae. No remarkable findings were noted in ophthalmoscopic or in EKG evaluations. In monkeys treated with 30 mg/kg/day there were some evidence for over immune stimulations such as an increase in the titer of antinuclear antibodies, an increase in the incidence of germinal centers in the bone marrow and of minor chronic focal fibrosing arterial lesions. The association of these findings to treatment is uncertain and the NOAEL for these findings was set to 10 mg/kg/day.

Based on these findings, the NOAEL for the systemic effects of glatiramer acetate in chronic studies is considered to be 7.5 mg/kg.

Local lesions at the injection sites were consistently observed in all studies and were dose related. At doses of 30 mg/kg/day and above in the rat and the monkey, injection site reactions were clinically significant and poorly tolerated.

## **Carcinogenicity**

Two life-span carcinogenicity studies with glatiramer acetate, one in mice and one in rats, were completed. Results from the two carcinogenicity studies do not suggest any evidence of carcinogenic potential related to glatiramer acetate administered subcutaneously to rats and mice, at dose levels of up to 60 mg/kg/day.

In the two-year carcinogenicity study in the mouse, repeated administration of doses up to 60 mg/kg/day, showed no evidence for systemic carcinogenicity. In males of the high dose group (60 mg/kg/day), but not in females, there was an increased incidence of fibrosarcomas at the injection sites. These rapidly growing sarcomas, consisting of spindle or fusiform cells with local invasion but no metastasis, were associated with skin damage precipitated by repetitive injections of an irritant over a limited skin area.

In a two-year carcinogenicity study in rats, subcutaneous administration of glatiramer acetate at a dose of 30 mg/kg/day was associated with an increased incidence of benign adrenal pheochromocytomas in males only. This effect was not seen at 15 mg/kg/day and was within the historical control values for the testing laboratory.

## **Mutagenicity**

Glatiramer acetate showed a marginal and inconsistent effect on structural chromosomal

aberrations in cultured human lymphocytes. Chromosomal aberrations or abnormalities did not occur in bone marrow cells of mice given 140 mg/kg, equivalent to approximately 60% of the LD<sub>50</sub>/kg, i.p. Glatiramer acetate, with or without metabolic activation, did not induce point mutations in four strains of *Salmonella typhimurium*, two strains of *Escherichia coli*, or mouse lymphoma L5178Y cell cultures.

### **Reproduction and Teratology**

In fertility and reproduction studies in rats, glatiramer acetate at doses up to 36 mg/kg/day had no adverse effects on reproductive parameters.

Embryofetal development toxicity studies have been performed in rats and rabbits at doses up to approximately 37.5 mg/kg and have revealed no evidence of impaired development of the fetus due to glatiramer acetate.

Peri- and post-natal development toxicity studies did not reveal any effect on the development and reproductive performances of pups born to female rats that were dosed until weaning of the pups with glatiramer acetate at doses up to 36 mg/kg.

### **Antigenicity Studies**

Studies to assess anaphylaxis in sensitized guinea pigs and mice showed that glatiramer acetate elicited IgG activity but very low or no IgE activity.

### **Cardiac Study**

In a dog study, a pharmacological effect of intravenous glatiramer acetate, i.e. reduction of blood pressure, was achieved at a dose of 6.0 mg/kg (10-times the human therapeutic dose on a mg/m<sup>2</sup> basis) but not at a 2-fold lower dose. This was not associated with a decrease in coronary artery blood flow or ischemic change on ECG.

## **17 SUPPORTING PRODUCT MONOGRAPHS**

COPAXONE (glatiramer acetate injection), 20 mg / mL and 40 mg / mL, submission control number 234666, Product Monograph, Teva Pharmaceutical Industries, Ltd., February 4, 2021.

## READ THIS FOR SAFE AND EFFECTIVE USE OF YOUR MEDICINE

### PATIENT MEDICATION INFORMATION

#### Pr **Glatiramer Acetate Injection**

Read this carefully before you start taking **Glatiramer Acetate Injection** and each time you get a refill. This leaflet is a summary and will not tell you everything about this drug. Talk to your healthcare professional about your medical condition and treatment and ask if there is any new information about **Glatiramer Acetate Injection**.

#### **What is Glatiramer Acetate Injection used for?**

Glatiramer Acetate Injection **20 mg / mL (once-daily)** is used to treat patients with Relapsing Remitting Multiple Sclerosis (RRMS), including those who have experienced one episode of nervous system symptoms and who have abnormalities on their brain scan that may be the first signs of Multiple Sclerosis.

Glatiramer Acetate Injection is not a cure. Patients treated with Glatiramer Acetate Injection experience fewer relapses (flare-ups of the disease).

#### **How does Glatiramer Acetate Injection work?**

Multiple Sclerosis (MS) is thought to be a disease where your immune system causes your body to attack its own cells. This leads to loss of myelin, a substance that covers your nerve fibers. The loss of myelin eventually leads to the symptoms of MS.

Glatiramer Acetate Injection is a mixture of small proteins. These small proteins are similar to a protein found in myelin. Glatiramer Acetate Injection is thought to work by modifying the immune processes that are believed to cause MS.

#### **What are the ingredients in Glatiramer Acetate Injection?**

Medicinal ingredients: Glatiramer acetate

Non-medicinal ingredients: Mannitol in sterile water for injection

#### **Glatiramer Acetate Injection comes in the following dosage forms:**

Once-daily solution: 20 mg/mL pre-filled syringe.

#### **Do not use Glatiramer Acetate Injection if:**

- you are allergic to glatiramer or mannitol.
- the solution in the pre-filled syringe is cloudy, leaking or contains any particles.

**To help avoid side effects and ensure proper use, talk to your healthcare professional before you take Glatiramer Acetate Injection. Talk about any health conditions or problems you may have, including if you:**

- have heart disease. Some patients taking glatiramer acetate experience chest pain.
- have a history of developing severe allergic reactions.
- have chronic obstructive pulmonary disease (COPD).
- have asthma.
- have kidney and/or liver problems.
- are pregnant, planning to become pregnant, or if you become pregnant while you are using this medication.
- are nursing.
- are under 18 years of age.

**Tell your healthcare professional about all the medicines you take, including any drugs, vitamins, minerals, natural supplements or alternative medicines.**

### **How to take Glatiramer Acetate Injection:**

The **first** time you use Glatiramer Acetate Injection you:

- will be given full instructions on how to use it.
- should be supervised by a healthcare professional.

Each pre-filled syringe should be:

- used only once.
- used only for subcutaneous injection.

### **Usual Adult Dose:**

- **Glatiramer Acetate Injection 20 mg / mL** is injected once a day.

Your doctor will prescribe the correct dose for you. Do NOT change the dose or dosing schedule without consulting your doctor.

Do NOT stop using Glatiramer Acetate Injection without consulting your doctor.

**Glatiramer acetate 20 mg / mL (once-daily) is not interchangeable with glatiramer acetate 40 mg / mL (three times-a-week) because they are different in their strength and dosing schedule.**

## **INSTRUCTIONS FOR USE**

### **Step 1: Gathering the materials**

- With clean hands, collect one of each of the items you will need on a clean, flat surface in a well-lit area.
  - 1 Glatiramer Acetate Injection pre-filled syringe. (Each syringe is contained inside a protective blister. Holding the package of syringes, tear off only 1 blister at a time. Keep all unused syringes in the refrigerator.)
  - Alcohol swab (not supplied) or access to soap, water, and a clean towel

- Dry cotton ball (not supplied)
- Ensure that the solution is at room temperature. Let the unopened blister containing the syringe stand at room temperature for at least 20 minutes.
- **Do not use** if the medication is frozen. If Glatiramer Acetate Injection is frozen or has ever been frozen, discard the product.
- Small air bubbles may be present in the liquid, which are harmless and can be injected.
- Do **NOT** try to force small air bubbles out of the syringe before injecting the medicine.

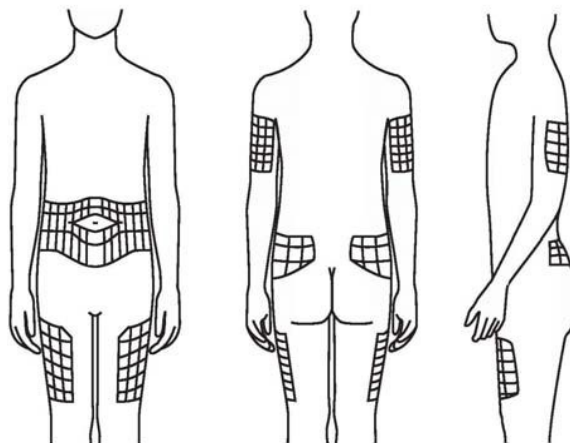
## **Step 2: Choosing the site for injection**

You should have a planned schedule for your chosen injection sites and make note of it in a diary.

- There are **7** possible areas on your body for injection (**see Figure 1**):
  - back of upper arms (right and left)
  - front and outside of thighs (right and left)
  - upper buttocks/rear of hips (right and left)
  - stomach (abdomen)
- If you are taking **Glatiramer Acetate Injection 20 mg / mL (once-daily)**, pick a different area each day (one for each day of the week).
- Within each of the 7 areas there are many sites where you can inject the drug. Rotate the injection sites within the chosen area. **Choose a different injection site each time.**

**Figure 1:**

<p><b>Arms</b> Administer the injection in the upper back portion of the arm.</p>	<p><b>Stomach</b> Administer the injection leaving 5 cm (2 inches) around the navel</p>
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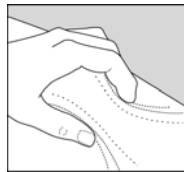
<p><b>Buttocks</b> Administer the injection in the upper and outer rear quadrant.</p>	<p><b>Thighs</b> Administer the injection in the front and outer part of the thigh, 5 cm (2 inches) above the knee and 5 cm (2 inches) below the groin.</p>
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- **Please note:** do NOT inject in any area that is:
  - painful.
  - discoloured.
  - where you feel firm knots or lumps.
  - where skin depression has occurred (a “dent” at the injection site). Further injections in these sites may make the depression deeper.

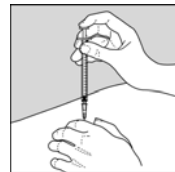
**Hard to inject areas:** There may be some areas on your body that are hard for you to inject the drug yourself (such as the back of your arms). You should ask your healthcare professional for instructions on how to inject Glatiramer Acetate Injection in these areas.

### **Step 3: Injection**

1. **Before you inject** wash and dry your hands. Avoid touching your hair or skin, after you have washed your hands. This will help prevent infection.
2. Remove the syringe from its protective blister by peeling back the paper label. Place the syringe back on the clean, flat surface.
3. Clean the site you have chosen to inject by using:
  - a fresh alcohol swab. (Let it air dry for 1 minute to reduce any stinging)
  - or
  - soap and water (dry with a clean towel)
4. Using the hand you write with, pick up the syringe as you would a pencil. Remove the needle cap from the needle.
5. With your other hand, pinch about a 5 centimeter (2 inch) fold of skin between your thumb and index finger (**See Figure 2**).
6. While resting the heel of your hand against your body, insert the needle at a 90° angle. When the needle is all the way in the skin, let go the fold of skin (**See Figure 3**).



**Figure 2**



**Figure 3**

7. To inject the medication, hold the syringe steady and push down on the plunger. This should take only a few seconds. (**See Figure 3**)
8. Pull the needle straight out.
9. Press a dry cotton ball on the injection site for few seconds.
10. Throw out the syringe and the needle cap in a safe hard-walled plastic container.



**Proper disposal of needles:**

- Throw out all used syringes in a hard-walled plastic container (such as a Sharps container from a pharmacy).
- Keep the cover of this container closed tight and **out of the reach and sight of children**.
- When the container is full, check with your healthcare professional about proper disposal.

**Overdose:**

If you think you, or a person you are caring for, have taken too much Glatiramer Acetate Injection, contact a healthcare professional, hospital emergency department, or regional poison control centre immediately, even if there are no symptoms.

**Missed Dose:**

**Glatiramer Acetate Injection 20 mg / mL (once-daily):** If you miss a dose, you should take it as soon as you remember. If it is less than 12 hours before your next dose, skip the missed dose and take your next dose at the usual time. Do NOT give yourself 2 injections in the same 12-hour period.

**What are possible side effects from using Glatiramer Acetate Injection?**

These are not all the possible side effects you may feel when taking Glatiramer Acetate Injection. If you experience any side effects not listed here, contact your healthcare professional.

The most common side effects of Glatiramer Acetate Injection are:

- Skin reactions at the injection site. These include:
  - Redness
  - Pain
  - Inflammation
  - Itching
  - Swelling
  - Lumps
- A permanent “dent” under the skin at the injection site, caused by damage to the fatty tissue at that site.
- Rash
- Hives
- Headache
- A feeling of worry, nervousness, unease (anxiety)

Serious side effects and what to do about them			
Symptom / effect	Talk to your healthcare professional		Stop taking drug and get immediate medical help
	Only if severe	In all cases	
<b>COMMON</b> <b>Post-injection Reaction:</b> Flushing, dizziness, skin eruptions with irritation, sweating, chest pain, chest tightness, irregular heartbeat, anxiety, difficulty in breathing, tightness in the throat, hives appearing immediately after injection			✓
<b>Low blood pressure:</b> dizziness, fatigue, nausea		✓	
<b>High blood pressure:</b> headache, dizziness, blurred vision or shortness of breath		✓	
<b>Breathing problems:</b> shortness of breath, difficulty breathing		✓	
Fast heart beat or skipping a beat		✓	
<b>Chest pain:</b> pressure or tightness in the chest		✓	
Back, neck or joint pain	✓		
<b>Angioedema:</b> Swelling of the arms, legs or face	✓		
<b>Depression:</b> change in weight, difficulty sleeping, lack of interest in regular activities	✓		
Changes to your vision	✓		
<b>RARE</b> <b>Serious Allergic Reactions:</b> rash, hives, swelling of the face, lips, throat, difficulty swallowing or breathing			✓
<b>VERY RARE</b> <b>Liver injury:</b> Yellowing of the skin or eyes, dark urine, abdominal pain, nausea, vomiting, loss of appetite, weight loss, unusual tiredness.			✓

If you have a troublesome symptom or side effect that is not listed here or becomes bad enough to interfere with your daily activities, talk to your healthcare professional.

## Reporting Side Effects

You can report any suspected side effects associated with the use of health products to Health Canada by:

- Visiting the Web page on Adverse Reaction Reporting (<https://www.canada.ca/en/health-canada/services/drugs-health-products/medeffect-canada/adverse-reaction-reporting.html>) for information on how to report online, by mail or by fax; or
- Calling toll-free at 1-866-234-2345.

*NOTE: Contact your health professional if you need information about how to manage your side effects. The Canada Vigilance Program does not provide medical advice.*

## Storage:

- Refrigerate (2°C - 8°C) immediately. Do NOT FREEZE.
- If you cannot store Glatiramer Acetate Injection in the refrigerator, it can be stored for 1 month at room temperature (15°C - 30°C). Do NOT store for longer than 1 month at room temperature.
- Protect from light. This drug is sensitive to light.

**Keep out of reach and sight of children.**

## If you want more information about Glatiramer Acetate Injection:

- Talk to your healthcare professional.
- Find the full product monograph that is prepared for healthcare professionals and includes this Patient Medication Information by visiting the Health Canada website (<https://www.canada.ca/en/health-canada/services/drugs-health-products/drug-products/drug-product-database.html>); or by calling 1-844-596-9526.

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