

# PRODUCT MONOGRAPH

Pr **EZETIMIBE**

Ezetimibe Tablets

10 mg ezetimibe

Cholesterol Absorption Inhibitor

Sanis Health Inc.  
333 Champlain St, Suite 102  
Dieppe, New Brunswick, Canada  
E1A 1P2

Date of Preparation: December 22, 2014

Submission Control No: 180439

## Table of Contents

<b>PART I: HEALTH PROFESSIONAL INFORMATION .....</b>	<b>3</b>
SUMMARY PRODUCT INFORMATION.....	3
INDICATIONS AND CLINICAL USE .....	3
CONTRAINDICATIONS.....	3
WARNINGS AND PRECAUTIONS .....	4
ADVERSE REACTIONS .....	7
DRUG INTERACTIONS .....	11
DOSAGE AND ADMINISTRATION .....	12
OVERDOSAGE.....	13
ACTION AND CLINICAL PHARMACOLOGY .....	14
STORAGE AND STABILITY .....	15
DOSAGE FORMS, COMPOSITION AND PACKAGING.....	15
<b>PART II: SCIENTIFIC INFORMATION .....</b>	<b>17</b>
PHARMACEUTICAL INFORMATION .....	17
CLINICAL TRIALS .....	18
TOXICOLOGY.....	22
REFERENCES.....	25
<b>PART III: CONSUMER INFORMATION .....</b>	<b>27</b>

PrEZETIMIBE

Ezetimibe Tablet

**PART I: HEALTH PROFESSIONAL INFORMATION**

**SUMMARY PRODUCT INFORMATION**

<b>Route of Administration</b>	<b>Dosage Form / Strength</b>	<b>Clinically Relevant Nonmedicinal Ingredients</b>
oral	Tablet 10 mg	Lactose monohydrate <i>For a complete listing see Dosage Forms, Composition and Packaging section.</i>

**INDICATIONS AND CLINICAL USE**

EZETIMIBE (ezetimibe) is indicated as an adjunct to lifestyle changes, including diet, when the response to diet and other non-pharmacological measures alone has been inadequate.

**Primary Hypercholesterolemia**

EZETIMIBE, administered alone or with an HMG-CoA reductase inhibitor (statin), is indicated for the reduction of elevated total cholesterol (total-C), low density lipoprotein cholesterol (LDLC), apolipoprotein B (Apo B), and triglycerides (TG) and to increase high density lipoprotein cholesterol (HDL-C) in patients with primary (heterozygous familial and non-familial) hypercholesterolemia.

EZETIMIBE, administered in combination with fenofibrate, is indicated for the reduction of elevated total-C, LDL-C, Apo B, and non-HDL-C in patients with mixed hyperlipidemia.

**Homozygous Familial Hypercholesterolemia (HoFH)**

EZETIMIBE, administered with a statin, is indicated for the reduction of elevated total-C and LDL-C levels in patients with HoFH as an adjunct to treatments such as LDL apheresis or if such treatments are not possible.

**Homozygous Sitosterolemia (Phytosterolemia)**

EZETIMIBE is indicated for the reduction of elevated sitosterol and campesterol levels in patients with homozygous familial sitosterolemia.

**CONTRAINDICATIONS**

Hypersensitivity to any component of this medication

When EZETIMIBE is to be administered with a statin or with fenofibrate, the contraindications to that medication should be reviewed before starting concomitant therapy.

*The combination of EZETIMIBE with a statin is contraindicated in patients with active liver disease or unexplained persistent elevations in serum transaminases.*

**All statins and fenofibrate are contraindicated in pregnant and nursing women. When EZETIMIBE is administered with a statin or with fenofibrate in a woman of childbearing potential, refer to the product labeling for that medication (see WARNINGS AND PRECAUTIONS, Special Populations, Pregnant Women).**

## WARNINGS AND PRECAUTIONS

### Serious Warnings and Precautions

- hepatitis
- pancreatitis
- myopathy/rhabdomyolysis
- myalgia
- anaphylaxis (see ADVERSE REACTIONS; Post-Market Adverse Drug Reactions)

### **General**

When ezetimibe is to be administered with a statin or with fenofibrate, please refer also to the Product Monograph for that medication. Note that all statins and fenofibrate are contraindicated in pregnant women (see the Product Monograph for the medication; see WARNINGS AND PRECAUTIONS, Special Populations, Pregnant Women).

### **Hepatic/Biliary/Pancreatic**

**Concomitant Administration with a Statin or Fenofibrate:** When ezetimibe is initiated in a patient already taking a statin or fenofibrate, liver function tests should be considered at initiation of ezetimibe therapy, and then as indicated (see ADVERSE REACTIONS, Abnormal Hematologic and Clinical Chemistry Findings).

When ezetimibe is initiated at the same time as a statin or fenofibrate, liver function tests should be performed at initiation of therapy and according to the recommendations of that medication (see ADVERSE REACTIONS, Abnormal Hematologic and Clinical Chemistry Findings).

**Liver Enzymes:** In controlled monotherapy studies, the incidence of consecutive elevations ( $\geq 3$  times the upper limit of normal [ULN]) in serum transaminases was similar between ezetimibe (0.5%) and placebo (0.3%).

In controlled co-administration trials in patients receiving ezetimibe with a statin, the incidence of consecutive transaminase elevations ( $\geq 3 \times \text{ULN}$ ) was 1.3% compared to 0.4% in patients on a statin alone.

**Patients with Liver Impairment:** The pharmacokinetics of ezetimibe were examined in patients with impaired liver function as defined by the Child-Pugh scoring system.

- In patients with mild hepatic insufficiency (Child-Pugh score 5 or 6), the mean area under the curve (AUC) for total ezetimibe (after a single 10 mg dose of ezetimibe) was increased approximately 1.7-fold compared to healthy subjects. No dosage adjustment is necessary for patients with mild hepatic insufficiency.
- In patients with moderate hepatic insufficiency (Child-Pugh score 7 to 9), the mean AUC for total ezetimibe (after multiple doses of 10 mg daily) was increased approximately 4-fold on Day 1 and Day 14 compared to healthy subjects. Due to the unknown effects of the increased exposure to ezetimibe in patients with moderate (Child-Pugh score 7 to 9) or severe (Child-Pugh score >9) hepatic insufficiency, ezetimibe is not recommended in these patients.
- No pharmacokinetic studies with ezetimibe have been carried out in patients with either active liver disease or unexplained and persistent elevations in serum transaminases. It is recommended that care be exercised in such patients.

*The co-administration of ezetimibe and a statin is contraindicated in patients with active liver disease or unexplained and persistent elevations in serum transaminases.*

Post-marketing reports of adverse events have included rare cases of hepatitis in patients taking ezetimibe, although causality has not been proven. If patients develop signs or symptoms of hepatitis, liver function should be evaluated.

**Concomitant Administration with fibrates:** The co-administration of ezetimibe with fibrates other than fenofibrate has not been studied. Therefore, co-administration of ezetimibe and fibrates (other than fenofibrate) is not recommended (see DRUG INTERACTIONS).

**Fenofibrate:** If cholelithiasis is suspected in a patient receiving ezetimibe and fenofibrate, gallbladder studies are indicated and alternative lipid-lowering therapy should be considered (see ADVERSE REACTIONS and the Product Monograph for fenofibrate).

**Pancreatitis:** Post-marketing reports of adverse events have included rare cases of acute pancreatitis occurring in patients taking ezetimibe, although causality has not been proven. The diagnosis of acute pancreatitis should be considered in patients taking ezetimibe who develop sudden acute abdominal pain.

### **Muscle Effects**

**Myopathy/Rhabdomyolysis:** Myopathy and rhabdomyolysis are known adverse effects of statins and fibrates. Post-marketing reports of adverse events have included rare cases of myopathy/rhabdomyolysis occurring in patients taking ezetimibe with or without a statin, regardless of causality. Myopathy/Rhabdomyolysis should be considered in patients presenting with muscle pain during treatment with ezetimibe with or without a statin or fenofibrate, and

consideration given to discontinuation of the drugs. Most cases of myopathy/rhabdomyolysis resolved when drugs were discontinued.

**Myalgia:** In controlled clinical trials, the incidence of myalgia was 5.0% for ezetimibe versus 4.6% for placebo (see ADVERSE REACTIONS, Table 2). Post-marketing reports of adverse events have included myalgia in patients taking ezetimibe with or without a statin, regardless of causality. Patients should be instructed to contact their physician if they experience persistent and severe muscle pains with no obvious cause.

A number of patients treated with ezetimibe, in whom myalgia occurred had previously experienced myalgia (with or without elevated CK levels) with statin therapy. Patients with a history of statin intolerance (myalgia with or without elevated CK levels) should be closely monitored for adverse muscle events during treatment with ezetimibe.

### **Renal**

**Renal Insufficiency:** After a single 10 mg dose of ezetimibe in patients with severe renal disease, the mean AUC for total ezetimibe was increased approximately 1.5-fold, compared to healthy subjects. Accordingly, no dosage adjustment is necessary for renal impaired patients.

### **Special Populations**

#### **Pregnant Women**

No clinical data on exposed pregnancies are available for ezetimibe. The effects of ezetimibe on labour and delivery in pregnant women are unknown. Note that all statins and fenofibrate are **contraindicated** in pregnant women (see the Product Monograph for the medication). Caution should be exercised when prescribing to pregnant women.

#### **Nursing Women**

Studies in rats have shown that ezetimibe is excreted in milk. It is not known whether ezetimibe is excreted into human breast milk, therefore, ezetimibe should not be used in nursing mothers unless the potential benefit justifies the potential risk to the infant. Note that all statins and fenofibrate are **contraindicated** in nursing women (see the Product Monograph for the medication).

#### **Pediatrics**

The pharmacokinetics of ezetimibe in adolescents (10 to 18 years) have been shown to be similar to that in adults. Treatment experience with ezetimibe in the pediatric population is limited to 4 patients (9 to 17 years) in the sitosterolemia study and 5 patients (11 to 17 years) in the HoFH study. Treatment with ezetimibe in children (<10 years) is not recommended.

#### **Geriatrics**

Plasma concentrations for total ezetimibe are about 2-fold higher in the elderly ( $\geq 65$  years) than in the young (18 to 45 years). LDL-C reduction and safety profile are comparable between elderly and young subjects treated with ezetimibe. Therefore, no dosage adjustment is necessary in the elderly.

**Sex**

Plasma concentrations for total ezetimibe are slightly higher (<20%) in women than in men. LDL-C reduction and safety profile are comparable between men and women treated with ezetimibe. Therefore, no dosage adjustment is necessary on the basis of sex.

**Race**

Based on a meta-analysis of pharmacokinetic studies, there were no pharmacokinetic differences between Blacks and Caucasians.

**ADVERSE REACTIONS****Adverse Drug Reaction Overview**

The most commonly reported adverse events in clinical studies were upper respiratory tract infection, headache, myalgia and back pain. In post-marketing use, serious adverse events reported rarely or very rarely, regardless of causality, included hepatitis, hypersensitivity reactions, pancreatitis and myopathy/rhabdomyolysis.

When ezetimibe is to be administered with a statin or fenofibrate, please refer also to the Product Monograph for that medication.

**Clinical Trial Adverse Drug Reactions**

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

Ezetimibe clinical trial experience involved 2486 patients in placebo-controlled monotherapy trials (1691 treated with ezetimibe tablets) and 4547 patients in active controlled trials (449 of whom were treated with ezetimibe tablets alone and 1708 treated with ezetimibe tablets plus a statin and 185 patients treated with ezetimibe tablets and fenofibrate). The studies were of 8 to 14 weeks duration.

The overall incidence of adverse events reported with ezetimibe tablet was similar to that reported with placebo and the discontinuation rates due to treatment related adverse events was similar between ezetimibe tablet (2.3%) and placebo (2.1%).

**Monotherapy**

Adverse experiences reported in  $\geq 2\%$  of patients treated with ezetimibe tablets and at an incidence greater than placebo in placebo-controlled studies of ezetimibe tablets, regardless of causality assessment, are shown in Table 1.

**Table 1\* Clinical Adverse Events Occurring in  $\geq 2\%$  of Patients Treated with Ezetimibe Tablets and at an Incidence Greater than Placebo, Regardless of Causality**

Body System/Organ Class Adverse Event	PLACEBO (%) (N=795)	EZETIMIBE TABLET 10 mg (%) (N=1691)
<b>Body as a whole – general disorders</b>		
Fatigue	1.8	2.2
<b>Gastrointestinal system disorders</b>		
Abdominal pain	2.8	3.0
Diarrhea	3.0	3.7
<b>Infection and infestations</b>		
Infection viral	1.8	2.2
Pharyngitis	2.1	2.3
Sinusitis	2.8	3.6
<b>Musculoskeletal system disorders</b>		
Arthralgia	3.4	3.8
Back pain	3.9	4.1
<b>Respiratory system disorders</b>		
Coughing	2.1	2.3

\* Includes patients who received placebo or ezetimibe tablets alone reported in Table 2.

The frequency of less common adverse events was comparable between ezetimibe tablet and placebo.

Only two patients out of the 1691 patients treated with ezetimibe tablets alone reported serious adverse reactions—one with abdominal pain plus panniculitis, and one with arm pain and palpitation.

In monotherapy placebo-controlled clinical trials, 4% of patients treated with ezetimibe tablet and 3.8% of patients treated with placebo were withdrawn from therapy due to adverse events.

The following additional drug-related adverse experiences were reported in patients taking ezetimibe alone (n = 2396) and at a greater incidence than placebo (n=1159).

Common (incidence  $\geq 1\%$  and  $< 10\%$ )

*Gastrointestinal Disorders:* flatulence

Uncommon (incidence  $\geq 0.1\%$  and  $< 1\%$ )

*Investigations:* ALT and/or AST increased; blood CPK increased; gammaglutamyltransferase increased; liver function test abnormal

*Gastrointestinal Disorders:* dyspepsia; gastroesophageal reflux disease; nausea

*General Disorders:* chest pain; pain

*Musculoskeletal and Connective Tissue Disorders:* muscle spasms; neck pain

*Metabolism and Nutrition Disorders:* decreased appetite

*Vascular Disorders:* hot flush; hypertension

### **Combination with a Statin**

Ezetimibe tablet has been evaluated for safety in combination studies in more than 2000 patients. In general, adverse experiences were similar between ezetimibe tablet administered with a statin



and a statin alone. However, the frequency of increased transaminases was slightly higher in patients receiving ezetimibe tablet administered with a statin than in patients treated with a statin alone (see WARNINGS AND PRECAUTIONS, Hepatic/Biliary/Pancreatic, Patients with Liver Impairment).

Clinical adverse experiences reported in  $\geq 2\%$  of patients and at an incidence greater than placebo in four placebo-controlled trials where ezetimibe tablet was administered alone or initiated concurrently with various statins, regardless of causality assessment, are shown in Table 2.

**Table 2\* Clinical Adverse Events Occurring in  $\geq 2\%$  of Patients and at an Incidence Greater than Placebo, Regardless of Causality, in Ezetimibe Tablet/Statin Combination Studies**

Body System/Organ Class Adverse Event	Placebo (%) (N=259)	Ezetimibe tablet 10 mg (%) (N=262)	All Statins** (%) (N=936)	Ezetimibe tablet + All Statins** (%) (N=925)
<b>Body as a whole - general disorders</b>				
Chest pain	1.2	3.4	2.0	1.8
Dizziness	1.2	2.7	1.4	1.8
Fatigue	1.9	1.9	1.4	2.8
Headache	5.4	8.0	7.3	6.3
<b>Gastrointestinal system disorders</b>				
Abdominal pain	2.3	2.7	3.1	3.5
Diarrhea	1.5	3.4	2.9	2.8
<b>Infection and infestations</b>				
Pharyngitis	1.9	3.1	2.5	2.3
Sinusitis	1.9	4.6	3.6	3.5
Upper respiratory tract infection	10.8	13.0	13.6	11.8
<b>Musculoskeletal system disorders</b>				
Arthralgia	2.3	3.8	4.3	3.4
Back pain	3.5	3.4	3.7	4.3
Myalgia	4.6	5.0	4.1	4.5

\* Includes four placebo-controlled combination studies in which ezetimibe tablet was initiated concurrently with a statin.

\*\* All statins=all doses of all statins.

In co-administration placebo-controlled clinical trials, 5.7% of patients treated with ezetimibe tablet co-administered with a statin, 4.3% of patients treated with statin alone, 5.0% of patients treated with ezetimibe tablet alone, and 6.2% of patients treated with placebo were withdrawn from therapy due to adverse events.

The following additional drug-related adverse experiences were reported in patients taking ezetimibe co-administered with a statin (n = 11,308) and at a greater incidence than statin administered alone (n=9361).

Uncommon (incidence  $\geq 0.1\%$  and  $< 1\%$ )

*Gastrointestinal Disorders:* dry mouth; gastritis

*General Disorders:* asthenia; edema peripheral

*Musculoskeletal and Connective Tissue Disorders:* muscular weakness; pain in extremity

*Nervous System Disorders:* paresthesia

*Skin and Subcutaneous Tissue Disorders:* pruritus; rash; urticaria

### **Combination with Fenofibrate**

In a clinical study involving 625 patients treated for up to 12 weeks and 576 patients treated for up to 1 year, co-administration of ezetimibe tablet and fenofibrate was well tolerated. This study was not designed to compare treatment groups for infrequent events. Incidence rates (95% CI) for clinically important elevations ( $>3$  X ULN, consecutive) in serum transaminases were 4.5% (1.9, 8.8) and 2.7% (1.2, 5.4) for fenofibrate monotherapy and ezetimibe tablet co-administered with fenofibrate, respectively, adjusted for treatment exposure. Corresponding incidence rates for cholecystectomy were 0.6% (0.0, 3.1) and 1.7% (0.6, 4.0) for fenofibrate monotherapy and ezetimibe tablet co-administered with fenofibrate, respectively (see WARNINGS AND PRECAUTIONS, Fenofibrate and DRUG INTERACTIONS). There were no CPK elevations  $>10$  X ULN in either treatment group in this study. Abdominal pain was commonly reported.

### **Abnormal Hematologic and Clinical Chemistry Findings**

In controlled clinical monotherapy trials, the incidence of clinically important consecutive elevations in serum transaminases (ALT and/or AST  $\geq 3$  X ULN) was similar between ezetimibe tablet (0.5%) and placebo (0.3%). In co-administration trials, the incidence was 1.3% for patients treated with ezetimibe tablet co-administered with a statin and 0.4% for patients treated with a statin alone. These elevations were generally asymptomatic, not associated with cholestasis, and returned to baseline levels after discontinuation of therapy or with continued treatment.

In clinical trials there was no excess of myopathy or rhabdomyolysis associated with ezetimibe tablet compared with the relevant control arm (placebo or statin alone). However, myopathy and rhabdomyolysis are known adverse reactions to statins and other lipid-lowering drugs. In clinical trials, the incidence of CK  $>10$  X ULN was 0.2% for ezetimibe tablet versus 0.1% for placebo, and 0.1% for ezetimibe tablet co-administered with a statin versus 0.4% for statin alone.

### **Post-Market Adverse Drug Reactions**

The following adverse events have been reported rarely or very rarely, regardless of causality:

- increased CK (creatine phosphokinase)
- myalgia (see WARNINGS AND PRECAUTIONS)
- myopathy/rhabdomyolysis (see WARNINGS AND PRECAUTIONS)
- elevations of liver transaminases
- hepatitis (see WARNINGS AND PRECAUTIONS)
- hypersensitivity reactions, including anaphylaxis, angioedema, rash and urticaria
- erythema multiforme
- nausea
- pancreatitis (see WARNINGS AND PRECAUTIONS)
- thrombocytopenia
- arthralgia
- dizziness
- cholelithiasis
- cholecystitis
- depression
- paresthesia
- constipation

- asthenia

## DRUG INTERACTIONS

Serious Drug Interactions
<ul style="list-style-type: none"><li>• cyclosporine</li></ul>



Drug-drug interactions are known or suspected with cholestyramine, cyclosporine and fibrates.

### **Drug-Drug Interactions**

**Cytochrome P450 System:** No clinically significant pharmacokinetic interactions have been observed between ezetimibe and drugs known to be metabolized *via* CYP 1A2, 2D6, 2C8, 2C9, and 3A4 isoenzymes, or N-acetyltransferase such as caffeine, dextromethorphan, tolbutamide, and IV midazolam. It has been shown that ezetimibe neither induces, nor inhibits, these cytochrome P450 isoenzymes.

**Anticoagulants:** Concomitant administration of ezetimibe (10 mg once daily) had no significant effect on bioavailability of warfarin and prothrombin time in a study of twelve healthy adult males. As with the initiation of any medication in patients treated with warfarin or another coumarin anticoagulant, additional International Normalised Ratio (INR) measurements are recommended for patients administered warfarin or another coumarin anticoagulant concomitantly with ezetimibe.

**Digoxin:** Concomitant administration of ezetimibe (10 mg once daily) had no significant effect on the bioavailability of digoxin and the ECG parameters (HR, PR, QT, and QTc intervals) in a study of twelve healthy adult males.

**Oral Contraceptives:** Co-administration of ezetimibe (10 mg once daily) with oral contraceptives had no significant effect on the bioavailability of ethinyl estradiol or levonorgestrel in a study of eighteen healthy adult females.

**Cimetidine:** Multiple doses of cimetidine (400 mg twice daily) had no significant effect on the oral bioavailability of ezetimibe and total ezetimibe in a study of twelve healthy adults.

**Antacids:** Concomitant antacid (aluminum and magnesium hydroxide) administration decreased the rate of absorption of ezetimibe but had no effect on the bioavailability of ezetimibe. This decreased rate of absorption is not considered clinically significant.

**Glipizide:** In a study of twelve healthy adult males, steady-state levels of ezetimibe (10 mg once daily) had no significant effect on the pharmacokinetics and pharmacodynamics of glipizide. A single dose of glipizide (10 mg) had no significant effect on the exposure to total ezetimibe or ezetimibe.

**Cholestyramine:** Concomitant cholestyramine administration decreased the mean AUC of total ezetimibe (ezetimibe + ezetimibe-glucuronide) approximately 55%. The incremental LDL-C reduction due to adding ezetimibe to cholestyramine may be lessened by this interaction.

**Fibrates:** The safety and effectiveness of ezetimibe co-administered with fenofibrate have been evaluated in a clinical study (see WARNINGS AND PRECAUTIONS; ADVERSE REACTIONS and CLINICAL TRIALS, Co-administration with Fenofibrate); co-administration of ezetimibe with other fibrates has not been studied. Fibrates may increase cholesterol excretion into the bile, leading to cholelithiasis. In a preclinical study in dogs, ezetimibe increased cholesterol in the gallbladder bile. Although the relevance of this preclinical finding to humans is unknown, co-administration of ezetimibe with fibrates (other than fenofibrate) is not recommended until use in patients is studied.

- **Fenofibrate:** In a pharmacokinetic study, concomitant fenofibrate administration increased total ezetimibe concentrations approximately 1.5-fold. This increase is not considered clinically significant.
- **Gemfibrozil:** In a pharmacokinetic study, concomitant gemfibrozil administration increased total ezetimibe concentrations approximately 1.7-fold. This increase is not considered clinically significant. No clinical data are available.

**Statins:** No clinically significant pharmacokinetic interactions were seen when ezetimibe was co-administered with atorvastatin, simvastatin, pravastatin, lovastatin, fluvastatin or rosuvastatin.

**Cyclosporine:** Caution should be exercised when initiating ezetimibe in the setting of cyclosporine. Cyclosporine concentrations should be monitored in patients receiving ezetimibe and cyclosporine.

In a study of eight post-renal transplant patients with creatinine clearance of >50 mL/min on a stable dose of cyclosporine, a single 10 mg dose of ezetimibe resulted in a 3.4-fold (range 2.3- to 7.9-fold) increase in the mean AUC for total ezetimibe compared to a healthy control population from another study (N=17). In a different study, a renal transplant patient with severe renal insufficiency (creatinine clearance of 13.2 mL/min/1.73 m<sup>2</sup>) who was receiving multiple medications, including cyclosporine, demonstrated a 12-fold greater exposure to total ezetimibe compared to concurrent controls.

In contrast, in a two-period crossover study in twelve healthy subjects, daily administration of 20 mg ezetimibe for 8 days with a single 100-mg dose of cyclosporine on Day 7 resulted in a mean 15% increase in cyclosporine AUC (range 10% decrease to 51% increase) compared to a single 100-mg dose of cyclosporine alone.

## DOSAGE AND ADMINISTRATION

### Dosing Considerations

- Patients should be placed on a standard cholesterol-lowering diet at least equivalent to the NCEP Adult Treatment Panel III (ATP III) TLC diet before receiving EZETIMIBE, and

should continue on this diet during treatment with EZETIMIBE. If appropriate, a program of weight control and physical exercise should be implemented.

- Prior to initiating therapy with EZETIMIBE, secondary causes for elevations in plasma lipid levels should be excluded. A lipid profile should also be performed.

### **Recommended Dose and Dosage Adjustment**

The recommended dose of EZETIMIBE is 10 mg once daily orally, alone, with a statin, or with fenofibrate. EZETIMIBE can be taken with or without food at any time of the day but preferably at the same time each day.

**Use in the Elderly:** No dosage adjustment is required for elderly patients (see WARNINGS AND PRECAUTIONS, Special Populations, Geriatrics).

**Use in Pediatric Patients:** Children and adolescents  $\geq 10$  years: No dosage adjustment is required (see WARNINGS AND PRECAUTIONS, Special Populations, Pediatrics).

**Use in Patients with Hepatic Impairment:** No dosage adjustment is required in patients with mild hepatic insufficiency (Child-Pugh score 5 to 6). Treatment with EZETIMIBE is not recommended in patients with moderate (Child-Pugh score 7 to 9) or severe (Child-Pugh score  $>9$ ) liver dysfunction (see WARNINGS AND PRECAUTIONS, Hepatic/Biliary/Pancreatic, Patients with Liver Impairment).

**Use in Patients with Renal Impairment:** No dosage adjustment is required for patients with renal impairment (see WARNINGS AND PRECAUTIONS, Renal, Renal Insufficiency).

**Co-administration with Bile Acid Sequestrants:** EZETIMIBE should be administered either 2 hours or longer before or 4 hours or longer after administration of a bile acid sequestrant (see DRUG INTERACTIONS, Drug-Drug Interactions, Cholestyramine).

### **Missed Dose**

The recommended dosing regimen is one tablet, once daily. If a dose is missed, the patient should be counseled to resume the usual schedule of one tablet daily.

## **OVERDOSAGE**

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

In clinical studies, administration of ezetimibe, 50 mg/day to 15 healthy subjects for up to 14 days, or 40 mg/day to 18 patients with primary hypercholesterolemia for up to 56 days, was generally well tolerated.

A few cases of overdose with ezetimibe tablets have been reported; most have not been associated with adverse experiences. Reported adverse experiences have not been serious. In the event of an overdose, symptomatic and supportive measures should be employed.

## **ACTION AND CLINICAL PHARMACOLOGY**

### **Mechanism of Action**

Ezetimibe is in a new class of lipid-lowering compounds that selectively inhibit the intestinal absorption of cholesterol and related plant sterols. Ezetimibe is orally active, with a unique mechanism of action that differs from other classes of cholesterol-reducing compounds e.g., HMG-CoA reductase inhibitors (statins), bile acid sequestrants (resins), fibric acid derivatives, plant stanols. The molecular target of ezetimibe is the sterol transporter, Niemann-Pick C1-Like 1 (NPC1L1), which is responsible for the intestinal uptake of cholesterol and phytosterols.

Although ezetimibe is rapidly absorbed and is extensively metabolized to an active phenolic glucuronide which reaches the systemic circulation after oral administration (see ACTION AND CLINICAL PHARMACOLOGY, Pharmacokinetics, Absorption), its action is localized at the brush border of the small intestine where it inhibits the absorption of cholesterol, leading to a decrease in the delivery of intestinal cholesterol to the liver. This results in a reduction of hepatic cholesterol stores and an increase in clearance of cholesterol from the blood. Ezetimibe does not increase bile acid excretion in contrast to bile acid sequestrants and does not inhibit cholesterol synthesis in the liver as do statins. Ezetimibe and statins have distinct mechanisms of action that provide complementary cholesterol reduction. Administration of Ezetimibe tablet with fenofibrate is effective in improving serum total-C, LDL-C, Apo B, TG, HDL-C, and non-HDL-C in patients with mixed hyperlipidemia.

Clinical studies have demonstrated that elevated levels of total-C, low density lipoprotein cholesterol (LDL-C) and apolipoprotein B (Apo B; the major protein constituent of LDL), promote atherosclerosis in humans. In addition, decreased levels of high density lipoprotein cholesterol (HDL-C) are associated with the development of atherosclerosis. Epidemiologic studies have established that cardiovascular morbidity and mortality vary directly with the level of total-C and LDL-C and inversely with the level of HDL-C. Like LDL, cholesterol-enriched triglyceride-rich lipoproteins, including very low density lipoproteins (VLDL), intermediate density lipoproteins (IDL), and remnants, can also promote atherosclerosis. **The effects of ezetimibe given either alone or in addition to a statin or fenofibrate on cardiovascular morbidity and mortality have not been established.**

### **Pharmacodynamics**

Preclinical studies in animals were performed to determine the selectivity of ezetimibe for inhibiting cholesterol absorption. Ezetimibe inhibited the absorption of [<sup>14</sup>C]-cholesterol with no effect on the absorption of triglycerides, fatty acids, bile acids, progesterone, ethinyl estradiol, or the fat soluble vitamins A and D.

In a study of hypercholesterolemic patients, ezetimibe inhibited intestinal cholesterol absorption by 54%, compared with placebo. Ezetimibe had no clinically meaningful effect on the plasma

concentrations of the fat-soluble vitamins A, D, and E, and did not impair adrenocortical steroid hormone production.

### **Pharmacokinetics**

**Absorption:** After oral administration, ezetimibe is rapidly absorbed and extensively conjugated to a phenolic glucuronide (ezetimibe-glucuronide) form which is at least as pharmacologically active as the parent drug. Mean ezetimibe peak plasma concentrations ( $C_{max}$ ) of 3.4 to 5.5 ng/mL were attained within 4 to 12 hours ( $T_{max}$ ). Ezetimibe-glucuronide mean  $C_{max}$  values of 45 to 71 ng/mL were achieved between 1 and 2 hours ( $T_{max}$ ). The extent of absorption and absolute bioavailability of ezetimibe cannot be determined as the compound is virtually insoluble in aqueous media suitable for injection.

Concomitant food administration (high fat or non-fat meals) had no effect on the extent of absorption of ezetimibe when administered as ezetimibe 10 mg tablets.  $C_{max}$  of ezetimibe was increased by 38% when taken with high fat meals.

**Distribution:** Ezetimibe and ezetimibe-glucuronide are bound 99.7% and 88 to 92% to human plasma proteins, respectively.

**Metabolism:** Ezetimibe is metabolized primarily in the small intestine and liver via glucuronide conjugation (a phase II reaction) with subsequent biliary and renal excretion. Minimal oxidative metabolism (a phase I reaction) has been observed in all species evaluated. Ezetimibe and ezetimibeglucuronide are the major compounds detected in plasma. The conjugate ezetimibeglucuronide constitutes 80-90% of plasma drug levels with ezetimibe the remaining 10-20%. Both ezetimibe and ezetimibe-glucuronide are slowly eliminated from plasma with evidence of significant enterohepatic recycling. The half-life for ezetimibe and ezetimibe-glucuronide is approximately 22 hours.

**Excretion:** Following oral administration of  $^{14}C$ -ezetimibe (20 mg) to human subjects, total ezetimibe (ezetimibe + ezetimibe-glucuronide) accounted for approximately 93% of the total radioactivity in plasma. Approximately 78% and 11% of the administered radioactivity were recovered in the feces and urine, respectively, over a 10-day collection period. After 48 hours, there were no detectable levels of radioactivity in the plasma. Ezetimibe was the major component in feces (69% of the administered dose) while ezetimibe-glucuronide was the major component in urine and accounted for 9% of the administered dose.

### **STORAGE AND STABILITY**

Store between 15°C-30°C. Protect from moisture.

### **DOSAGE FORMS, COMPOSITION AND PACKAGING**

EZETIMIBE is available as a 10 mg tablet for oral administration.

EZETIMIBE is formulated as white, oval tablets with debossing “10” on one side and “EZT” on the other side. Each tablet contains 10 mg of active ingredient, ezetimibe.

Non-medicinal ingredients: croscarmellose sodium, hypromellose, lactose monohydrate, magnesium stearate, microcrystalline cellulose, sodium lauryl sulfate.

EZETIMIBE tablets are available in HDPE bottles of 100.



## PART II: SCIENTIFIC INFORMATION

### PHARMACEUTICAL INFORMATION

#### Drug Substance

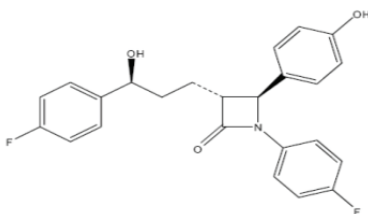
Common name: ezetimibe

Chemical name: 1-(4-fluorophenyl)-3(R)-[3-(4-fluorophenyl)-3(S)-hydroxypropyl]-4(S)-4-hydroxyphenyl)-2-azetidinone

Molecular formula: C<sub>24</sub>H<sub>21</sub>F<sub>2</sub>NO<sub>3</sub>

Molecular mass: 409.42 g/mol

Structural formula:



Physicochemical properties: White to an off-white crystalline powder

Solubility: Ezetimibe is freely to very soluble in ethanol, methanol and acetone and practically insoluble in water.

Solubility of ezetimibe in various aqueous media at 37 °C:

Media	Solubility	final pH
water	0.0004 mg/ml	6.0
0.1M HCl	0.0008 mg/ml	1.2
phosphate – citric buffers:		
- pH 3.0	0.0007 mg/ml	3.1
- pH 4.5	0.0006 mg/ml	4.6
- pH 6.8	0.0005 mg/ml	6.8
- pH 7.5	0.0003 mg/ml	7.5

The solubility of ezetimibe is independent of crystal form as the anhydrous form rapidly converts into the monohydrate form in aqueous media.

pKa: 9.72 (potentiometric titration)  
9.66 (theoretical)

Partition coefficient: LogP = 4.5

Melting point:

Anhydrous form: melts at 163°C (onset)

Hydrate form: dehydration peak into anhydrate from around 65°C; melts at 163°C (onset)

## CLINICAL TRIALS

### Comparative Bioavailability

This was a single-dose, blinded, crossover, randomized bioequivalence study of EZETIMIBE versus Ezetrol<sup>®</sup> (ezetimibe), each administered as 1x10mg tablets in 45 healthy subjects (24 males and 21 females) between the ages of 22 and 53 years old under fasting conditions.

SUMMARY TABLE OF THE COMPARATIVE BIOAVAILABILITY DATA

Ezetimibe (1 x 10 mg ezetimibe tablet) From measured data Geometric Mean Arithmetic Mean (CV %)				
Parameter	Test*	Reference†	% Ratio of Geometric Means	90% Confidence Interval
AUC <sub>T</sub> (pg·h/mL)	84111.22 94906.71 (51.93%)	83721.12 90748.34 (41.43%)	100.82	94.41 – 107.67
AUC <sub>∞</sub> (pg·h/mL)	87443.92 94733.32 (50.97%)	87328.10 94486.76 (44.48%)	100.13	93.34 – 107.42
C <sub>max</sub> (pg/mL)	4884.60 5736.02 (60.09%)	4425.60 4992.07 (53.03%)	110.37	101.38 – 120.16
T <sub>max</sub> § (h)	5.00 (0.50 – 12.00)	5.00 (0.75 – 12.00)		
T <sub>½</sub> (h)□	20.56 (39.20%)	21.30 (44.80%)		

\* EZETIMIBE tablets

† EZETROL<sup>®</sup> tablets from Merck Frosst-Schering Pharma G.P. were purchased in Canada

§ Expressed as the median (range) only

□ Expressed as the arithmetic mean (CV %) only

## Primary Hypercholesterolemia

Ezetimibe tablet has been shown to be effective in reducing total-C, LDL-C, Apo B, and TG and increasing HDL-C in patients with primary hypercholesterolemia. Maximal to near maximal response is generally achieved within 2 weeks and maintained during chronic therapy.

Ezetimibe tablet is effective in a variety of patient populations with hypercholesterolemia, in men and women, and in the elderly, administered alone or with a statin.

## Monotherapy

In two double-blind, placebo-controlled studies of 12 weeks duration in patients with primary hypercholesterolemia, ezetimibe tablet significantly lowered total-C, LDL-C, Apo B, and TG and increased HDL-C compared with placebo. The studies enrolled 1719 patients (ezetimibe tablet =1288, placebo = 431) with an LDL-C  $\geq$  130 mg/dL (3.37 mmol/L) and  $\leq$  250 mg/dL (6.48 mmol/L), and with a TG  $\leq$  350 mg/dL (3.96 mmol/L). In general, the groups were balanced with regard to body weight, sex, age, race and baseline lipid levels; at entry into the study the mean LDL-C was 165 mg/dL (4.27 mmol/L) while the mean age was 58 years and 48% were male.

Reductions in LDL-C were consistent across age, sex, race, and baseline LDL-C (see Table 3). In addition, ezetimibe tablet had no effect on the plasma concentrations of the fat-soluble vitamins A, D, and E, or on prothrombin time, and did not impair adrenocortical steroid hormone production.

**Table 3 Mean Response to Ezetimibe tablet in Patients with Primary Hypercholesterolemia (Mean % Change from Baseline)**

	Treatment Group	N	Total-C	LDL-C	Apo B	TG <sup>a</sup>	HDLC
Study 1	Placebo	205	+1	+1	-1	-1	-1
	Ezetimibe tablet	622	-12	-18	-15	-7	+1
Study 2	Placebo	226	+1	+1	-1	+2	-2
	Ezetimibe tablet	666	-12	-18	-16	-9	+1

<sup>a</sup> Median % change from baseline

In two, 12 week ezetimibe monotherapy studies which included 1288 patients treated with ezetimibe and 431 treated with placebo, the safety profile of ezetimibe was similar to that of placebo. There was no difference in the incidence of clinically important liver function or muscle adverse experiences between the groups.

## Co-Administration with a Statin

### Ezetimibe Initiated Concurrently with a Statin

In four double-blind, placebo-controlled studies in patients with primary hypercholesterolemia, Ezetimibe tablet co-administered with a statin significantly lowered total-C, LDL-C, Apo B and TG and increased HDL-C compared with a statin alone. The studies enrolled 2382 patients (Ezetimibe tablet alone=262, placebo=259, ezetimibe tablet co-administered with a statin=925, statin alone=936) with an LDL-C  $\geq$  145 mg/dL (3.76 mmol/L) and  $\leq$  250 mg/dL (6.48 mmol/L) and with TG  $\leq$  350 mg/dL (3.96 mmol/L). In general, the groups were balanced with regard to body weight, sex, age, race and baseline lipids; at entry into the study the mean LDL-C was 179 mg/dL (4.64 mmol/L) while the mean age was 57 years and 43% were male.

In general, the incremental effect on LDL-C reduction was independent of the dose or specific statin used. In addition, LDL-C reduction for ezetimibe tablet co-administered with the lowest tested dose (10 mg) of any of the statins was similar to or greater than the LDL-C reduction of the highest tested dose of the corresponding statin administered alone (Table 4).

**Table 4 Mean % Change from Baseline in Plasma Concentration of Calculated LDL-C for Ezetimibe tablet Administered with Statins**

	Atorvastatin Study	Simvastatin Study	Pravastatin Study	Lovastatin Study
Placebo	+4	-1	-1	0
Ezetimibe	-20	-19	-20	-19
10 mg statin	-37	-27	-21	-20
Ezetimibe+10 mg statin	-53	-46	-34	-34
20 mg statin	-42	-36	-23	-26
Ezetimibe + 20 mg statin	-54	-46	-40	-41
40 mg statin	-45	-38	-31	-30
Ezetimibe + 40 mg statin	-56	-56	-42	-46
80 mg statin	-54	-45	-	-
Ezetimibe+ 80 mg statin	-61	-58	-	-

In addition, ezetimibe had a beneficial effect on total-C, Apo B, TG, and HDL-C.

In the 4 ezetimibe and statin factorial studies performed with lovastatin, pravastatin, simvastatin and atorvastatin, 925 patients received ezetimibe co-administered with statins and 936 received statin alone. Overall, the co-administration of ezetimibe and statin was well tolerated. There was no difference in the incidence of clinically important muscle adverse experiences. There was small excess of liver function elevations in the co-administration group compared to statins alone: 1.3% versus 0.4% respectively.

### **Ezetimibe Added to On-going Statin Therapy**

In a single double-blind, placebo-controlled study of 8 weeks duration in patients with primary hypercholesterolemia, with known coronary artery disease or multiple cardiovascular risk factors not controlled by existing statin therapy (i.e., LDL-C exceeded NCEP ATP II defined targets), the addition of ezetimibe to a statin further reduced LDL-C by 25% (versus 4% for statin alone) and brought significantly more patients to their LDL-C goal than the statin alone (72% versus 19%). The study enrolled 769 patients (Ezetimibe tablet co-administered with a statin=379, statin alone=390). In general, the groups were balanced with regard to body weight, sex, age, race and baseline lipids; at entry into the study the mean LDL-C was 139 mg/dL (3.60 mmol/L) while the mean age was 60 years and 58% were male.

### **Co-administration with Fenofibrate**

In a multicenter, double-blind, placebo-controlled, clinical study in patients with mixed hyperlipidemia, 625 patients were treated for up to 12 weeks and 576 for up to 1 year. Patients with an LDL-C  $\geq$  130 mg/dL (3.37 mmol/L) and  $\leq$  220 mg/dL (5.70 mmol/L) (for non-diabetics) or  $\geq$  100 mg/dL (2.59 mmol/L) and  $\leq$  180 mg/dL (4.66 mmol/L) (for diabetics), and with TG  $\geq$  200 mg/dL (2.26 mmol/L) and  $\leq$  500 mg/dL (5.65 mmol/L) were randomized to receive placebo, ezetimibe tablet alone, 160 mg fenofibrate alone, or ezetimibe tablet and 160 mg fenofibrate. In general, the groups were balanced with regard to body weight, sex, age, race and baseline lipids; at entry into the study the mean LDL-C was 161 mg/dL (4.17 mmol/L) while the mean age was 54 years and 56% were male.

Ezetimibe co-administered with fenofibrate significantly lowered total-C, LDL-C, Apo B, and non-HDL-C compared to fenofibrate administered alone. The percent decrease in TG and percent increase in HDL-C for ezetimibe co-administered with fenofibrate were comparable to those for fenofibrate administered alone (see Table 5).

**Table 5 Response to Ezetimibe and Fenofibrate Initiated Concurrently in Patients with Mixed Hyperlipidemia (Mean<sup>a</sup>% Change from Untreated Baseline<sup>b</sup> at 12 weeks)**

Treatment (Daily Dose)	N	Total-C	LDL-C	Apo B	TG	HDL-C	Non-HDL-C
Placebo	63	0	0	-1	-9	+3	0
Ezetimibe	185	-12	-13	-11	-11	+4	-15
Fenofibrate 160 mg	188	-11	-6	-15	-43	+19	-16
Ezetimibe + Fenofibrate 160 mg	183	-22	-20	-26	-44	+19	-30

<sup>a</sup> For triglycerides, median % change from baseline

<sup>b</sup> Baseline - on no lipid-lowering drug

Improvements in lipid endpoints after 1 year of treatment were consistent with the 12-week data displayed above.

### **Homozygous Familial Hypercholesterolemia (HoFH)**

A study was conducted to assess the efficacy of ezetimibe in the treatment of HoFH. This double-blind, randomized, 12-week study enrolled 50 patients with a clinical and/or genotypic diagnosis of HoFH, with or without concomitant LDL apheresis. Patients were already receiving atorvastatin or simvastatin (40 mg) at entry, had LDL-C  $\geq$  100 mg/dL (2.59 mmol/L), and were randomized to one of three treatment groups: atorvastatin or simvastatin (80 mg; n=17), ezetimibe administered with atorvastatin or simvastatin (40 mg) or ezetimibe administered with atorvastatin or simvastatin (80 mg; n=33). In general, the groups were well balanced with regard to body weight, sex, age, race and baseline lipids; at entry into the study the mean LDL-C was 332 mg/dL (8.60 mmol/L), the mean age was 32 years and 42% were male.

Ezetimibe tablet administered with atorvastatin (40 mg or 80 mg) or simvastatin (40 mg or 80 mg), significantly reduced LDL-C compared with increasing the dose of simvastatin or atorvastatin monotherapy from 40 mg to 80 mg.

**Table 6 Mean Response to Ezetimibe in Patients with HoFH (Mean % Change from Baseline)**

Treatment (Daily Dose)	N	LDL-C
Atorvastatin (80 mg) or simvastatin (80 mg)	17	-7
Ezetimibe+ atorvastatin (40 mg or 80 mg) or simvastatin (40 mg or 80 mg)	33	-21
Sub-group analysis: Ezetimibe+ atorvastatin (80 mg) or simvastatin (80 mg)	17	-27

### **Homozygous Sitosterolemia (Phytosterolemia)**

A study was conducted to assess the efficacy of ezetimibe tablet as adjunctive therapy in the treatment of homozygous sitosterolemia. This multicenter, double-blind, placebo-controlled, study of 8-weeks duration enrolled 37 patients (Ezetimibe tablet=30, placebo=7)  $\geq$  10 years of age with sitosterol  $>$ 5 mg/dL (0.1 mmol/L). In general, the groups were well balanced with regard to body weight, sex, age, race and baseline lipids; at entry into the study the mean sitosterol was 20 mg/dL (0.5 mmol/L), the mean age was 37 years and 35% were male.

Ezetimibe significantly lowered the two major plant sterols, sitosterol and campesterol, by 21% and 24% from baseline, respectively. In contrast, patients who received placebo had increases in sitosterol and campesterol of 4% and 3% from baseline, respectively. For patients treated with ezetimibe, the reduction in plant sterols was progressive over the course of the study.

Reductions in sitosterol and campesterol were consistent between patients taking ezetimibe tablet concomitantly with bile acid sequestrants (n=8) and patients not on concomitant bile acid sequestrant therapy (n=21).

## TOXICOLOGY

### Acute Toxicity

The acute toxicity of ezetimibe following single doses was evaluated in mice, rats, and dogs.

**Table 7 Ezetimibe LD<sub>50</sub> Values**

Species	Sex	Route	Estimated LD <sub>50</sub> Value (mg/kg)
Mouse	Male/Female	PO	>5000
Mouse	Male/Female	IP	>1000 LD <sub>50</sub> <2000
Rat	Male/Female	PO	>5000
Rat	Male/Female	IP	>2000
Dog	Male/Female	PO	>3000

PO=orally; IP=intraperitoneally

In animals, no toxicity was observed after single oral doses of 5000 mg/kg of ezetimibe in rats and mice and 3000 mg/kg in dogs.

Ezetimibe (1000 mg/kg) was co-administered with either simvastatin (1000 mg/kg) or lovastatin (1000 mg/kg) by oral gavage to mice and rats. All animals survived. There were no clinical observations of toxicity and no effects on body weight parameters. The estimated oral LD<sub>50</sub> for both species was >1000 mg/kg of each co-administered agent.

### Chronic Toxicity (ezetimibe alone)

Ezetimibe was well tolerated by mice, rats and dogs. No target organs of toxicity were identified in chronic studies at daily doses up to 1500 and 500 mg/kg in male and female rats, respectively, up to 500 mg/kg in mice, or up to 300 mg/kg in dogs.

### Subchronic Toxicity (Ezetimibe/Statin Co-administration)

The safety of concomitant administration of ezetimibe and statins was assessed in rats and dogs in multiple dose toxicity studies ranging from 2 weeks to 3 months in duration. Target organs identified in these studies are summarized in the following table.

**Table 8 Target Organs Affected in Animal Co-administered Ezetimibe and Statins<sup>a</sup>**

Rat	Dog
Liver <sup>b</sup> : increased weight, hepatocellular vacuolation, hepatocellular hypertrophy, foci of cellular alteration, bile duct hyperplasia, increased liver-related serum enzymes	Liver <sup>b</sup> : decreased weight, bile duct hyperplasia, increased liver-related serum enzymes

Rat	Dog
Skeletal Muscle <sup>b</sup> : myofiber degeneration/regeneration, mixed cellular infiltration	Testes <sup>b</sup> : spermatic aggregates, spermatogenic alteration, luminal cellular debris
Stomach (nonglandular) <sup>b</sup> : hyperkeratosis, acanthosis, mixed cellular infiltration	

<sup>a</sup> Ezetimibe was co-administered with simvastatin, lovastatin, pravastatin or atorvastatin.

<sup>b</sup> Known target organ of statins.

When ezetimibe was co-administered with statins (specifically atorvastatin, simvastatin, pravastatin or lovastatin) toxicologic findings were consistent with those seen with statins administered alone. Co-administration of ezetimibe and statins did not result in any new toxicities.

Myopathy in rats was attributed to a toxicokinetic interaction resulting in increased systemic exposure to the statin (1.5- to 15.1 -fold) and/or its pharmacologically active metabolite (2.4- to 11.2 -fold) compared to the statin control. Similar alterations in plasma drug levels are not seen at lower doses (~10-20 times human exposure to total ezetimibe), and no myopathy in rats is seen under these conditions. Thus, ezetimibe does not increase the sensitivity of rats to statin-induced myopathy in the absence of a toxicokinetic interaction.

Co-administration of ezetimibe and statins to dogs was associated with marked (100x) increases in serum ALT activity. However, there was no evidence of necrosis in liver or skeletal muscle. Upon cessation of dosing, ALT values approached or returned to baseline within one month. Increases in ALT were attenuated by mevalonate, the product of HMG-CoA reductase, demonstrating that these increases were related to inhibition of the reductase. While the source of the ALT has not been identified, these changes in dogs were not indicative of drug-induced organ toxicity, based on the lack of any functional or morphologic changes in the liver that would typically be associated with transaminase increases of this magnitude.

Findings potentially relevant to the safety of concomitant administration of ezetimibe and statin in humans (i.e., hepatotoxicity, myopathy, and testicular degeneration) are similar to those of HMG-CoA reductase inhibitors administered alone.

### **Carcinogenicity**

In two-year studies conducted in mice and rats, ezetimibe was not carcinogenic. A 104-week oral carcinogenicity study with ezetimibe was conducted in mice at doses up to 500 mg/kg (>150 times the human exposure at 10 mg daily based on AUC<sub>0-24hr</sub> for total ezetimibe). A 104-week oral carcinogenicity study with ezetimibe was conducted in rats at doses up to 1500 mg/kg (males) and 500 mg/kg (females) (~14 and ~17 times the human exposure at 10 mg daily based on AUC<sub>0-24hr</sub> for total ezetimibe). There were no statistically significant increases in tumor incidences in drug-treated rats or mice.

### **Mutagenicity**

No evidence of mutagenicity was observed *in vitro* in a microbial mutagenicity (Ames) test with *salmonella typhimurium* and *escherichia coli* with or without metabolic activation. No evidence of clastogenicity was observed *in vitro* in a chromosomal aberration assay in human peripheral

blood lymphocytes with or without metabolic activation. In addition, there was no evidence of genotoxicity in the *in vivo* mouse micronucleus test.

Combinations of ezetimibe and statins were not mutagenic (with or without metabolic activation), did not induce chromosome aberration (with or without exogenous metabolic activation) and did not induce an increase in micronuclei in mouse bone marrow polychromatic erythrocytes.

### **Reproductive and Teratogenicity Studies**

In oral (gavage) fertility studies of ezetimibe conducted in rats, there was no evidence of reproductive toxicity at doses up to 1000 mg/kg/day in male or female rats (~1181 [males] times the human dose at 10 mg daily based on surface area and ~7 [females] times the human exposure at 10 mg daily based on AUC<sub>0-24hr</sub> for total ezetimibe). Ezetimibe, at doses up to 1000 mg/kg (the highest feasible dose), was not maternotoxic in embryo-fetal development studies in rats and rabbits.

Ezetimibe was not teratogenic in rats or rabbits and had no effect on prenatal or postnatal development. When ezetimibe was given with lovastatin, simvastatin, pravastatin or atorvastatin, no teratogenic effects were observed in embryo-fetal development studies in pregnant rats. In pregnant rabbits, a low incidence of skeletal malformations (fused sternbrae, fused caudal vertebrae, reduced number of caudal vertebrae) was observed when ezetimibe (1000 mg/kg;  $\geq 146$  times the human exposure at 10 mg daily based on AUC<sub>0-24hr</sub> for total ezetimibe) was administered with lovastatin (2.5 and 25 mg/kg), simvastatin (5 and 10 mg/kg), pravastatin (25 and 50 mg/kg), or atorvastatin (5, 25, and 50 mg/kg). Exposure to the pharmacologically active form of the statin ranged from 1.4 (atorvastatin) to 547 (lovastatin) times the human exposure at 10 mg daily (simvastatin or atorvastatin) or 20 mg daily (lovastatin and pravastatin) based on AUC<sub>0-24hr</sub>.



## REFERENCES

1. Ballantyne CM, Hourii J, Notarbartolo A, Melani L, Lipka LJ, Suresh R, et al for the Ezetimibe Study Group. Effect of ezetimibe coadministered with atorvastatin in 628 patients with primary hypercholesterolemia: a prospective, randomized, double-blind trial. *Circulation* 2003; 107:2409-15.
2. Ballantyne C, Van Heek M, Davis H, and Stone N. Evolving concepts: the role of ezetimibe in the management of hypercholesterolaemia. *Eur Heart J Supplements* 2002;4(Suppl J):J1-J24.
3. Bays H. Ezetimibe. *Expert Opin Investig Drugs* 2002;11(11):1587-604.
4. Bays HE, Moore PB, Drehobl MA, Rosenblatt S, Toth PD, Dujovne CA, et al for the Ezetimibe Study Group. Effectiveness and tolerability of ezetimibe in patients with primary hypercholesterolemia: pooled analysis of two phase II studies [published erratum appears in *Clin Ther* 2001 Sep;23(9):1601]. *Clin Ther* 2001;23(8):1209-30.
5. Davidson MH, McGarry T, Bettis R, Melani L, Lipka LJ, LeBeaut AP, et al on behalf of the Ezetimibe Study Group. Ezetimibe coadministered with simvastatin in patients with primary hypercholesterolemia. *JACC* 2002;40(12):2125-34i.
6. Dujovne CA, Ettinger MP, McNeer JF, Lipka LJ, LeBeaut AP, Suresh R, et al for the Ezetimibe Study Group. Efficacy and safety of a potent new selective cholesterol absorption inhibitor, ezetimibe, in patients with primary hypercholesterolemia. *Am J Cardiol* 2002;90(10):1092-7.
7. Expert Panel On Detection; Evaluation; And Treatment Of High Blood Cholesterol In Adults. Executive summary of the third report of the national cholesterol education program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel III). *JAMA* 2001;285(19):2486-97.
8. Farnier M, Freeman M, Macdonell G, Perevozskaya I, Davies M, Mitchel Y, Gumbiner B. Efficacy and safety of the coadministration of ezetimibe with fenofibrate in patients with mixed hyperlipidaemia. *Eur Heart J* 2005;26:897-905.
9. Fodor JG, Frohlich JJ, Genest JJ Jr, McPherson PR. Recommendations for the management and treatment of dyslipidemia. Report of the Working Group on Hypercholesterolemia and Other Dyslipidemias. *CMAJ* 2000;162(10):1441-7.
10. Gagné C, Bays HE, Weiss SR, Mata P, Quinto K, Melino M, et al for the Ezetimibe Study Group. Efficacy and safety of ezetimibe added to ongoing statin therapy for treatment of patients with primary hypercholesterolemia. *Am J Cardiol* 2002;90(10):1084-91.
11. Gagné C, Gaudet D, Bruckert E for the Ezetimibe Study Group. Efficacy and safety of ezetimibe coadministered with atorvastatin or simvastatin in patients with homozygous familial hypercholesterolemia. *Circulation* 2002;105(21):2469-75.

12. Garcia-Calvo M, Lisnock JM, Bull HG, Hawes BE, Burnett DA, Braun MP, et al. The target of ezetimibe is Niemann–Pick C1-Like 1 (NPC1L1). *Proc. Natl. Acad. Sci. USA* 2005;102(23):8132-8137.
13. Kastelein JJP & Van Dam MJ. A new role for combination therapy in lipid management. *Br J Cardiol* 2001;8(11):639-53 (passim).
14. Kerzner B, Corbelli J, Sharp S, Lipka LJ, Melani L, LeBeaut A, et al for the Ezetimibe Study Group. Efficacy and safety of ezetimibe coadministered with lovastatin in primary hypercholesterolemia. *Am J Cardiol* 2003;91(4):418-24.
15. Knopp RH, Gitter H, Truitt T, Bays H, Manion CV, Lipka LJ, et al for the Ezetimibe Study Group. Effects of ezetimibe, a new cholesterol absorption inhibitor, on plasma lipids in patients with primary hypercholesterolemia. *Eur Heart J* 2003; 24(8):729-41.
16. Kosoglou T, Meyer I, Veltri EP, Statkevich P, Yang B, Zhu Y, et al. Pharmacodynamic interaction between the new selective cholesterol absorption inhibitor ezetimibe and simvastatin. *Br J Clin Pharmacol* 2002;54(3):309-19.
17. Melani L, Mills R, Hassman D, Lipetz R, Lipka LJ, LeBeaut A, et al, for the Ezetimibe Study Group. Efficacy and safety of ezetimibe coadministered with pravastatin in patients with primary hypercholesterolemia: A prospective, randomized, double-blind trial. *Eur Heart J* 2003;24(8):717-28.
18. Pearson TA, Laurora I, Chu H, Kafonek S. The lipid treatment assessment project (LTAP). A multicenter survey to evaluate the percentages of dyslipidemic patients receiving lipid-lowering therapy and achieving low-density lipoprotein cholesterol goals. *Arch Intern Med* 2000;160(4):459-67.
19. Shepherd J. The role of the exogenous pathway in hypercholesterolaemia. *Eur Heart J Supplements* 2001;3(Suppl E):E2-E5.
20. Sudhop T, Lutjohann D, Kodal A, Igel M, Tribble DL, Shah S, et al. Inhibition of intestinal cholesterol absorption by ezetimibe in humans. *Circulation* 2002;106(15):1943-8.
21. Merck Canada Inc. Product Monograph EZETROL, Control Number 153192 Dated: March 6, 2012.

### PART III: CONSUMER INFORMATION

Pr **EZETIMIBE**  
Ezetimibe tablets

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

Remember that your doctor has prescribed this medicine for you. Never give it to anyone else.

#### ABOUT THIS MEDICATION

What the medication is used for:

EZETIMIBE helps to reduce the amount of cholesterol and triglycerides in your blood in conjunction with lifestyle changes including exercise, diet, and weight management, when a response to such changes has been inadequate.

Cholesterol is one of several fatty substances found in the bloodstream. Your total cholesterol is made up mainly of low density lipoprotein cholesterol and high density lipoprotein cholesterol (LDL and HDL cholesterol).

LDL cholesterol is often called "bad" cholesterol because it can build up in the walls of your arteries forming plaque. Eventually this plaque build-up can lead to a narrowing of the arteries. This narrowing can slow or block blood flow to vital organs such as the heart and brain. This blocking of blood flow can result in a heart attack or stroke.

HDL cholesterol is often called "good" cholesterol because it helps keep the bad cholesterol from building up in the arteries and protects against heart disease.

Triglycerides are another form of fat in your blood that may increase your risk for heart disease.

EZETIMIBE may be taken alone or with other cholesterol-lowering medicines known as *statins* or with another medicine known as fenofibrate, in addition to diet and other lifestyle changes (see INTERACTIONS WITH THIS MEDICATION). EZETIMIBE adds to the cholesterol-lowering effect of statins and fenofibrate. Statins and fenofibrate lower cholesterol in a different way; they work in the liver.

What it does:

EZETIMIBE works by decreasing the absorption of cholesterol in the small intestine.

When it should not be used:

- Patients who are hypersensitive (allergic) to ezetimibe or any of the nonmedicinal ingredients should not take EZETIMIBE.

- Patients with liver disease, active or unexplained increases in liver enzymes (blood tests of liver function) should not take EZETIMIBE together with a statin.
- Patients who are pregnant should not take EZETIMIBE together with a statin.
- Patients who are nursing should not take EZETIMIBE together with a statin.

What the medicinal ingredient is:

Ezetimibe

What the nonmedicinal ingredients are:

Croscarmellose sodium, hypromellose, lactose monohydrate, magnesium stearate, microcrystalline cellulose, sodium lauryl sulfate.

What dosage forms it comes in:

Tablet 10 mg (white, oval tablets with debossing "10" on one side and "EZT" on the other side).

#### WARNINGS AND PRECAUTIONS

##### Serious Warnings and Precautions

- **Liver disease (Hepatitis)**
- **Pancreas disease (Pancreatitis)**
- **Muscle pain (Myopathy/ Rhabdomyolysis, myalgia)**
- **Severe allergic reaction (Anaphylaxis)**

**Before you use EZETIMIBE talk to your doctor if you:**

- are pregnant, plan to become pregnant or think you might be pregnant.
- are breast-feeding. EZETIMIBE may be passed in your milk to your baby.
- have now or have had in the past any medical problems (including liver disease or liver problems).

#### INTERACTIONS WITH THIS MEDICATION

You should always tell your doctor about all drugs that you are taking or plan to take as well as those obtained without a prescription.

Drugs that may interact with EZETIMIBE include:

- **Cyclosporine**
- Cholestyramine (a resine/bile acid sequestrant) or any other bile acid sequestrant. In that case, EZETIMIBE should be taken at least 2 hours before or 4 hours after taking the bile acid sequestrant.
- Fibrates

**PROPER USE OF THIS MEDICATION**

Usual dose:

- EZETIMIBE should be taken as directed. Take one 10 mg tablet by mouth each day, preferably at the same time of day. EZETIMIBE can be taken with or without food.
- Continue taking your other cholesterol-lowering medicines known as statins or fenofibrate unless your doctor tells you to stop.
- If you are taking a statin or fenofibrate, EZETIMIBE can be taken at the same time.
- Even if you are taking medication to treat high cholesterol, it is important to have your cholesterol measured regularly. You should also know your cholesterol levels and goals.

Overdose:

Take EZETIMIBE only as prescribed for you. If you take more EZETIMIBE than you were prescribed, contact your doctor or pharmacist.

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

Missed Dose:

If you miss a dose, just resume the usual schedule of one tablet daily.

**SIDE EFFECTS AND WHAT TO DO ABOUT THEM**

EZETIMIBE is generally well tolerated.

- When used alone, the following common side effects have been reported: abdominal pain, diarrhea, flatulence, tiredness, viral infection, throat infection (pharyngitis), nose infection (sinusitis), joint pain (arthralgia), back pain, and coughing.

The following uncommon side effects have been reported: elevations in some laboratory blood tests of liver (transaminases) or muscle (CK) function, indigestion, heartburn; nausea, muscle spasms, neck pain, decreased appetite, hot flush, high blood pressure, chest pain and pain

- When used with a statin, the following common side effects have been reported: headache, tiredness, abdominal pain, diarrhea, joint pain (arthralgia), muscle pain (myalgia), back pain, throat infection (pharyngitis), nose infection (sinusitis), upper chest infection (respiratory tract), and changes in certain laboratory blood tests.

The following uncommon side effects have been reported: tingling sensation, dry mouth, gastritis, itching, rash; hives, muscular weakness, pain in arms and legs, unusual tiredness or weakness, and swelling, especially in the hands and feet.

When used with fenofibrate, the following side effect was reported: abdominal pain

- In general use, the following side effects have been reported: raised red rash, sometimes with target-shaped lesions, dizziness, depression, tingling sensation, constipation, and unusual tiredness or weakness.
- You should contact your doctor if you develop persistent and severe muscle aches or pains with no obvious explanation at any time after starting to take EZETIMIBE.

If you are prescribed EZETIMIBE with a statin, your doctor will order routine blood tests to check your liver function before and after starting treatment.

Talk to your doctor anytime you have a medical problem you think may be related to EZETIMIBE.

**SERIOUS SIDE EFFECTS, HOW OFTEN THEY HAPPEN AND WHAT TO DO ABOUT THEM**

Symptom / effect		Talk with your doctor or pharmacist		Stop taking drug and seek immediate emergency medical attention
		Only if severe	In all cases	
Rare	Muscle aches and pains (Myopathy/Rhabdomyolysis)	√		
	Sudden severe allergic reactions (swelling of the face, lips, tongue, and/or throat that may cause difficulty in breathing or swallowing, rash and hives).			√
	Symptoms of liver problems (severe abdominal pain, especially if felt on the upper right side below the ribs, dark urine, general itchiness, severe nausea or vomiting, pale stools, yellowing of skin or eyes)		√	
	Symptoms of gallstones or inflammation of the gallbladder (severe abdominal pain, nausea, vomiting)		√	
	Symptoms of pancreas problems (severe abdominal pain)		√	

*This is not a complete list of side effects. For any unexpected effects while taking EZETIMIBE contact your doctor or*

pharmacist.

## HOW TO STORE IT

Keep your medicine between 15°C-30°C. Protect from moisture.

**Keep this medication out of reach of children.**

Do not use this medicine after the date shown following EX (or EXP) on the container.

## REPORTING SUSPECTED SIDE EFFECTS

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

- Report online at [www.healthcanada.gc.ca/medeffect](http://www.healthcanada.gc.ca/medeffect)
- Call toll-free at 1-866-234-2345
- Complete a Canada Vigilance Reporting form and:
  - Fax toll-free to 1-866-678-6789, or
  - Mail to:  
Canada Vigilance Program  
Health Canada  
Postal Locator 0701E  
Ottawa ON K1A 0K9

Postage paid labels, Canada Vigilance Reporting Form and the adverse reaction reporting guidelines are available on the MedEffect™ Canada Web site at [www.healthcanada.gc.ca/medeffect](http://www.healthcanada.gc.ca/medeffect).

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

## MORE INFORMATION

This document plus the full product monograph, prepared for health professionals can be found by contacting the sponsor, Sanis Health Inc. at:

Phone: 1-866-236-4076;

Fax: 905-689-1465

or [quality@sanis.com](mailto:quality@sanis.com)

This leaflet was prepared by:

Sanis Health Inc.  
333 Champlain Street, Suite 102  
Dieppe, New Brunswick  
Canada, E1A 1P2

Last revised: December 22, 2014