

## HIGHLIGHTS OF PRESCRIBING INFORMATION

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

**CRESTOR (rosuvastatin calcium) tablets**  
Initial U.S. Approval: 2003

### RECENT MAJOR CHANGES

Indications and Usage, Slowing of the Progression of Atherosclerosis (1.4)	11/2007
Dosage and Administration, Slowing of the Progression of Atherosclerosis (2.2)	11/2007
Use with Cyclosporine or Lopinavir/Ritonavir (2.5)	07/2007
Warnings and Precautions, Skeletal Muscle Effects (5.1)	07/2007

### INDICATIONS AND USAGE

CRESTOR is an HMG Co-A reductase inhibitor indicated for:

- patients with primary hyperlipidemia and mixed dyslipidemia as an adjunct to diet to reduce elevated total-C, LDL-C, ApoB, nonHDL-C, and TG levels and to increase HDL-C (1.1)
- patients with hypertriglyceridemia as an adjunct to diet (1.2)
- patients with homozygous familial hypercholesterolemia (HoFH) to reduce LDL-C, total-C, and ApoB (1.3)
- slowing the progression of atherosclerosis as part of a treatment strategy to lower total-C and LDL-C as an adjunct to diet (1.4)

Limitations of use (1.5):

- Effect of CRESTOR on cardiovascular morbidity and mortality has not been determined.
- CRESTOR has not been studied in Fredrickson Type I, III, and V dyslipidemias.

### DOSAGE AND ADMINISTRATION

- CRESTOR can be taken with or without food, at any time of day. (2.1)
- Dose range: 5-40 mg once daily. Use 40 mg dose only for patients not reaching LDL-C goal with 20 mg. (2.1)
- Hyperlipidemia, mixed dyslipidemia, hypertriglyceridemia, and atherosclerosis:** Starting dose 10 mg. Consider 20 mg starting dose for patients with LDL-C > 190 mg/dL and aggressive lipid targets. (2.2)
- HoFH:** Starting dose 20 mg. (2.3)

### DOSAGE FORMS AND STRENGTHS

Tablets: 5 mg, 10 mg, 20 mg, and 40 mg (3)

### CONTRAINDICATIONS

- Known hypersensitivity to product components (4)

- Active liver disease, which may include unexplained persistent elevations in hepatic transaminase levels (4)
- Women who are pregnant or may become pregnant (4, 8.1)
- Nursing mothers (4, 8.3)

### WARNINGS AND PRECAUTIONS

- Skeletal muscle effects (e.g., myopathy and rhabdomyolysis):** Risks increase with use of 40 mg dose, advanced age ( $\geq 65$ ), hypothyroidism, renal impairment, and combination use with cyclosporine, lopinavir/ritonavir, or certain other lipid-lowering drugs. Advise patients to promptly report unexplained muscle pain, tenderness, or weakness and discontinue CRESTOR if signs or symptoms appear (5.1)
- Liver enzyme abnormalities and monitoring:** Persistent elevations in hepatic transaminases can occur. Monitor liver enzymes before and during treatment. (5.2)

### ADVERSE REACTIONS

Most frequent adverse reactions (rate  $\geq 2\%$ ) are headache, myalgia, abdominal pain, asthenia, and nausea. (6.1)

To report SUSPECTED ADVERSE REACTIONS, contact AstraZeneca at 1-800-236-9933 or FDA at 1-800-FDA-1088 or [www.fda.gov/medwatch](http://www.fda.gov/medwatch)

### DRUG INTERACTIONS

- Cyclosporine:** Combination increases rosuvastatin exposure. Limit CRESTOR to 5 mg once daily. (2.5, 7.1)
- Gemfibrozil:** Combination should be avoided. If used together, limit CRESTOR dose to 10 mg once daily. (2.6, 5.1, 7.2)
- Lopinavir/Ritonavir:** Combination increases rosuvastatin exposure. Limit CRESTOR dose to 10 mg once daily. (2.5, 5.1, 7.3)
- Coumarin anti-coagulants:** Combination prolongs INR. Achieve stable INR prior to starting CRESTOR. Monitor INR frequently until stable upon initiation or alteration of CRESTOR therapy. (5.3, 7.4)
- Concomitant lipid-lowering therapies:** Use with fibrates and niacin products may increase the risk of skeletal muscle effects. (2.6, 5.1, 7.5, 7.6)

### USE IN SPECIFIC POPULATIONS

- Pediatric use:** Safety and effectiveness not established. (8.4)
- Severe renal impairment (not on hemodialysis):** Starting dose is 5 mg, not to exceed 10 mg. (2.7, 5.1, 8.6)
- Asian population:** Consider 5 mg starting dose. (2.4, 8.8)

See 17 for PATIENT COUNSELING INFORMATION

Revised: 11/2007

## \*FULL PRESCRIBING INFORMATION: CONTENTS

### 1 INDICATIONS AND USAGE

- Hyperlipidemia and Mixed Dyslipidemia
- Hypertriglyceridemia
- Homozygous Familial Hypercholesterolemia
- Slowing of the Progression of Atherosclerosis
- Limitations of Use

### 2 DOSAGE AND ADMINISTRATION

- General Dosing Information
- Hyperlipidemia, Mixed Dyslipidemia, Hypertriglyceridemia, and Slowing of the Progression of Atherosclerosis
- Homozygous Familial Hypercholesterolemia
- Dosage in Asian Patients
- Use with Cyclosporine or Lopinavir/Ritonavir
- Concomitant Lipid-Lowering Therapy
- Dosage in Patients With Severe Renal Impairment

### 3 DOSAGE FORMS AND STRENGTHS

### 4 CONTRAINDICATIONS

### 5 WARNINGS AND PRECAUTIONS

- Skeletal Muscle Effects
- Liver Enzyme Abnormalities and Monitoring
- Concomitant Coumarin Anticoagulants
- Proteinuria and Hematuria
- Endocrine Effects

### 6 ADVERSE REACTIONS

- Clinical Studies Experience
- Postmarketing Experience

### 7 DRUG INTERACTIONS

- Cyclosporine
- Gemfibrozil
- Lopinavir/Ritonavir
- Coumarin Anticoagulants
- Niacin
- Fenofibrate

### 8 USE IN SPECIFIC POPULATIONS

- Pregnancy
- Nursing Mothers
- Pediatric Use
- Geriatric Use
- Renal Impairment
- Hepatic Impairment
- Asian Patients

### 10 OVERDOSAGE

### 11 DESCRIPTION

### 12 CLINICAL PHARMACOLOGY

- Mechanism of Action
- Pharmacokinetics

### 13 NONCLINICAL TOXICOLOGY

- Carcinogenesis, Mutagenesis, Impairment of Fertility
- Animal Toxicology and/or Pharmacology

### 14 CLINICAL STUDIES

- Hyperlipidemia and Mixed Dyslipidemia
- Heterozygous Familial Hypercholesterolemia
- Hypertriglyceridemia
- Homozygous Familial Hypercholesterolemia
- Slowing of the Progression of Atherosclerosis

### 16 HOW SUPPLIED/STORAGE AND HANDLING

### 17 PATIENT COUNSELING INFORMATION

- Skeletal Muscle Effects
- Concomitant Use of Antacids
- Pregnancy
- Liver Enzymes

\*Sections or subsections omitted from the full prescribing information are not listed

## FULL PRESCRIBING INFORMATION

### 1 INDICATIONS AND USAGE

#### 1.1 Hyperlipidemia and Mixed Dyslipidemia

CRESTOR is indicated as adjunctive therapy to diet to reduce elevated Total-C, LDL-C, ApoB, nonHDL-C, and triglycerides and to increase HDL-C in adult patients with primary hyperlipidemia or mixed dyslipidemia. Lipid-altering agents should be used in addition to a diet restricted in saturated fat and cholesterol when response to diet and non-pharmacological interventions alone has been inadequate.

#### 1.2 Hypertriglyceridemia

CRESTOR is indicated as adjunctive therapy to diet for the treatment of adult patients with hypertriglyceridemia.

#### 1.3 Homozygous Familial Hypercholesterolemia

CRESTOR is indicated as adjunctive therapy to other lipid-lowering treatments (e.g., LDL apheresis) or alone if such treatments are unavailable to reduce LDL-C, Total-C, and ApoB in adult patients with homozygous familial hypercholesterolemia.

#### 1.4 Slowing of the Progression of Atherosclerosis

CRESTOR is indicated as adjunctive therapy to diet to slow the progression of atherosclerosis in adult patients as part of a treatment strategy to lower Total-C and LDL-C to target levels.

#### 1.5 Limitations of Use

The effect of CRESTOR on cardiovascular morbidity and mortality has not been determined.

CRESTOR has not been studied in Fredrickson Type I, III, and V dyslipidemias.

### 2 DOSAGE AND ADMINISTRATION

#### 2.1 General Dosing Information

The dose range for CRESTOR is 5 to 40 mg orally once daily.

CRESTOR can be administered as a single dose at any time of day, with or without food.

When initiating CRESTOR therapy or switching from another HMG-CoA reductase inhibitor therapy, the appropriate CRESTOR starting dose should first be utilized, and only then titrated according to the patient's response and individualized goal of therapy.

The 40 mg dose of CRESTOR should be used only for those patients who have not achieved their LDL-C goal utilizing the 20 mg dose [*see Warnings and Precautions (5.1)*].

## **2.2 Hyperlipidemia, Mixed Dyslipidemia, Hypertriglyceridemia and Slowing of the Progression of Atherosclerosis**

The recommended starting dose of CRESTOR is 10 mg once daily. For patients with marked hyperlipidemia (LDL-C > 190 mg/dL) and aggressive lipid targets, a 20 mg starting dose may be considered.

After initiation or upon titration of CRESTOR, lipid levels should be analyzed within 2 to 4 weeks and the dosage adjusted accordingly.

## **2.3 Homozygous Familial Hypercholesterolemia**

The recommended starting dose of CRESTOR is 20 mg once daily. Response to therapy should be estimated from pre-apheresis LDL-C levels.

## **2.4 Dosage in Asian Patients**

Initiation of CRESTOR therapy with 5 mg once daily should be considered for Asian patients. [*see Use in Specific Populations (8.8) and Clinical Pharmacology (12.3)*].

## **2.5 Use with Cyclosporine or Lopinavir/Ritonavir**

In patients taking cyclosporine, the dose of CRESTOR should be limited to 5 mg once daily [*see Warnings and Precautions (5.1) and Drug Interactions (7.1)*]. In patients taking a combination of lopinavir and ritonavir, the dose of CRESTOR should be limited to 10 mg once daily [*see Warnings and Precautions (5.1) and Drug Interactions (7.3)*].

## **2.6 Concomitant Lipid-Lowering Therapy**

The risk of skeletal muscle effects may be enhanced when CRESTOR is used in combination with niacin or fenofibrate; a reduction in CRESTOR dosage should be considered in this setting. [*see Warnings and Precautions (5.1) and Drug Interactions (7.5, 7.6)*]

Combination therapy with gemfibrozil should be avoided because of an increase in CRESTOR exposure with concomitant use; if CRESTOR is used in combination with gemfibrozil, the dose of CRESTOR should be limited to 10 mg once daily [*see Warnings and Precautions (5.1) and Drug Interactions (7.2)*].

## **2.7 Dosage in Patients With Severe Renal Impairment**

For patients with severe renal impairment ( $CL_{cr} < 30$  mL/min/1.73 m<sup>2</sup>) not on hemodialysis, dosing of CRESTOR should be started at 5 mg once daily and not exceed 10 mg once daily [*see Use in Specific Populations (8.6) and Clinical Pharmacology (12.3)*].

## **3 DOSAGE FORMS AND STRENGTHS**

5 mg: Yellow, round, biconvex, coated tablets. Debossed “CRESTOR” and “5” on one side of the tablet.

10 mg: Pink, round, biconvex, coated tablets. Debossed “CRESTOR” and “10” on one side of the tablet.

20 mg: Pink, round, biconvex, coated tablets. Debossed “CRESTOR” and “20” on one side of the tablet.

40 mg: Pink, oval, biconvex, coated tablets. Debossed “CRESTOR” on one side and “40” on the other side of the tablet.

#### **4 CONTRAINDICATIONS**

CRESTOR is contraindicated in the following conditions:

- Patients with a known hypersensitivity to any component of this product. Hypersensitivity reactions including rash, pruritus, urticaria and angioedema have been reported with CRESTOR [*see Adverse Reactions* (6.1)].
- Patients with active liver disease, which may include unexplained persistent elevations of hepatic transaminase levels [*see Warnings and Precautions* (5.2)].
- Women who are pregnant or may become pregnant. Because HMG-CoA reductase inhibitors decrease cholesterol synthesis and possibly the synthesis of other biologically active substances derived from cholesterol, CRESTOR may cause fetal harm when administered to pregnant women. Additionally, there is no apparent benefit to therapy during pregnancy, and safety in pregnant women has not been established. If the patient becomes pregnant while taking this drug, the patient should be apprised of the potential hazard to the fetus and the lack of known clinical benefit with continued use during pregnancy. [*see Use in Specific Populations* (8.1) and *Nonclinical Toxicology* (13.2)]
- Nursing mothers. Because another drug in this class passes into breast milk, and because HMG-CoA reductase inhibitors have the potential to cause serious adverse reactions in nursing infants, women who require CRESTOR treatment should be advised not to nurse their infants. [*see Use in Specific Populations* (8.3)].

#### **5 WARNINGS AND PRECAUTIONS**

##### **5.1 Skeletal Muscle Effects**

Cases of myopathy and rhabdomyolysis with acute renal failure secondary to myoglobinuria have been reported with HMG-CoA reductase inhibitors, including CRESTOR. These risks can occur at any dose level, but are increased at the highest dose (40 mg).

CRESTOR should be prescribed with caution in patients with predisposing factors for myopathy (e.g., age  $\geq$  65 years, inadequately treated hypothyroidism, renal impairment).

The risk of myopathy during treatment with CRESTOR may be increased with concurrent administration of some other lipid-lowering therapies (fibrates or niacin), gemfibrozil, cyclosporine, or lopinavir/ritonavir. [*see Dosage and Administration* (2) and *Drug Interactions* (7)].

CRESTOR therapy should be discontinued if markedly elevated creatinine kinase levels occur or myopathy is diagnosed or suspected. CRESTOR therapy should also be temporarily withheld in any patient with an acute, serious condition suggestive of myopathy or

predisposing to the development of renal failure secondary to rhabdomyolysis (e.g., sepsis, hypotension, dehydration, major surgery, trauma, severe metabolic, endocrine, and electrolyte disorders, or uncontrolled seizures). All patients should be advised to promptly report unexplained muscle pain, tenderness, or weakness, particularly if accompanied by malaise or fever.

### **5.2 Liver Enzyme Abnormalities and Monitoring**

It is recommended that liver enzyme tests be performed before and at 12 weeks following both the initiation of therapy and any elevation of dose, and periodically (e.g., semiannually) thereafter.

Increases in serum transaminases [AST (SGOT) or ALT (SGPT)] have been reported with HMG-CoA reductase inhibitors, including CRESTOR. In most cases, the elevations were transient and resolved or improved on continued therapy or after a brief interruption in therapy. There were two cases of jaundice, for which a relationship to CRESTOR therapy could not be determined, which resolved after discontinuation of therapy. There were no cases of liver failure or irreversible liver disease in these trials.

In a pooled analysis of placebo-controlled trials, increases in serum transaminases to >3 times the upper limit of normal occurred in 1.1% of patients taking CRESTOR versus 0.5% of patients treated with placebo.

Patients who develop increased transaminase levels should be monitored until the abnormalities have resolved. Should an increase in ALT or AST of >3 times ULN persist, reduction of dose or withdrawal of CRESTOR is recommended.

CRESTOR should be used with caution in patients who consume substantial quantities of alcohol and/or have a history of chronic liver disease [*see Clinical Pharmacology* (12.3)]. Active liver disease, which may include unexplained persistent transaminase elevations, is a contraindication to the use of CRESTOR. [*see Contraindications* (4)]

### **5.3 Concomitant Coumarin Anticoagulants**

Caution should be exercised when anticoagulants are given in conjunction with CRESTOR because of the potentiation of coumarin-type anti-coagulants in prolonging the prothrombin time/INR. In patients taking coumarin anticoagulants and CRESTOR concomitantly, INR should be determined before starting CRESTOR and frequently enough during early therapy to ensure that no significant alteration of INR occurs. [*see Drug Interactions* (7.4)]

### **5.4 Proteinuria and Hematuria**

In the CRESTOR clinical trial program, dipstick-positive proteinuria and microscopic hematuria were observed among CRESTOR treated patients. This finding was more frequent in patients taking CRESTOR 40 mg, when compared to lower doses of CRESTOR or comparator HMG-CoA reductase inhibitors, though it was generally transient and was not associated with worsening renal function. Although the clinical significance of this finding is unknown, a dose reduction should be considered for patients on CRESTOR therapy with unexplained persistent proteinuria and/or hematuria during routine urinalysis testing.

### **5.5 Endocrine Effects**

Although clinical studies have shown that CRESTOR alone does not reduce basal plasma cortisol concentration or impair adrenal reserve, caution should be exercised if CRESTOR is administered concomitantly with drugs that may decrease the levels or activity of endogenous steroid hormones such as ketoconazole, spironolactone, and cimetidine.

## 6 ADVERSE REACTIONS

The following serious adverse reactions are discussed in greater detail in other sections of the label:

- Rhabdomyolysis with myoglobinuria and acute renal failure and myopathy (including myositis). [*see Warnings and Precautions (5.1)*]
- Liver enzyme abnormalities [*see Warnings and Precautions (5.2)*]

In the CRESTOR controlled clinical trials database (placebo or active-controlled) of 5,394 patients with a mean treatment duration of 15 weeks, 1.4% of patients discontinued due to adverse reactions. The most common adverse reactions that led to treatment discontinuation were:

- myalgia
- abdominal pain
- nausea

The most commonly reported adverse reactions (incidence  $\geq 2\%$ ) in the CRESTOR controlled clinical trial database of 5,394 patients were:

- headache
- myalgia
- abdominal pain
- asthenia
- nausea

### 6.1 Clinical Studies Experience

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

Adverse reactions reported in  $\geq 2\%$  of patients in placebo-controlled clinical studies and at a rate greater than or equal to placebo are shown in Table 1. These studies had a treatment duration of up to 12 weeks.

**Table 1. Adverse Reactions\* Reported by  $\geq 2\%$  of Patients Treated with CRESTOR and  $\geq$  Placebo in Placebo-Controlled Trials (% of Patients)**

Adverse Reactions	CRESTOR 5 mg N=291	CRESTOR 10 mg N=283	CRESTOR 20 mg N=64	CRESTOR 40 mg N=106	Total CRESTOR 5 mg – 40mg N=744	Placebo N=382
Headache	5.5	4.9	3.1	8.5	5.5	5.0
Nausea	3.8	3.5	6.3	0	3.4	3.1
Myalgia	3.1	2.1	6.3	1.9	2.8	1.3
Asthenia	2.4	3.2	4.7	0.9	2.7	2.6
Constipation	2.1	2.1	4.7	2.8	2.4	2.4

\* Adverse reactions by COSTART preferred term.

Other adverse reactions reported in clinical studies were abdominal pain, dizziness, hypersensitivity (including rash, pruritus, urticaria, and angioedema) and pancreatitis. The following laboratory abnormalities have also been reported: dipstick-positive proteinuria and microscopic hematuria [see *Warnings and Precautions* (5.4)]; elevated creatine phosphokinase, transaminases, glucose, glutamyl transpeptidase, alkaline phosphatase, and bilirubin; and thyroid function abnormalities.

In the METEOR study, involving 981 participants treated with rosuvastatin 40 mg (n=700) or placebo (n=281) with a mean treatment duration of 1.7 years, 5.6% of CRESTOR-treated subjects versus 2.8% of placebo-treated subjects discontinued due to adverse reactions. The most common adverse reactions that led to treatment discontinuation were: myalgia, hepatic enzyme increased, headache, and nausea [see *Clinical Studies* (14.5)]

Adverse reactions reported in  $\geq 2\%$  of patients and at a rate greater than or equal to placebo are shown in Table 2.

**Table 2. Adverse Reactions\* Reported by  $\geq 2\%$  of Patients Treated with CRESTOR and  $\geq$  Placebo in the METEOR Trial (% of Patients)**

Adverse Reactions	CRESTOR 40 mg N=700	Placebo N=281
Myalgia	12.7	12.1
Arthralgia	10.1	7.1
Headache	6.4	5.3

Dizziness	4.0	2.8
Blood CPK	2.6	0.7
Abdominal pain	2.4	1.8
ALT >3x ULN	2.2	0.7

\* Adverse reactions by MedDRA preferred term.

## 6.2 Postmarketing Experience

The following adverse reactions have been identified during post-approval use of CRESTOR: arthralgia, hepatitis, jaundice and memory loss. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

## 7 DRUG INTERACTIONS

### 7.1 Cyclosporine

Cyclosporine significantly increased rosuvastatin exposure. Therefore, in patients taking cyclosporine, therapy should be limited to CRESTOR 5 mg once daily. [*see Dosage and Administration (2.5), Warnings and Precautions (5.1), and Clinical Pharmacology (12.3)*].

### 7.2 Gemfibrozil

Gemfibrozil significantly increased rosuvastatin exposure. Therefore, combination therapy with CRESTOR and gemfibrozil should be avoided. If used, do not exceed CRESTOR 10 mg once daily. [*see Dosage and Administration (2.6) and Clinical Pharmacology (12.3)*].

### 7.3 Lopinavir/Ritonavir

The combination of lopinavir and ritonavir significantly increased rosuvastatin exposure. Therefore, in patients taking a combination of lopinavir and ritonavir, the dose of CRESTOR should be limited to 10 mg once daily. The effect of other protease inhibitors on rosuvastatin pharmacokinetics has not been examined. [*see Dosage and Administration (2.5), Warnings and Precautions (5.1) and Clinical Pharmacology (12.3)*]

### 7.4 Coumarin Anticoagulants

CRESTOR significantly increased INR in patients receiving coumarin anticoagulants. Therefore, caution should be exercised when coumarin anticoagulants are given in conjunction with CRESTOR. In patients taking coumarin anticoagulants and CRESTOR concomitantly, INR should be determined before starting CRESTOR and frequently enough during early therapy to ensure that no significant alteration of INR occurs. [*see Warnings and Precautions (5.3) and Clinical Pharmacology (12.3)*]



## 7.5 Niacin

The risk of skeletal muscle effects may be enhanced when CRESTOR is used in combination with niacin; a reduction in CRESTOR dosage should be considered in this setting [*see Warnings and Precautions* (5.1)]

## 7.6 Fenofibrate

When CRESTOR was coadministered with fenofibrate no clinically significant increase in the AUC of rosuvastatin or fenofibrate was observed. The benefit of further alterations in lipid levels by the combined use of CRESTOR with fibrates should be carefully weighed against the potential risks of this combination. [*see Warnings and Precautions* (5.1) and *Clinical Pharmacology* (12.3)].

## 8 USE IN SPECIFIC POPULATIONS

### 8.1 Pregnancy

#### **Teratogenic effects: Pregnancy Category X.**

CRESTOR is contraindicated in women who are or may become pregnant. Serum cholesterol and triglycerides increase during normal pregnancy, and cholesterol products are essential for fetal development. Atherosclerosis is a chronic process and discontinuation of lipid-lowering drugs during pregnancy should have little impact on long-term outcomes of primary hyperlipidemia therapy. [*see Contraindications* (4)]

There are no adequate and well-controlled studies of CRESTOR in pregnant women. There have been rare reports of congenital anomalies following intrauterine exposure to HMG-CoA reductase inhibitors. In a review of about 100 prospectively followed pregnancies in women exposed to other HMG-CoA reductase inhibitors, the incidences of congenital anomalies, spontaneous abortions, and fetal deaths/stillbirths did not exceed the rate expected in the general population. However, this study was only able to exclude a three-to-four-fold increased risk of congenital anomalies over background incidence. In 89% of these cases, drug treatment started before pregnancy and stopped during the first trimester when pregnancy was identified.

Rosuvastatin crosses the placenta in rats and rabbits. In rats, CRESTOR was not teratogenic at systemic exposures equivalent to a human therapeutic dose of 40 mg/day. At 10-12 times the human dose of 40 mg/day, there was decreased pup survival, decreased fetal body weight among female pups, and delayed ossification. In rabbits, pup viability decreased and maternal mortality increased at doses equivalent to the human dose of 40 mg/day. [*see Nonclinical Toxicology* (13.2)]

CRESTOR may cause fetal harm when administered to a pregnant woman. If the patient becomes pregnant while taking CRESTOR, the patient should be apprised of the potential risks to the fetus and the lack of known clinical benefit with continued use during pregnancy.

### 8.3 Nursing Mothers

It is not known whether rosuvastatin is excreted in human milk, but a small amount of another drug in this class does pass into breast milk. In rats, breast milk concentrations of rosuvastatin are three times higher than plasma levels; however, animal breast milk drug levels may not accurately reflect human breast milk levels. Because another drug in this class

passes into human milk and because HMG-CoA reductase inhibitors have a potential to cause serious adverse reactions in nursing infants, women who require CRESTOR treatment should be advised not to nurse their infants. [*see Contraindication (4)*]

#### **8.4 Pediatric Use**

The safety and effectiveness of CRESTOR in pediatric patients have not been established.

Treatment experience with CRESTOR in a pediatric population is limited to 8 patients with homozygous FH. None of these patients was below 8 years of age.

In a pharmacokinetic study, 18 patients (9 boys and 9 girls) 10 to 17 years of age with heterozygous FH received single and multiple oral doses of CRESTOR. Both  $C_{max}$  and AUC of rosuvastatin were similar to values observed in adult subjects administered the same doses.

#### **8.5 Geriatric Use**

Of the 10,275 patients in clinical studies with CRESTOR, 3,159 (31%) were 65 years and older, and 698 (6.8%) were 75 years and older. No overall differences in safety or effectiveness were observed between these subjects and younger subjects, and other reported clinical experience has not identified differences in responses between the elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out.

Elderly patients are at higher risk of myopathy and CRESTOR should be prescribed with caution in the elderly. [*see Warnings and Precautions, (5.1) and Clinical Pharmacology, (12.3)*]

#### **8.6 Renal Impairment**

Rosuvastatin exposure is not influenced by mild to moderate renal impairment ( $CL_{cr} \geq 30$  mL/min/1.73 m<sup>2</sup>); however, exposure to rosuvastatin is increased to a clinically significant extent in patients with severe renal impairment who are not receiving hemodialysis. CRESTOR dosing should be adjusted in patients with severe renal impairment ( $CL_{cr} < 30$  mL/min/1.73 m<sup>2</sup>) not requiring hemodialysis. [*see Dosage and Administration (2.7) and Warnings and Precautions (5.1) and Clinical Pharmacology (12.3)*].

#### **8.7 Hepatic Impairment**

CRESTOR is contraindicated in patients with active liver disease, which may include unexplained persistent elevations of hepatic transaminase levels. Chronic alcohol liver disease is known to increase rosuvastatin exposure; CRESTOR should be used with caution in these patients. [*see Contraindications (4) and Warning and Precautions (5.2) and Clinical Pharmacology (12.3)*].

#### **8.8 Asian Patients**

Pharmacokinetic studies have demonstrated an approximate 2-fold increase in median exposure to rosuvastatin in Asian subjects when compared with Caucasian controls. CRESTOR dosage should be adjusted in Asian patients. [*see Dosage and Administration (2.4) and Clinical Pharmacology (12.3)*]

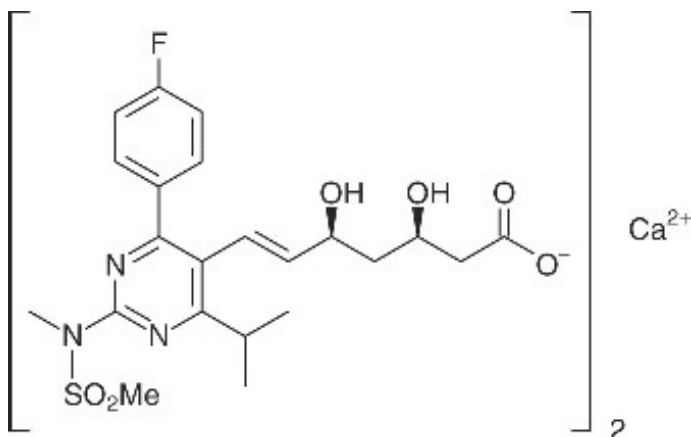
## 10 OVERDOSAGE

There is no specific treatment in the event of overdose. In the event of overdose, the patient should be treated symptomatically and supportive measures instituted as required. Hemodialysis does not significantly enhance clearance of rosuvastatin.

## 11 DESCRIPTION

CRESTOR (rosuvastatin calcium) is a synthetic lipid-lowering agent for oral administration.

The chemical name for rosuvastatin calcium is bis[(E)-7-[4-(4-fluorophenyl)-6-isopropyl-2-[methyl(methylsulfonyl)amino] pyrimidin-5-yl](3R,5S)-3,5-dihydroxyhept-6-enoic acid] calcium salt with the following structural formula:



The empirical formula for rosuvastatin calcium is  $(C_{22}H_{27}FN_3O_6S)_2Ca$  and the molecular weight is 1001.14. Rosuvastatin calcium is a white amorphous powder that is sparingly soluble in water and methanol, and slightly soluble in ethanol. Rosuvastatin calcium is a hydrophilic compound with a partition coefficient (octanol/water) of 0.13 at pH of 7.0.

Inactive Ingredients: Each tablet contains: microcrystalline cellulose NF, lactose monohydrate NF, tribasic calcium phosphate NF, crospovidone NF, magnesium stearate NF, hypromellose NF, triacetin NF, titanium dioxide USP, yellow ferric oxide, and red ferric oxide NF.

## 12 CLINICAL PHARMACOLOGY

### 12.1 Mechanism of Action

CRESTOR is a selective and competitive inhibitor of HMG-CoA reductase, the rate-limiting enzyme that converts 3-hydroxy-3-methylglutaryl coenzyme A to mevalonate, a precursor of cholesterol. *In vivo* studies in animals, and *in vitro* studies in cultured animal and human cells have shown rosuvastatin to have a high uptake into, and selectivity for, action in the liver, the target organ for cholesterol lowering. In *in vivo* and *in vitro* studies, rosuvastatin produces its lipid-modifying effects in two ways. First, it increases the number of hepatic LDL receptors on the cell-surface to enhance uptake and catabolism of LDL. Second, rosuvastatin inhibits hepatic synthesis of VLDL, which reduces the total number of VLDL and LDL particles.

## 12.3 Pharmacokinetics

- **Absorption:** In clinical pharmacology studies in man, peak plasma concentrations of rosuvastatin were reached 3 to 5 hours following oral dosing. Both  $C_{\max}$  and AUC increased in approximate proportion to CRESTOR dose. The absolute bioavailability of rosuvastatin is approximately 20%.

Administration of CRESTOR with food did not affect the AUC of rosuvastatin.

The AUC of rosuvastatin does not differ following evening or morning drug administration.

- **Distribution:** Mean volume of distribution at steady-state of rosuvastatin is approximately 134 liters. Rosuvastatin is 88% bound to plasma proteins, mostly albumin. This binding is reversible and independent of plasma concentrations.
- **Metabolism:** Rosuvastatin is not extensively metabolized; approximately 10% of a radiolabeled dose is recovered as metabolite. The major metabolite is N-desmethyl rosuvastatin, which is formed principally by cytochrome P450 2C9, and *in vitro* studies have demonstrated that N-desmethyl rosuvastatin has approximately one-sixth to one-half the HMG-CoA reductase inhibitory activity of the parent compound. Overall, greater than 90% of active plasma HMG-CoA reductase inhibitory activity is accounted for by the parent compound.
- **Excretion:** Following oral administration, rosuvastatin and its metabolites are primarily excreted in the feces (90%). The elimination half-life ( $t_{1/2}$ ) of rosuvastatin is approximately 19 hours.

After an intravenous dose, approximately 28% of total body clearance was via the renal route, and 72% by the hepatic route.

- **Race:** A population pharmacokinetic analysis revealed no clinically relevant differences in pharmacokinetics among Caucasian, Hispanic, and Black or Afro-Caribbean groups. However, pharmacokinetic studies, including one conducted in the US, have demonstrated an approximate 2-fold elevation in median exposure (AUC and  $C_{\max}$ ) in Asian subjects when compared with a Caucasian control group.
- **Gender:** There were no differences in plasma concentrations of rosuvastatin between men and women.
- **Geriatric:** There were no differences in plasma concentrations of rosuvastatin between the nonelderly and elderly populations (age  $\geq 65$  years).
- **Renal Impairment:** Mild to moderate renal impairment ( $CL_{cr} \geq 30$  mL/min/1.73 m<sup>2</sup>) had no influence on plasma concentrations of rosuvastatin. However, plasma concentrations of rosuvastatin increased to a clinically significant extent (about 3-fold) in patients with severe renal impairment ( $CL_{cr} < 30$  mL/min/1.73 m<sup>2</sup>) not receiving hemodialysis compared with healthy subjects ( $CL_{cr} > 80$  mL/min/1.73 m<sup>2</sup>).

- **Hemodialysis:** Steady-state plasma concentrations of rosuvastatin in patients on chronic hemodialysis were approximately 50% greater compared with healthy volunteer subjects with normal renal function.
- **Hepatic Impairment:** In patients with chronic alcohol liver disease, plasma concentrations of rosuvastatin were modestly increased.

In patients with Child-Pugh A disease,  $C_{max}$  and AUC were increased by 60% and 5%, respectively, as compared with patients with normal liver function. In patients with Child-Pugh B disease,  $C_{max}$  and AUC were increased 100% and 21%, respectively, compared with patients with normal liver function

### **Drug-Drug Interactions:**

#### **Cytochrome P450 3A4**

Rosuvastatin clearance is not dependent on metabolism by cytochrome P450 3A4 to a clinically significant extent.

**Table 3. Effect of Co-administered Drugs on Rosuvastatin Systemic Exposure**

Co-administered drug and dosing regimen	Rosuvastatin		
	Dose (mg)*	Change in AUC	Change in $C_{max}$
Cyclosporine – stable dose required (75 mg – 200 mg BID)	10 mg QD for 10 days	↑ 7-fold†	↑11-fold†
Gemfibrozil 600 mg BID for 7 days	80 mg	↑ 1.9-fold†	↑ 2.2-fold†
Lopinavir/ritonavir combination 400 mg/100 mg BID for 10 days	20 mg QD for 7 days	↑ 5-fold†	↑ 2-fold†
Fenofibrate 67 mg TID for 7 days	10 mg	↑ 7%	↑21%
Aluminum & magnesium hydroxide combination antacid Administered simultaneously Administered 2 hours apart	40 mg	↓ 54%†	↓ 50%†
	40 mg	↓ 22%	↓ 16%
Erythromycin 500 mg QID for 7 days	80 mg	↓ 20%	↓ 31%
Ketoconazole 200 mg BID for 7 days	80 mg	↑ 2%	↓ 5%
Itraconazole 200 mg QD for 5 days	10 mg	↑ 39%	↑ 36%
	80 mg	↑ 28%	↑ 15%
Fluconazole 200 mg QD for 11 days	80 mg	↑ 14%	↑ 9%

\* Single dose unless otherwise noted

† Clinically significant [see *Dosage and Administration (2) and Warnings and Precautions (5)*]

**Table 4. Effect of Rosuvastatin Co-Administration on Systemic Exposure To Other Drugs**

Rosuvastatin Dosage Regimen	Co-administered Drug		
	Name and Dose	Change in AUC	Change in C <sub>max</sub>
40 mg QD for 10 days	Warfarin* 25 mg single dose	R-Warfarin ↑4% S-Warfarin ↑6%	R-Warfarin ↓ 1% S-Warfarin 0%
40 mg QD for 12 days	Digoxin 0.5 mg single dose	↑ 4%	↑ 4%
40 mg QD for 28 days	Oral Contraceptive  (ethinyl estradiol 0.035 mg & norgestrel 0.180, 0.215 and 0.250 mg) QD for 21 Days	EE ↑ 26% NG ↑ 34%	EE ↑ 25% NG ↑ 23%

EE = ethinyl estradiol, NG = norgestrel

\*Clinically significant pharmacodynamic effects [See *Warnings and Precautions* (5.4)]

### 13 NONCLINICAL TOXICOLOGY

#### 13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

In a 104-week carcinogenicity study in rats at dose levels of 2, 20, 60, or 80 mg/kg/day by oral gavage, the incidence of uterine stromal polyps was significantly increased in females at 80 mg/kg/day at systemic exposure 20 times the human exposure at 40 mg/day based on AUC. Increased incidence of polyps was not seen at lower doses.

In a 107-week carcinogenicity study in mice given 10, 60, 200 mg/kg/day by oral gavage, an increased incidence of hepatocellular adenoma/carcinoma was observed at 200 mg/kg/day at systemic exposures 20 times the human exposure at 40 mg/day based on AUC. An increased incidence of hepatocellular tumors was not seen at lower doses.

Rosuvastatin was not mutagenic or clastogenic with or without metabolic activation in the Ames test with *Salmonella typhimurium* and *Escherichia coli*, the mouse lymphoma assay, and the chromosomal aberration assay in Chinese hamster lung cells. Rosuvastatin was negative in the *in vivo* mouse micronucleus test.

In rat fertility studies with oral gavage doses of 5, 15, 50 mg/kg/day, males were treated for 9 weeks prior to and throughout mating and females were treated 2 weeks prior to mating and throughout mating until gestation day 7. No adverse effect on fertility was observed at 50 mg/kg/day (systemic exposures up to 10 times the human exposure at 40 mg/day based on AUC). In testicles of dogs treated with rosuvastatin at 30 mg/kg/day for one month, spermatidic giant cells were seen. Spermatidic giant cells were observed in monkeys after 6-month treatment at 30 mg/kg/day in addition to vacuolation of seminiferous tubular epithelium. Exposures in the dog were 20 times and in the monkey 10 times the human

exposure at 40 mg/day based on body surface area. Similar findings have been seen with other drugs in this class.

### **13.2 Animal Toxicology and/or Pharmacology**

#### **Embryo-fetal Development**

Rosuvastatin crosses the placenta and is found in fetal tissue and amniotic fluid at 3% and 20%, respectively, of the maternal plasma concentration following a single 25 mg/kg oral gavage dose on gestation day 16 in rats. A higher fetal tissue distribution (25% maternal plasma concentration) was observed in rabbits after a single oral gavage dose of 1 mg/kg on gestation day 18.

In female rats given oral gavage doses of 5, 15, 50 mg/kg/day rosuvastatin before mating and continuing through day 7 postcoitus results in decreased fetal body weight (female pups) and delayed ossification at the high dose (systemic exposures 10 times the human exposure at 40 mg/day based on AUC).

In pregnant rats given oral gavage doses of 2, 10, 50 mg/kg/day from gestation day 7 through lactation day 21 (weaning), decreased pup survival occurred in groups given 50 mg/kg/day, systemic exposures  $\geq$  12 times the human exposure at 40 mg/day based on body surface area.

In pregnant rabbits given oral gavage doses of 0.3, 1, 3 mg/kg/day from gestation day 6 to lactation day 18 (weaning), exposures equivalent to the human exposure at 40 mg/day based on body surface area, decreased fetal viability and maternal mortality was observed.

Rosuvastatin was not teratogenic in rats at  $\leq$  25 mg/kg/day or in rabbits  $\leq$  3 mg/kg/day (systemic exposures equivalent to the human exposure at 40 mg/day based on AUC or body surface area, respectively).

#### **Central Nervous System Toxicity**

CNS vascular lesions, characterized by perivascular hemorrhages, edema, and mononuclear cell infiltration of perivascular spaces, have been observed in dogs treated with several other members of this drug class. A chemically similar drug in this class produced dose-dependent optic nerve degeneration (Wallerian degeneration of retinogeniculate fibers) in dogs, at a dose that produced plasma drug levels about 30 times higher than the mean drug level in humans taking the highest recommended dose. Edema, hemorrhage, and partial necrosis in the interstitium of the choroid plexus was observed in a female dog sacrificed moribund at day 24 at 90 mg/kg/day by oral gavage (systemic exposures 100 times the human exposure at 40 mg/day based on AUC). Corneal opacity was seen in dogs treated for 52 weeks at 6 mg/kg/day by oral gavage (systemic exposures 20 times the human exposure at 40 mg/day based on AUC). Cataracts were seen in dogs treated for 12 weeks by oral gavage at 30 mg/kg/day (systemic exposures 60 times the human exposure at 40 mg/day based on AUC). Retinal dysplasia and retinal loss were seen in dogs treated for 4 weeks by oral gavage at 90 mg/kg/day (systemic exposures 100 times the human exposure at 40 mg/day based on AUC). Doses  $\leq$  30 mg/kg/day (systemic exposures  $\leq$  60 times the human exposure at 40 mg/day based on AUC) did not reveal retinal findings during treatment for up to one year.

## 14 CLINICAL STUDIES

### 14.1 Hyperlipidemia and Mixed Dyslipidemia

CRESTOR reduces total-C, LDL-C, ApoB, nonHDL-C, and TG, and increases HDL-C, in adult patients with hyperlipidemia and mixed dyslipidemia.

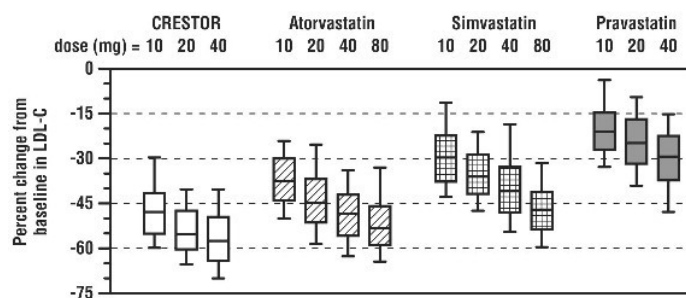
*Dose-Ranging Study:* In a multicenter, double-blind, placebo-controlled, dose-ranging study in patients with hyperlipidemia CRESTOR given as a single daily dose for 6 weeks significantly reduced total-C, LDL-C, nonHDL-C, and ApoB, across the dose range (Table 5).

**Table 5. Dose-Response in Patients With Hyperlipidemia (Adjusted Mean % Change From Baseline at Week 6)**

Dose	N	Total-C	LDL-C	Non-HDL-C	ApoB	TG	HDL-C
Placebo	13	-5	-7	-7	-3	-3	3
CRESTOR 5 mg	17	-33	-45	-44	-38	-35	13
CRESTOR 10 mg	17	-36	-52	-48	-42	-10	14
CRESTOR 20 mg	17	-40	-55	-51	-46	-23	8
CRESTOR 40 mg	18	-46	-63	-60	-54	-28	10

*Active-Controlled Study:* CRESTOR was compared with the HMG-CoA reductase inhibitors atorvastatin, simvastatin, and pravastatin in a multicenter, open-label, dose-ranging study of 2,240 patients with hyperlipidemia or mixed dyslipidemia. After randomization, patients were treated for 6 weeks with a single daily dose of either CRESTOR, atorvastatin, simvastatin, or pravastatin (Figure 1 and Table 6).

**Figure 1. Percent LDL-C Change by Dose of CRESTOR, Atorvastatin, Simvastatin, and Pravastatin at Week 6 in Patients with Hyperlipidemia or Mixed Dyslipidemia**



Box plots are a representation of the 25th, 50th, and 75th percentile values, with whiskers representing the 10th and 90th percentile values. Mean baseline LDL-C: 189 mg/dL



**Table 6. Percent Change in LDL-C From Baseline to Week 6 (LS Mean\*) by Treatment Group (sample sizes ranging from 156–157 patients per group)**

Treatment	Treatment Daily Dose			
	10 mg	20 mg	40 mg	80 mg
CRESTOR	-46 <sup>†</sup>	-52 <sup>‡</sup>	-55 <sup>§</sup>	---
Atorvastatin	-37	-43	-48	-51
Simvastatin	-28	-35	-39	-46
Pravastatin	-20	-24	-30	---

\* Corresponding standard errors are approximately 1.00

<sup>†</sup> CRESTOR 10 mg reduced LDL-C significantly more than atorvastatin 10 mg; pravastatin 10 mg, 20 mg, and 40 mg; simvastatin 10 mg, 20 mg, and 40 mg. (p<0.002)

<sup>‡</sup> CRESTOR 20 mg reduced LDL-C significantly more than atorvastatin 20 mg and 40 mg; pravastatin 20 mg and 40 mg; simvastatin 20 mg, 40 mg, and 80 mg. (p<0.002)

<sup>§</sup> CRESTOR 40 mg reduced LDL-C significantly more than atorvastatin 40 mg; pravastatin 40 mg; simvastatin 40 mg, and 80 mg (p<0.002)

## 14.2 Heterozygous Familial Hypercholesterolemia

*Active-Controlled Study:* In a study of patients with heterozygous FH (baseline mean LDL of 291), patients were randomized to CRESTOR 20 mg or atorvastatin 20 mg. The dose was increased by 6-week intervals. Significant LDL-C reductions from baseline were seen at each dose in both treatment groups (Table 7).

**Table 7. Mean LDL-C Percentage Change from Baseline**

		CRESTOR (n=435) *LS Mean 95% CI	Atorvastatin (n=187) LS Mean 95% CI
Week 6	20 mg	-47% (-49%, -46%)	-38% (-40%, -36%)
Week 12	40 mg	-55% (-57%, -54%)	-47% (-49%, -45%)
Week 18	80 mg	NA	-52% (-54%, -50%)

\*LS Means are least square means adjusted for baseline LDL

## 14.3 Hypertriglyceridemia

*Dose-Response Study:* In a double-blind, placebo-controlled dose-response study in patients with baseline TG levels from 273 to 817 mg/dL, CRESTOR given as a single daily dose (5 to 40 mg) over 6 weeks significantly reduced serum TG levels (Table 8).

**Table 8. Dose-Response in Patients With Primary Hypertriglyceridemia Over 6 Weeks Dosing Median (Min, Max) Percent Change From Baseline**

Dose	Placebo (n=26)	CRESTOR	CRESTOR	CRESTOR	CRESTOR
		5 mg (n=25)	10 mg (n=23)	20 mg (n=27)	40 mg (n=25)
Triglycerides	1 (-40, 72)	-21 (-58, 38)	-37 (-65, 5)	-37 (-72, 11)	-43 (-80, -7)
nonHDL-C	2 (-13, 19)	-29 (-43, -8)	-49 (-59, -20)	-43 (-74, 12)	-51 (-62, -6)
VLDL-C	2 (-36, 53)	-25 (-62, 49)	-48 (-72, 14)	-49 (-83, 20)	-56 (-83, 10)
Total-C	1 (-13, 17)	-24 (-40, -4)	-40 (-51, -14)	-34 (-61, -11)	-40 (-51, -4)
LDL-C	5 (-30, 52)	-28 (-71, 2)	-45 (-59, 7)	-31 (-66, 34)	-43 (-61, -3)
HDL-C	-3 (-25, 18)	3 (-38, 33)	8 (-8, 24)	22 (-5, 50)	17 (-14, 63)

#### 14.4 Homozygous Familial Hypercholesterolemia

*Dose-Titration Study:* In an open-label, forced-titration study, homozygous FH patients (n=40, 8-63 years) were evaluated for their response to CRESTOR 20 to 40 mg titrated at a 6-week interval. In the overall population, the mean LDL-C reduction from baseline was 22%. About one-third of the patients benefited from increasing their dose from 20 mg to 40 mg with further LDL lowering of greater than 6%. In the 27 patients with at least a 15% reduction in LDL-C, the mean LDL-C reduction was 30% (median 28% reduction). Among 13 patients with an LDL-C reduction of <15%, 3 had no change or an increase in LDL-C. Reductions in LDL-C of 15% or greater were observed in 3 of 5 patients with known receptor negative status.

#### 14.5 Slowing of the Progression of Atherosclerosis

In the *Measuring Effects on Intima Media Thickness: an Evaluation Of Rosuvastatin 40 mg (METEOR)* study, the effect of therapy with CRESTOR on carotid atherosclerosis was assessed by B-mode ultrasonography in patients with elevated LDL-C, at low risk (Framingham risk <10% over ten years) for symptomatic coronary artery disease and with subclinical atherosclerosis as evidenced by carotid intimal-medial thickness (cIMT). In this double-blind, placebo-controlled clinical study 984 patients were randomized (of whom 876 were analyzed) in a 5:2 ratio to CRESTOR 40 mg or placebo once daily. Ultrasonograms of the carotid walls were used to determine the annualized rate of change per patient from baseline to two years in mean maximum cIMT of 12 measured segments. The estimated difference in the rate of change in the maximum cIMT analyzed over all 12 carotid artery sites between CRESTOR-treated patients and placebo-treated patients was -0.0145 mm/year (95% CI -0.0196, -0.0093; p<0.0001).

The annualized rate of change from baseline for the placebo group was +0.0131 mm/year (p<0.0001). The annualized rate of change from baseline for the CRESTOR group was -0.0014 mm/year (p=0.32).

At an individual patient level in the CRESTOR group, 52.1% of patients demonstrated an absence of disease progression (defined as a negative annualized rate of change), compared to 37.7% of patients in the placebo group.

## **16 HOW SUPPLIED/STORAGE AND HANDLING**

CRESTOR<sup>®</sup> (rosuvastatin calcium) Tablets are supplied as:

- NDC 0310-0755-90: 5 mg. Yellow, round, biconvex, coated tablets. Debossed “CRESTOR” and “5” on one side; bottle of 90 tablets
- NDC 0310-0751-90: 10 mg. Pink, round, biconvex, coated tablets. Debossed “CRESTOR” and “10” on one side; bottle of 90 tablets
- NDC 0310-0751-39: 10 mg. Pink, round, biconvex, coated tablets. Debossed “CRESTOR” and “10” on one side; unit dose packages of 100
- NDC 0310-0752-90: 20 mg. Pink, round, biconvex, coated tablets. Debossed “CRESTOR” and “20” on one side; bottles of 90
- NDC 0310-0752-39: 20 mg. Pink, round, biconvex, coated tablets. Debossed “CRESTOR” and “20” on one side; unit dose packages of 100
- NDC 0310-0754-30: 40 mg. Pink, oval, biconvex, coated tablets. Debossed “CRESTOR” on one side and “40” on the other side; bottles of 30

### **Storage**

Store at controlled room temperature, 20-25°C (68-77°F) [see USP Controlled Room Temperature]. Protect from moisture.

## **17 PATIENT COUNSELING INFORMATION**

### **17.1 Skeletal Muscle Effects**

Patients should be advised to report promptly unexplained muscle pain, tenderness, or weakness, particularly if accompanied by malaise or fever.

### **17.2 Concomitant Use of Antacids**

When taking CRESTOR with an aluminum and magnesium hydroxide combination antacid, the antacid should be taken at least 2 hours after CRESTOR administration.

### **17.3 Pregnancy**

If the patient becomes pregnant while taking this drug, the patient should be apprised of the potential hazard to the fetus and the lack of known clinical benefit with continued use during pregnancy.

### **17.4 Liver Enzymes**

It is recommended that liver enzymes be checked before and at 12 weeks following both the initiation of therapy and any elevation of dose, and periodically (e.g., semiannually) thereafter.

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