

CRESTOR®
rosuvastatin
Film-coated tablets

Qualitative and quantitative composition

Each film-coated tablet contains 5 mg, 10 mg, 20 mg or 40 mg of rosuvastatin as rosuvastatin calcium.

For excipients, see *List of excipients*

Pharmaceutical form

Film-coated tablet.

5 mg tablet: Round, yellow coloured tablets, intagliated with 'ZD4522' and '5' on one side and plain on the reverse.

10 mg tablet: Round, pink coloured tablets, intagliated with 'ZD4522' and '10' on one side and plain on the reverse.

20 mg tablet: Round, pink coloured tablets, intagliated with 'ZD4522' and '20' on one side and plain on the reverse.

40 mg tablet: Oval, pink coloured tablets, intagliated with 'ZD4522' on one side and '40' on the reverse.

Therapeutic indications

CRESTOR is indicated for patients with primary hypercholesterolaemia, (type IIa, including heterozygous familial hypercholesterolaemia) or mixed dyslipidaemia (type IIb) as an adjunct to diet when response to diet and exercise is inadequate.

CRESTOR reduces elevated LDL-cholesterol, total cholesterol, triglycerides and ApoB, and increases HDL-cholesterol.

CRESTOR is also indicated in patients with homozygous familial hypercholesterolemia as an adjunct to diet and other lipid lowering treatments (e.g. LDL aphaeresis).

Posology and method of administration

Before treatment initiation the patient should be placed on a standard cholesterol-lowering diet that should continue during treatment. The dose should be individualised according to the goal of therapy and patient response, using current consensus guidelines.

CRESTOR may be given at any time of day, with or without food.

The recommended start dose is 5 mg or 10 mg orally once daily in both statin naïve or patients switched from another HMG CoA reductase inhibitor. The choice of start dose should take into account the individual patient's cholesterol level and future cardiovascular risk as well as the potential risk for adverse reactions. A dose adjustment to the next dose level can be made after 4 weeks, if necessary (see *Pharmacodynamic properties*). In light of the increased reporting rate of adverse reactions with the 40 mg dose compared to lower

doses (see *Undesirable effects*), a final titration to the maximum dose of 40 mg should only be considered in patients with severe hypercholesterolaemia at high cardiovascular risk (in particular those with familial hypercholesterolaemia), who do not achieve their treatment goal on 20 mg, and in whom routine follow-up will be performed (see *Special warnings and precautions for use*). Specialist supervision is recommended when the 40 mg dose is initiated.

Use in children

Safety and efficacy have not been established in children. Paediatric experience is limited to a small number of children (aged 8 years or above) with homozygous familial hypercholesterolaemia. Therefore, CRESTOR is not recommended for paediatric use at this time.

Use in the elderly

A start dose of 5 mg is recommended in patients >70 years (see *Special warnings and precautions for use*). No other dose adjustment is necessary in relation to age.

Dosage in patients with renal insufficiency

No dose adjustment is necessary in patients with mild to moderate renal impairment. For patients with severe renal impairment ($CL_{cr} < 30$ ml/min/1.73m²) not on haemodialysis, dosing of CRESTOR should be started at 5 mg once daily and not to exceed 10 mg once daily (see Pharmacokinetic properties).

Dosage in patients with hepatic impairment

There was no increase in systemic exposure to rosuvastatin in subjects with Child-Pugh scores of 7 or below. However, increased systemic exposure has been observed in subjects with Child-Pugh scores of 8 and 9 (see *Pharmacokinetic properties*). In these patients an assessment of renal function should be considered and the dose of CRESTOR should not exceed 20 mg once daily (see *Special warnings and precautions for use*). There is no experience in subjects with Child-Pugh scores above 9. CRESTOR is contraindicated in patients with active liver disease (see *Contraindication*).

Race

A 5 mg starting dose of CRESTOR should be considered for Asian patients. Increased plasma concentration of rosuvastatin has been seen in Asian subjects (see *Special warnings and precautions for use* and *Pharmacokinetic properties*). The increased systemic exposure should be taken into consideration when treating Asian patients whose hypercholesterolemia is not adequately controlled at doses up to 20 mg/day.

Dosage in patients with pre-disposing factors to myopathy

The recommended start dose is 5 mg in patients with predisposing factors to myopathy (see *Special warnings and precautions for use*).

Concomitant therapy

Rosuvastatin is a substrate of various transporter proteins (e.g. OATP1B1 and BCRP). The risk of myopathy (including rhabdomyolysis) is increased when CRESTOR is administered concomitantly with certain medicinal products that may increase the plasma concentration of

rosuvastatin due to interactions with these transporter proteins (e.g. ciclosporin and certain protease inhibitors including combinations of ritonavir with atazanavir, lopinavir and/or tipranavir; see *Special warnings and precautions for use* and *Interaction with other medicinal products and other forms of interaction*). It is recommended that prescribers consult the relevant product information when considering administration of such products together with CRESTOR. Whenever possible, alternative medications should be considered, and if necessary, consider temporarily discontinuing CRESTOR therapy. In situations where co-administration of these medicinal products with CRESTOR is unavoidable, the benefit and the risk of concurrent treatment and CRESTOR dosing adjustments should be carefully considered (see *Interaction with other medicinal products and other forms of interaction*).

Contraindications

CRESTOR is contraindicated in patients:

- with hypersensitivity to rosuvastatin or to any of the excipients.
- with active liver disease including unexplained, persistent elevations of serum transaminases and any serum transaminase elevation exceeding 3x the upper limit of normal (ULN).
- with myopathy.
- receiving concomitant cyclosporine.
- during pregnancy and lactation and in women of childbearing potential not using appropriate contraceptive measures.

Special warnings and precautions for use

Renal effects

Proteinuria, detected by dipstick testing and mostly tubular in origin, has been observed in patients treated with higher doses of CRESTOR, in particular 40 mg, where it was transient or intermittent in most cases. Proteinuria has not been shown to be predictive of acute or progressive renal disease (see *Undesirable effects*). An assessment of renal function should be considered during routine follow-up of patients treated with a dose of 40 mg.

Skeletal muscle effects

As with other HMG-CoA reductase inhibitors, effects on skeletal muscle e.g. myalgia, myopathy and, rarely, rhabdomyolysis have been reported in CRESTOR-treated patients with all doses and in particular with doses > 20 mg. As with other HMG-CoA reductase inhibitors, the reporting rate for rhabdomyolysis associated with CRESTOR in post-marketing use is higher at the 40 mg dose.

Creatine kinase measurement

Creatine Kinase (CK) should not be measured following strenuous exercise or in the presence of a plausible alternative cause of CK increase which may confound interpretation of the result. If CK levels are significantly elevated at baseline (>5 x ULN) a confirmatory test should be carried out within 5 – 7 days. If the repeat test confirms a baseline CK >5 x ULN, treatment should not be started.

Before treatment

CRESTOR, as with other HMG-CoA reductase inhibitors, should be prescribed with caution in patients with pre-disposing factors for myopathy/rhabdomyolysis. Such factors include:

- renal impairment
- hypothyroidism
- personal or family history of hereditary muscular disorders
- previous history of muscular toxicity with another HMG-CoA reductase inhibitor or fibrate
- alcohol abuse
- age >70 years
- situations where an increase in plasma levels may occur (see *Dosology and method of administration, Interaction with other medicinal products and other forms of interaction* and *Pharmacokinetic properties*)
- concomitant use of fibrates.

In such patients the risk of treatment should be considered in relation to possible benefit and clinical monitoring is recommended. If CK levels are significantly elevated at baseline (>5 x ULN) treatment should not be started.

Whilst on treatment

Patients should be asked to report inexplicable muscle pain, weakness or cramps immediately, particularly if associated with malaise or fever. CK levels should be measured in these patients. Therapy should be discontinued if CK levels are markedly elevated (>5 x ULN) or if muscular symptoms are severe and cause daily discomfort (even if CK levels are ≤ 5 x ULN). If symptoms resolve and CK levels return to normal, then consideration should be given to re-introducing CRESTOR or an alternative HMG-CoA reductase inhibitor at the lowest dose with close monitoring. Routine monitoring of CK levels in asymptomatic patients is not warranted.

There have been very rare reports of an immune-mediated necrotizing myopathy clinically characterized by persistent proximal muscle weakness and elevated serum creatine kinase during treatment or following discontinuation of statins, including rosuvastatin. Additional neuromuscular and serologic testing may be necessary. Treatment with immunosuppressive agents may be required.

In clinical trials there was no evidence of increased skeletal muscle effects in the small number of patients dosed with CRESTOR and concomitant therapy. However, an increase in the incidence of myositis and myopathy has been seen in patients receiving other HMG-CoA reductase inhibitors together with fibric acid derivatives including gemfibrozil, ciclosporin, nicotinic acid, azole antifungals, protease inhibitors and macrolide antibiotics. Gemfibrozil increases the risk of myopathy when given concomitantly with some HMG-CoA reductase inhibitors. The benefit of further alterations in lipid levels by the combined use of CRESTOR with fibrates or niacin should be carefully weighed against the potential risks of such combinations. The 40 mg dose is contraindicated with concomitant use of a fibrate (see *Interaction with other medicinal products and other forms of interaction* and *Undesirable effects*).

CRESTOR should not be used 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, major surgery, trauma, severe metabolic, endocrine and electrolyte disorders; or uncontrolled seizures).

Liver effects

As with other HMG-CoA reductase inhibitors, CRESTOR should be used with caution in patients who consume excessive quantities of alcohol and/or have a history of liver disease. It is recommended that liver function tests be carried out prior to, and 3 months following, the initiation of treatment. CRESTOR should be discontinued or the dose reduced if the level of serum transaminases is greater than 3 times the upper limit of normal.

In patients with secondary hypercholesterolaemia caused by hypothyroidism or nephrotic syndrome, the underlying disease should be treated prior to initiating therapy with CRESTOR.

Diabetes mellitus

As with other HMG-CoA reductase inhibitors, increases in HbA1c and serum glucose levels have been observed in patients treated with rosuvastatin, and in some instances these increases may exceed the threshold for the diagnosis of diabetes mellitus, primarily in patients already at high risk for developing diabetes (see *Undesirable effects*).

Race

Pharmacokinetic studies show an increase in exposure in Asian subjects compared with Caucasians (see *Posology and method of administration* and *Pharmacokinetic properties*).

Interactions with other medicinal products and other forms of interaction

Effect of co-administered medicinal products on rosuvastatin

Transporter protein inhibitors: *In vitro* and *in vivo* data indicate that rosuvastatin has no clinically significant cytochrome P450 interactions (as a substrate, inhibitor or inducer). Rosuvastatin is a substrate for certain transporter proteins including the hepatic uptake transporter OATP1B1 and efflux transporter BCRP. Concomitant administration of CRESTOR with medicinal products that are inhibitors of these transporter proteins may result in increased rosuvastatin plasma concentrations and an increased risk of myopathy (see Table 1, *Posology and method of administration* and *Special warnings and special precautions for use*).

Ciclosporin: During concomitant treatment with CRESTOR and ciclosporin, rosuvastatin AUC values were on average 7 times higher than those observed in healthy volunteers (see Table 1). CRESTOR is contraindicated in patients receiving concomitant ciclosporin (see *Contraindications*). Concomitant administration did not affect plasma concentrations of ciclosporin.

Protease inhibitors: Although the exact mechanism of interaction is unknown, concomitant protease inhibitor use may strongly increase rosuvastatin exposure (see Table 1). For instance, in a pharmacokinetic study, co-administration of 10 mg rosuvastatin and a combination product of two protease inhibitors (300 mg atazanavir / 100 mg ritonavir) in healthy volunteers was associated with an approximately three-fold increase in rosuvastatin AUC. The concomitant use of CRESTOR and some protease inhibitor combinations may be considered after careful consideration of CRESTOR dose adjustments based on the expected increase in rosuvastatin exposure (Table 1).

Gemfibrozil and other lipid-lowering products: Concomitant use of CRESTOR and gemfibrozil resulted in a 2-fold increase in rosuvastatin C_{max} and AUC. Based on data from specific interaction studies no pharmacokinetic relevant interaction with fenofibrate is expected, however a pharmacodynamic interaction may occur. Gemfibrozil, fenofibrate, other fibrates and lipid lowering doses ($\geq$ or equal to 1g/day) of niacin (nicotinic acid) increase the risk of myopathy when given concomitantly with HMG-CoA reductase inhibitors, probably because they can produce myopathy when given alone. The 40 mg dose is contraindicated with concomitant use of a fibrate. These patients should also start with the 5 mg dose.

Ezetimibe: Concomitant use of CRESTOR and ezetimibe resulted in no change to AUC for either drug when administered to healthy volunteers. There was a 1.2 fold increase in AUC of rosuvastatin when 10 mg CRESTOR and 10 mg ezetimibe was administered in hypercholesterolaemic subjects (Table 1). A pharmacodynamic interaction, in terms of adverse effects, between CRESTOR and ezetimibe cannot be ruled out.

Antacid: The simultaneous dosing of CRESTOR with an antacid suspension containing aluminium and magnesium hydroxide resulted in a decrease in rosuvastatin plasma concentration of approximately 50%. This effect was mitigated when the antacid was dosed 2 hours after CRESTOR. The clinical relevance of this interaction has not been studied.

Fusidic Acid: Interaction studies with rosuvastatin and fusidic acid have not been conducted. As with other statins, muscle related events, including rhabdomyolysis, have been reported in post-marketing experience with rosuvastatin and fusidic acid given concurrently. Patients should be closely monitored and temporary suspension of rosuvastatin treatment may be appropriate.

Erythromycin: Concomitant use of CRESTOR and erythromycin resulted in a 20% decrease in AUC and a 30% decrease in C_{max} of rosuvastatin. This interaction may be caused by the increase in gut motility caused by erythromycin.

Cytochrome P450 enzymes: Results from *in vitro* and *in vivo* studies show that rosuvastatin is neither an inhibitor nor an inducer of cytochrome P450 isoenzymes. In addition, rosuvastatin is a poor substrate for these isoenzymes. Therefore, drug interactions resulting from cytochrome P450-mediated metabolism are not expected. No clinically relevant interactions have been observed between rosuvastatin and either fluconazole (an inhibitor of CYP2C9 and CYP3A4) or ketoconazole (an inhibitor of CYP2A6 and CYP3A4).

Interactions requiring rosuvastatin dose adjustments (see also Table 1)

When it is necessary to co-administer CRESTOR with other medicinal products known to increase exposure to rosuvastatin, doses of CRESTOR should be adjusted. It is recommended that prescribers consult the relevant product information when considering administration of such products together with CRESTOR.

If medicinal product is observed to increase rosuvastatin AUC approximately 2 fold or higher, the starting dose of CRESTOR should not exceed 5 mg once daily. The maximum daily dose of CRESTOR should be adjusted so that the expected rosuvastatin exposure would not likely exceed that of a 40 mg daily dose of CRESTOR taken without interacting medicinal products, for example a 20 mg dose of CRESTOR with gemfibrozil (1.9-fold increase), a 10 mg dose of CRESTOR with combination ritonavir/atazanavir (3.1-fold increase), and a 5 mg dose of CRESTOR with ciclosporin (7.1 fold increase in exposure).

If medicinal product is observed to increase rosuvastatin AUC less than 2-fold, the starting dose need not be decreased but caution should be taken if increasing the CRESTOR dose above 20mg.

Protease Inhibitors: Coadministration of rosuvastatin with certain protease inhibitors or combination of protease inhibitors may increase the rosuvastatin exposure, (AUC) up to 7-fold (see Table1). Dose adjustment are needed depending on the level of effect on rosuvastatin exposure (see sections posology and administration, and special warning and precautions)

Table 1 Effect of co-administered medicinal products on rosuvastatin exposure (AUC; in order of decreasing magnitude) from published clinical trials		
2-fold or greater than 2-fold increase in AUC of rosuvastatin		
Interacting drug dose regimen	Rosuvastatin dose regimen	Change in rosuvastatin AUC*
Sofosbuvir/velpatasvir/voxilaprevir (400 mg-100 mg-100 mg) + Voxilaprevir (100 mg) once daily for 15 days	10mg single dose	7.39 -fold ↑
Ciclosporin 75 mg BID to 200 mg BID, 6 months	10 mg OD, 10 days	7.1-fold ↑
Darolutamide 600 mg BID, 5 days	5mg, single dose	5.2-fold ↑
Regorafenib 160 mg OD, 14 days	5 mg single dose	3.8 -fold ↑
Atazanavir 300 mg/ritonavir 100 mg OD, 8 days	10 mg, single dose	3.1-fold ↑
Simeprevir 150 mg OD, 7 days	10 mg, single dose	2.8-fold ↑
Velpatasvir 100 mg OD	10 mg single dose	2.69 -fold ↑
Ombitasvir 25 mg/paritaprevir 150 mg/ritonavir 100 mg/dasabuvir 400 mg BID	5mg single dose	2.59-fold ↑
Grazoprevir 200 mg/elbasvir 50 mg OD	10mg single dose	2.26-fold ↑
Glecaprevir 400 mg/pibrentasvir 120 mg OD for 7 days	5mg once daily	2.2-fold ↑

Lopinavir 400 mg/ritonavir 100 mg BID, 17 days	20 mg OD, 7 days	2.1-fold ↑
Clopidogrel 300 mg loading, followed by 75 mg at 24 hours	20 mg, single dose	2-fold ↑
Gemfibrozil 600 mg BID, 7 days	80 mg, single dose	1.9-fold ↑
Less than 2-fold increase in AUC of rosuvastatin		
Interacting drug dose regimen	Rosuvastatin dose regimen	Change in rosuvastatin AUC*
Eltrombopag 75 mg OD, 5 days	10 mg, single dose	1.6-fold ↑
Darunavir 600 mg/ritonavir 100 mg BID, 7 days	10 mg OD, 7 days	1.5-fold ↑
Tipranavir 500 mg/ritonavir 200 mg BID, 11 days	10 mg, single dose	1.4-fold ↑
Dronedaron 400 mg BID	Not available	1.4-fold ↑
Itraconazole 200 mg OD, 5 days	10 mg or 80 mg, single dose	1.4-fold ↑
Ezetimibe 10 mg OD, 14 days	10 mg, OD, 14 days	1.2-fold ↑
Decrease in AUC of rosuvastatin		
Interacting drug dose regimen	Rosuvastatin dose regimen	Change in rosuvastatin AUC*
Erythromycin 500 mg QID, 7 days	80 mg, single dose	20% ↓
Baicalin 50 mg TID, 14 days	20 mg, single dose	47% ↓
*Data given as x-fold change represent a simple ratio between co-administration and rosuvastatin alone. Data given as % change represent % difference relative to rosuvastatin alone. Increase is indicated as “↑”, decrease as “↓”. AUC = area under curve; OD = once daily; BID = twice daily; TID = three times daily; QID = four times daily		

Effect of rosuvastatin on co-administered medicinal products

Vitamin K antagonists: As with other HMG-CoA reductase inhibitors, the initiation of treatment or dosage up-titration of CRESTOR in patients treated concomitantly with vitamin K antagonists (e.g. warfarin or another coumarin anticoagulant) may result in an increase in International Normalised Ratio (INR). Discontinuation or down-titration of CRESTOR may result in a decrease in INR. In such situations, appropriate monitoring of INR is desirable.

Oral contraceptive/hormone replacement therapy (HRT): Concomitant use of CRESTOR and an oral contraceptive resulted in an increase in ethinyl estradiol and norgestrel AUC of 26% and 34%, respectively. These increased plasma levels should be considered when selecting oral contraceptive doses. There are no pharmacokinetic data available in subjects

taking concomitant CRESTOR and HRT and therefore a similar effect cannot be excluded. However, the combination has been extensively used in women in clinical trials and was well tolerated.

Genetic polymorphisms

Genotypes of SLCO1B1 (OATP1B1) c.521CC and ABCG2 (BCRP) c.421AA have been shown to be associated with an increase in rosuvastatin exposure (AUC) compared to SLCO1B1 c.521TT and ABCG2 c.421CC. For patients known to have the c.521CC or c.421AA genotype, a maximum once daily dose of 20 mg of CRESTOR is recommended (see *Special warnings and precautions for use*, *Interaction with other medicinal products and other forms of interaction* and *Pharmacokinetic properties*).

Pregnancy and lactation

CRESTOR is contraindicated during pregnancy or lactation as the safety of CRESTOR during pregnancy and whilst breast-feeding has not been established. Women of child-bearing potential should use appropriate contraceptive measures. Since cholesterol and other products of cholesterol biosyntheses are essential for the development of the foetus, the potential risk from inhibition of HMG-CoA reductase outweighs the advantage of treatment during pregnancy. Animal studies provide limited evidence of reproductive toxicity (see *Preclinical safety data*). If a patient becomes pregnant during the use of this product, treatment should be discontinued immediately.

Rosuvastatin is excreted in the milk of rats. There are no data with respect to excretion in milk in humans (see *Contraindications*).

Effects on ability to drive and use machines

Studies to determine the effect of CRESTOR on the ability to drive and use machines have not been conducted. However, based on its pharmacodynamic properties, CRESTOR is unlikely to affect this ability. When driving vehicles or operating machines, it should be taken into account that dizziness may occur during treatment.

Undesirable effects

The adverse events seen with CRESTOR are generally mild and transient. In controlled clinical trials, less than 4% of CRESTOR-treated patients were withdrawn due to adverse events.

The frequencies of adverse events are ranked according to the following: Common (>1/100, <1/10); Uncommon (>1/1,000, <1/100); Rare (>1/10,000, <1/1,000); Very rare (<1/10,000); Not known (cannot be estimated from the available data).

Immune system disorders

Rare: hypersensitivity reactions including angioedema

Endocrine disorders

Common: diabetes mellitus¹²

Nervous system disorders

Common: headache, dizziness

Gastrointestinal disorders

Common: constipation, nausea, abdominal pain
Rare: pancreatitis

Skin and subcutaneous tissue disorders

Uncommon: pruritus, rash and urticaria

Musculoskeletal, connective tissue and bone disorders

Common: myalgia

Rare: myopathy (including myositis) and rhabdomyolysis

General disorders

Common: asthenia

¹ Frequency will depend on the presence or absence of risk factors (fasting blood glucose ≥ 5.6 mmol/L, BMI >30 kg/m², raised triglycerides, history of hypertension).

As with other HMG-CoA reductase inhibitors, the incidence of adverse drug reactions tends to be dose dependent.

Renal effects: Proteinuria, detected by dipstick testing and mostly tubular in origin, has been observed in patients treated with CRESTOR. Shifts in urine protein from none or trace to ++ or more were seen in $<1\%$ of patients at some time during treatment with 10 and 20 mg, and in approximately 3% of patients treated with 40 mg. A minor increase in shift from none or trace to + was observed with the 20 mg dose. In most cases, proteinuria decreases or disappears spontaneously on continued therapy and is not predictive acute or progressive renal disease.

Skeletal muscle effects: Rare cases of rhabdomyolysis which were occasionally associated with the impairment of renal function have been reported with rosuvastatin and with other marketed statins.

Laboratory effects: As with other HMG-CoA reductase inhibitors, a dose-related increase in transaminases and CK have been observed in a small number of patients taking rosuvastatin; the majority of cases were mild, asymptomatic and transient. If CK levels are elevated (>5 x ULN), treatment should be discontinued. Increases in HbA1c have also been observed in patients treated with rosuvastatin (see section Special warnings and precautions for use and *Pharmacodynamic properties*).

Post marketing experience:

In addition to the above, the following adverse events have been reported during post marketing experience for CRESTOR:

Haematological disorders: Frequency unknown: thrombocytopenia.

Hepatobiliary disorders: Very rare: jaundice, hepatitis; *rare:* increased hepatic transaminases. *Musculoskeletal disorders: Frequency unknown:* immune-mediated necrotising myopathy; *very rare:* arthralgia.

As with other HMG-CoA reductase inhibitors, the reporting rate for rhabdomyolysis in post-marketing use is higher at the highest marketed dose.

Nervous system disorders: Very rare: polyneuropathy, memory loss, frequency unknown:

peripheral neuropathy

Psychiatric disorders: Frequency unknown: depression, sleep disorders (including insomnia and nightmares).

Reproductive system and breast disorders: Frequency unknown: gynaecomastia.

Skin and subcutaneous tissue disorders: Frequency unknown: drug reaction with eosinophilia and systemic symptoms (DRESS)

Overdose

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. Liver function and CK levels should be monitored. Haemodialysis is unlikely to be of benefit.

Pharmacological properties

Pharmacodynamic properties

Pharmacotherapeutic group: HMG-CoA reductase inhibitors

ATC code: C10A A07

Mechanism of action

Rosuvastatin 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 for cholesterol. The primary site of action of rosuvastatin is the liver, the target organ for cholesterol lowering.

Rosuvastatin increases the number of hepatic LDL receptors on the cell-surface, enhancing uptake and catabolism of LDL and it inhibits the hepatic synthesis of VLDL, thereby reducing the total number of VLDL and LDL particles.

Pharmacodynamic effects

CRESTOR reduces elevated LDL-cholesterol, total cholesterol and triglycerides and increases HDL-cholesterol. It also lowers ApoB, nonHDL-C, VLDL-C, VLDL-TG and increases ApoA-I (see Table 2).

CRESTOR also lowers the LDL-C/HDL-C, total C/HDL-C and nonHDL-C/HDL-C and the ApoB/ApoA-I ratios.

Table 2 Dose response in patients with primary hypercholesterolaemia (type IIa and IIb) (adjusted mean percent change from baseline)

Dose	N	LDL-C	Total-C	HDL-C	TG	NonHDL-C	ApoB	ApoA-1
Placebo	13	-7	-5	3	-3	-7	-3	0
5	17	-45	-33	13	-35	-44	-38	4

10	17	-52	-36	14	-10	-48	-42	4
20	17	-55	-40	8	-23	-51	-46	5
40	18	-63	-46	10	-28	-60	-54	0

A therapeutic response to CRESTOR is evident within 1 week of commencing therapy and 90% of maximum response is usually achieved in 2 weeks. The maximum response is usually achieved by 4 weeks and is maintained after that.

Clinical efficacy

CRESTOR is effective in adult patient populations with hypercholesterolaemia, with and without hypertriglyceridaemia, regardless of race, sex or age and in special populations such as diabetics or patients with familial hypercholesterolaemia.

From pooled phase III data CRESTOR has been shown to be effective at treating the majority of patients with type IIa and IIb hypercholesterolaemia (mean baseline LDL-C about 4.8 mmol/l) to recognized European Atherosclerosis Society (EAS:1998) guideline targets; about 80% of patients treated with CRESTOR 10mg reached the EAS targets for LDL-C levels (<3 mmol/l).

In a large study of patients with heterozygous familial hypercholesterolaemia, 435 subjects were given CRESTOR from 20 mg to 80 mg in a force-titration design. All doses of CRESTOR showed a beneficial effect on lipid parameters and treatment to target goals.

Following titration to 40mg (12 weeks of treatment), LDL-C was reduced by 53%. 33% of patients reached EAS guidelines for LDL-C levels (<3 mmol/l).

In a force-titration, open label trial, 42 patients with homozygous familial hypercholesterolaemia were evaluated for their response to CRESTOR 20 - 40 mg. In the overall population, the mean LDL-C reduction was 22%.

In clinical studies with a limited number of patients, CRESTOR has been shown to have additive efficacy in lowering triglycerides when used in combination with fenofibrate and in increasing HDL-C levels when used in combination with niacin (see *Special warnings and precautions for use*).

Pharmacokinetic properties

Absorption: Maximum rosuvastatin plasma concentrations are achieved approximately 5 hours after oral administration. The absolute bioavailability is approximately 20%.

Distribution: Rosuvastatin is taken up extensively by the liver which is the primary site of cholesterol synthesis and LDL-C clearance. The volume of distribution of rosuvastatin is approximately 134 L. Approximately 90% of rosuvastatin is bound to plasma proteins, mainly to albumin.

Metabolism: Rosuvastatin undergoes limited metabolism (approximately 10%) mainly to the N-desmethyl metabolite and the lactone metabolite. The N-desmethyl metabolite is approximately 50% less active than rosuvastatin whereas the lactone form is considered

clinically inactive. Rosuvastatin accounts for greater than 90% of the circulating HMG-CoA reductase inhibitor activity.

Excretion: Approximately 90% of rosuvastatin is excreted as unchanged drug in the faeces (consisting of absorbed and non-absorbed active substance) and the remaining part is excreted in the urine. Approximately 5% is excreted unchanged in urine. The plasma elimination half-life is approximately 19 hours. The elimination half-life does not increase at higher doses. The geometric mean plasma clearance is approximately 50 litres/hour (coefficient of variation 21.7%). As with other HMG-CoA reductase inhibitors, the hepatic uptake of rosuvastatin involves the membrane transporter OATP-C. This transporter is important in the hepatic elimination of rosuvastatin.

Special populations:

Age and sex: There was no clinically relevant effect of age or sex on the pharmacokinetics of rosuvastatin in adults.

Race: Pharmacokinetic studies show an approximate 2-fold elevation in median AUC in Asian subjects compared with Caucasians. A population pharmacokinetic analysis revealed no clinically relevant differences in pharmacokinetics among Caucasian, Hispanic and Black or Afro-Caribbean groups.

Renal insufficiency: In a study in subjects with varying degrees of renal impairment, mild to moderate renal disease had no influence on plasma concentrations of rosuvastatin. However, subjects with severe impairment ($\text{CrCl} < 30 \text{ ml/min}$) had a 3-fold increase in plasma concentration compared to healthy volunteers. Steady-state plasma concentrations of rosuvastatin in subjects undergoing haemodialysis were approximately 50% greater compared to healthy volunteers.

Hepatic impairment: In a study with subjects with varying degrees of hepatic impairment there was no evidence of increased exposure to rosuvastatin other than in the 2 subjects with the most severe liver disease (Child-Pugh scores of 8 and 9). In these subjects systemic exposure was increased by at least 2-fold compared to subjects with lower Child-Pugh scores. There is no experience in subjects with Child-Pugh scores above 9.

Genetic polymorphisms: Disposition of HMG-CoA reductase inhibitors, including rosuvastatin, involves OATP1B1 and BCRP transporter proteins. In patients with SLCO1B1 (OATP1B1) and/or ABCG2 (BCRP) genetic polymorphisms there is a risk of increased rosuvastatin exposure. Individual polymorphisms of SLCO1B1 c.521CC and ABCG2 c.421AA are associated with an approximate 1.7-fold higher rosuvastatin exposure (AUC) or 2.4-fold higher exposure, respectively, compared to the SLCO1B1 c.521TT or ABCG2 c.421CC genotypes. This specific genotyping is not established in clinical practice, but for patients who are known to have these types of polymorphisms, a lower daily dose of CRESTOR is recommended.

Preclinical safety data

Preclinical data reveal no special hazard for humans based on conventional studies of safety pharmacology, repeated dose toxicity, genotoxicity and carcinogenicity potential. In a rat pre

and post-natal study, reproductive toxicity was evident from reduced litter sizes, litter weight and pup survival. These effects were observed at maternally toxic doses at systemic exposures several times above the therapeutic exposure level.

List of excipients

Tablet core:

Crospovidone
Lactose monohydrate
Microcrystalline cellulose
Calcium phosphate
Magnesium stearate

Tablet coat:

Titanium dioxide (E171)
Ferric oxide, red (E172)
Ferric oxide, yellow (E172)
Glycerol triacetate
Lactose monohydrate
Hypromellose

Incompatibilities

None applicable

Shelf life

Please refer to expiry date on outer carton

Special precautions for storage

Do not store above 30°C

Pack Size

5 mg tablets : Box of 2 blisters @ 15 film-coated tablets (Reg. No.: DKI1435300817A1)
10 mg tablets : Box of 2 blisters @ 15 film-coated tablets (Reg. No.: DKI1435300817B1)
20 mg tablets : Box of 2 blisters @ 15 film-coated tablets (Reg. No.: DKI1435300817C1)
40 mg tablets : Box of 3 blisters @ 10 film-coated tablets (Reg. No.: DKI1435300817D1)

Instructions for use/handling

No special instructions

HARUS DENGAN RESEP DOKTER

Manufactured by:

IPR Pharmaceuticals Inc, Puerto Rico
For AstraZeneca UK Limited, Macclesfield, Cheshire, SK10 2NA, United Kingdom

Packed and released by:

AstraZeneca Pharmaceutical Co. Ltd
No. 2 Huangshan Road, Wuxi, Jiangsu, China

Imported by:

PT AstraZeneca Indonesia

DISETUJUI OLEH BPOM : 30/05/2022

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Cikarang, Bekasi - Indonesia

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ANGEL Locator :

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