

**IRISH MEDICINES BOARD ACTS 1995 AND 2006**

**MEDICINAL PRODUCTS(CONTROL OF PLACING ON THE MARKET)REGULATIONS,2007**

**(S.I. No.540 of 2007)**

**PA0819/030/003**

Case No: 2074325

The Irish Medicines Board in exercise of the powers conferred on it by the above mentioned Regulations hereby grants to

**Ratiopharm GmbH**

**Graf-Arco-Strasse 3, 89079 ULM, Germany**

an authorisation, subject to the provisions of the said Regulations, in respect of the product

**Pravalo 40 mg Tablets**

The particulars of which are set out in Part I and Part II of the attached Schedule. The authorisation is also subject to the general conditions as may be specified in the said Regulations as listed on the reverse of this document.

This authorisation, unless previously revoked, shall continue in force from **16/12/2009** until **28/09/2011**.

Signed on behalf of the Irish Medicines Board this

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A person authorised in that behalf by the said Board.

## Part II

# Summary of Product Characteristics

### 1 NAME OF THE MEDICINAL PRODUCT

Pravalo 40 mg Tablets

### 2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each tablet contains 40 mg pravastatin sodium.

For a full list of excipients, see section 6.1.

### 3 PHARMACEUTICAL FORM

Tablet.

Yellow biconvex oblong tablet with a breaking notch on both sides.

The tablets can be divided into equal halves.

### 4 CLINICAL PARTICULARS

#### 4.1 Therapeutic Indications

##### **Hypercholesterolaemia**

Treatment of primary hypercholesterolaemia or mixed dyslipidaemia, as an adjunct to diet, when response to diet and other non-pharmacological treatments (e.g. exercise, weight reduction) is inadequate.

##### **Primary prevention**

Reduction of cardiovascular mortality and morbidity in patients with moderate or severe hypercholesterolaemia and at high risk of a first cardiovascular event, as an adjunct to diet (see section 5.1).

##### **Secondary prevention**

Reduction of cardiovascular mortality and morbidity in patients with a history of myocardial infarction or unstable angina pectoris and with either normal or increased cholesterol levels, as an adjunct to correction of other risk factors (see section 5.1).

##### **Post transplantation**

Reduction of post transplantation hyperlipidaemia in patients receiving immunosuppressive therapy following solid organ transplantation (see sections 4.2, 4.5 and 5.1).

#### 4.2 Posology and method of administration

Prior to initiating Pravalo Tablets, secondary causes of hypercholesterolaemia should be excluded and patients should be placed on a standard lipid-lowering diet which should be continued during treatment.

Pravalo Tablets are administered orally once daily preferably in the evening with or without food.

**Hypercholesterolaemia:** the recommended dose range is 10-40 mg once daily. The therapeutic response is seen within a week and the full effect of a given dose occurs within four weeks, therefore periodic lipid determinations should be performed and the dosage adjusted accordingly. The maximum daily dose is 40 mg.

**Cardiovascular prevention:** in all preventive morbidity and mortality trials, the only studied starting and maintenance dose was 40 mg daily.

**Dosage after transplantation:** following **organ transplantation** a starting dose of 20 mg per day is recommended in patients receiving immunosuppressive therapy (see section 4.5). Depending on the response of the lipid parameters, the dose may be adjusted up to 40 mg under close medical supervision (see section 4.5).

**Children and adolescents (8-18 years of age):** For adolescents (14-18 years of age), the recommended dose range is 10-40 mg once daily. In children (8-13 years of age), the maximum recommended dose is 20 mg once daily, as doses greater than 20 mg have not been studied in this population (for children and adolescent females of child-bearing potential, see also section 4.6; for results of the study see section 5.1).

The documentation on efficacy and safety in patients less than 8 years old is limited; therefore, the use of Pravastatin Sodium Tablets is not recommended in these patients.

**Elderly patients:** there is no dose adjustment necessary in these patients unless there are predisposing risk factors (see section 4.4).

**Renal or hepatic impairment:** a starting dose of 10 mg a day is recommended in patients with moderate or severe renal impairment or significant hepatic impairment. The dosage should be adjusted according to the response of lipid parameters and under medical supervision.

**Concomitant therapy:** the lipid lowering effects of Pravalto Tablets on total cholesterol and LDL-cholesterol are enhanced when combined with a bile acid-binding resin (e.g. cholestyramine, colestipol). Pravalto Tablets should be given either one hour before or at least four hours after the resin (see section 4.5).

For patients taking ciclosporin with or without other immunosuppressive medicinal products, treatment should begin with 20 mg of pravastatin once daily and titration to 40 mg should be performed with caution (see section 4.5).

### 4.3 Contraindications

- Hypersensitivity to the active substance or to any of the excipients.
- Active liver disease including unexplained persistent elevations of serum transaminase exceeding 3 x the upper limit of normal (ULN) (see section 4.4).
- Pregnancy and lactation (see section 4.6).

### 4.4 Special warnings and precautions for use

Pravastatin has not been evaluated in patients with homozygous familial hypercholesterolaemia. Therapy is not suitable when hypercholesterolaemia is due to elevated HDL-Cholesterol.

As for other HMG-CoA reductase inhibitors, combination of pravastatin with fibrates is not recommended.

In children before puberty, the benefit/risk of treatment should be carefully evaluated by physicians before treatment initiation.

**Hepatic disorders:** as with other lipid-lowering agents, moderate increases in liver transaminase levels have been observed. In the majority of cases, liver transaminase levels have returned to their baseline value without the need for treatment discontinuation. Special attention should be given to patients who develop increased transaminase levels and therapy should be discontinued if increases in alanine aminotransferase (ALT) and aspartate aminotransferase (AST) exceed three times the upper limit of normal and persist.

Caution should be exercised when pravastatin is administered to patients with a history of liver disease or heavy alcohol ingestion.

**Muscle disorders:** as with other HMG-CoA reductase inhibitors (statins), pravastatin has been associated with the onset of myalgia, myopathy and very rarely, rhabdomyolysis.

Myopathy must be considered in any patient under statin therapy presenting with unexplained muscle symptoms such as pain or tenderness, muscle weakness, or muscle cramps. In such cases creatine kinase (CK) levels should be measured (see below).

Statin therapy should be temporarily interrupted when CK levels are  $> 5 \times \text{ULN}$  or when there are severe clinical symptoms. Very rarely (in about 1 case over 100 000 patient-years), rhabdomyolysis occurs, with or without secondary renal insufficiency. Rhabdomyolysis is an acute potentially fatal condition of skeletal muscle which may develop at any time during treatment and is characterised by massive muscle destruction associated with major increase in CK (usually  $> 30$  or  $40 \times \text{ULN}$ ) leading to myoglobinuria.

The risk of myopathy with statins appears to be exposure-dependent and therefore may vary with individual drugs (due to lipophilicity and pharmacokinetic differences), including their dosage and potential for drug interactions. Although there is no muscular contraindication to the prescription of a statin, certain predisposing factors may increase the risk of muscular toxicity and therefore justify a careful evaluation of the benefit/risk and special clinical monitoring. CK measurement is indicated before starting statin therapy in these patients (see below).

The risk and severity of muscular disorders during statin therapy is increased by the co-administration of interacting medicines. The use of fibrates alone is occasionally associated with myopathy. The combined use of a statin and fibrates should generally be avoided. The co-administration of statins and nicotinic acid should be used with caution. An increase in the incidence of myopathy has also been described in patients receiving other statins in combination with inhibitors of cytochrome P450 metabolism. This may result from pharmacokinetic interactions that have not been documented for pravastatin (see section 4.5). When associated with statin therapy, muscle symptoms usually resolve following discontinuation of statin therapy.

#### Creatine kinase measurement and interpretation:

Routine monitoring of creatine kinase (CK) or other muscle enzyme levels is not recommended in asymptomatic patients on statin therapy. However, measurement of CK is recommended before starting statin therapy in patients with special predisposing factors, and in patients developing muscular symptoms during statin therapy, as described below. If CK levels are significantly elevated at baseline ( $> 5 \times \text{ULN}$ ), CK levels should be re-measured about 5 to 7 days later to confirm the results. When measured, CK levels should be interpreted in the context of other potential factors that can cause transient muscle damage, such as strenuous exercise or muscle trauma.

Before treatment initiation: caution should be used in patients with predisposing factors such as renal impairment, hypothyroidism, previous history of muscular toxicity with a statin or fibrate, personal or familial history of hereditary muscular disorders, or alcohol abuse. In these cases, CK levels should be measured prior to initiation of therapy. CK measurement should also be considered before starting treatment in persons over 70 years of age especially in the presence of other predisposing factors in this population. If CK levels are significantly elevated ( $> 5 \times \text{ULN}$ ) at baseline, treatment should not be started and the results should be re-measured after 5 - 7 days. The baseline CK levels may also be useful as a reference in the event of a later increase during statin therapy.

During treatment: patients should be advised to report promptly unexplained muscle pain, tenderness, weakness or cramps. In these cases, CK levels should be measured. If a markedly elevated ( $> 5 \times \text{ULN}$ ) CK level is detected, statin therapy must be interrupted. Treatment discontinuation should also be considered if the muscular symptoms are severe and cause daily discomfort, even if the CK increase remains  $\leq 5 \times \text{ULN}$ . If symptoms resolve and CK levels return to normal, then reintroduction of statin therapy may be considered at the lowest dose and with close monitoring. If a hereditary muscular disease is suspected in such patients, restarting statin therapy is not recommended.

This product contains lactose. Patients with rare hereditary problems of galactose intolerance, the Lapp-lactase deficiency or glucose-galactose malabsorption should not take this medicine.

## 4.5 Interaction with other medicinal products and other forms of interaction

**Fibrates:** the use of fibrates alone is occasionally associated with myopathy. An increased risk of muscle-related adverse events, including rhabdomyolysis, have been reported when fibrates are co-administered with other statins. These adverse events with pravastatin cannot be excluded; therefore the combined use of pravastatin and fibrates (e.g. gemfibrozil, fenofibrate) should generally be avoided (see section 4.4). If this combination is considered necessary, careful clinical and CK monitoring of patients on such regimen is required.

**Cholestyramine/Colestipol:** concomitant administration resulted in approximately 40 to 50% decrease in the bioavailability of pravastatin. There was no clinically significant decrease in bioavailability or therapeutic effect when pravastatin was administered one hour before or four hours after cholestyramine or one hour before colestipol (see section 4.2).

**Ciclosporin:** concomitant administration of pravastatin and ciclosporin leads to an approximately 4-fold increase in pravastatin systemic exposure. In some patients, however, the increase in pravastatin exposure may be larger. Clinical and biochemical monitoring of patients receiving this combination is recommended (see section 4.2).

**Warfarin and other oral anticoagulants:** bioavailability parameters at steady state for pravastatin were not altered following administration with warfarin. Chronic dosing of the two products did not produce any changes in the anticoagulant action of warfarin.

**Products metabolised by cytochrome P450:** pravastatin is not metabolised to a clinically significant extent by the cytochrome P450 system. This is why products that are metabolised by, or inhibitors of, the cytochrome P450 system can be added to a stable regimen of pravastatin without causing significant changes in the plasma levels of pravastatin, as have been seen with other statins. The absence of a significant pharmacokinetic interaction with pravastatin has been specifically demonstrated for several products, particularly those that are substrates/inhibitors of CYP3A4 e.g. diltiazem, verapamil, itraconazole, ketoconazole, protease inhibitors, grapefruit juice and CYP2C9 inhibitors (e.g. fluconazole).

In one of two interaction studies with pravastatin and erythromycin a statistically significant increase in pravastatin AUC (70%) and  $C_{max}$  (121%) was observed. In a similar study with clarithromycin a statistically significant increase in AUC (110%) and  $C_{max}$  (127%) was observed. Although these changes were minor, caution should be exercised when associating pravastatin with erythromycin or clarithromycin.

**Other products:** in interaction studies, no statistically significant differences in bioavailability were observed when pravastatin was administered with acetylsalicylic acid, antacids (when given one hour prior to pravastatin), nicotinic acid or probucol.

## 4.6 Pregnancy and lactation

**Pregnancy:** pravastatin is contraindicated during pregnancy and should be administered to women of childbearing potential only when these patients are unlikely to conceive and have been informed of the potential hazards. Special caution is recommended in children and adolescent females of child-bearing potential to ensure proper understanding of the potential risks associated with pravastatin therapy during pregnancy and the use of adequate contraceptive measures as appropriate while on pravastatin therapy.

If a patient plans to become pregnant or becomes pregnant, the doctor has to be informed immediately and pravastatin should be discontinued because of the potential risk to the foetus.

**Lactation:** a small amount of pravastatin is excreted in human breast milk, therefore pravastatin is contraindicated during breastfeeding (see section 4.3).

## 4.7 Effects on ability to drive and use machines

Pravastatin has no or negligible influence on the ability to drive and use machines. However, when driving vehicles or operating machines, it should be taken into account that dizziness may occur during treatment.

## 4.8 Undesirable effects

The frequencies of adverse events are ranked according to the following: very common ( $\geq 1/10$ ); common ( $\geq 1/100$ ,  $< 1/10$ ); uncommon ( $\geq 1/1,000$ ,  $< 1/100$ ); rare ( $\geq 1/10,000$ ,  $< 1/1,000$ ); very rare ( $< 1/10,000$ ).

### Clinical trials:

Pravalo Tablets has been studied at 40 mg in seven randomized double-blind placebo-controlled trials involving over 21,000 patients treated with pravastatin (N = 10764) or placebo (N = 10719), representing over 47,000 patient years of exposure to pravastatin. Over 19,000 patients were followed for a median of 4.8 - 5.9 years.

The following adverse drug reactions were reported; none of them occurred at a rate in excess of 0.3% in pravastatin group compared to the placebo group.

System Organ Class	Uncommon
Nervous system disorders	Dizziness, headache, sleep disturbance, insomnia
Eye disorders	Vision disturbance (including blurred vision and diplopia)
Gastrointestinal disorders	Dyspepsia/heartburn, abdominal pain, nausea/vomiting, constipation, diarrhoea, flatulence
Skin and subcutaneous tissue disorders	Pruritus, rash, urticaria, scalp/hair abnormality (including alopecia)
Renal and urinary disorders	Abnormal urination (including dysuria, frequency, nocturia)
Reproductive system and breast disorders	Sexual dysfunction
General disorders	Fatigue

### Events of special clinical interest

**Skeletal muscle:** effects on the skeletal muscle, e.g. musculoskeletal pain including arthralgia, muscle cramps, myalgia, muscle weakness and elevated CK levels have been reported in clinical trials. The rate of myalgia (1.4% pravastatin vs 1.4% placebo) and muscle weakness (0.1% pravastatin vs  $< 0.1\%$  placebo) and the incidence of CK level  $> 3 \times$  ULN and  $> 10 \times$  ULN in CARE, WOSCOPS and LIPID was similar to placebo (1.6% pravastatin vs 1.6% placebo and 1.0% pravastatin vs 1.0% placebo, respectively) (see section 4.4).

**Liver effects:** elevations of serum transaminases have been reported. In the three long-term, placebo-controlled clinical trials CARE, WOSCOPS and LIPID, marked abnormalities of ALT and AST ( $> 3 \times$  ULN) occurred at similar frequency ( $\leq 1.2\%$ ) in both treatment groups.

### Post marketing:

In addition to the above the following adverse events have been reported during post marketing experience of pravastatin:

System Organ Class	Very rare
Nervous system disorders	Peripheral polyneuropathy, in particular if used for long period of time, paresthesia
Immune system disorders	Hypersensitivity reactions: anaphylaxis, angioedema, lupus erythematosus-like syndrome
Gastrointestinal disorders	Pancreatitis
Hepatobiliary disorders	Jaundice, hepatitis, fulminant hepatic necrosis
Musculoskeletal and connective tissue disorders	Rhabdomyolysis, which can be associated with acute renal failure secondary to myoglobinuria, myopathy (see section 4.4); myositis and polymyositis Isolated cases of tendon disorders, sometimes complicated by rupture

## 4.9 Overdose

To date there has been limited experience with overdosage of pravastatin. 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.

## 5 PHARMACOLOGICAL PROPERTIES

### 5.1 Pharmacodynamic properties

**Pharmacotherapeutic group:** serum lipid reducing agents/cholesterol and triglyceride reducers/HMG- CoA reductase inhibitors, ATC-Code: C10AA03

#### **Mechanism of action:**

Pravastatin is a competitive inhibitor of 3-hydroxy-3-methylglutaryl-coenzyme A (HMG CoA) reductase, the enzyme catalysing the early rate-limiting step in cholesterol biosynthesis, and produces its lipid-lowering effect in two ways. Firstly, with the reversible and specific competitive inhibition of HMG-CoA reductase, it effects modest reduction in the synthesis of intracellular cholesterol. This results in an increase in the number of LDL-receptors on cell surfaces and enhanced receptor-mediated catabolism and clearance of circulating LDL-cholesterol. Secondly, pravastatin inhibits LDL production by inhibiting the hepatic synthesis of VLDL-cholesterol, the LDL-cholesterol precursor. In both healthy subjects and patients with hypercholesterolaemia, pravastatin sodium lowers the following lipid values: total cholesterol, LDL-cholesterol, apolipoprotein B, VLDL-cholesterol and triglycerides; while HDL-cholesterol and apolipoprotein A are elevated.

#### **Clinical efficacy:**

##### *Primary prevention*

The "West of Scotland Coronary Prevention Study (WOSCOPS)" was a randomised, double-blind, placebo-controlled trial among 6,595 male patients aged from 45 to 64 years with moderate to severe hypercholesterolaemia (LDL-C: 155-232 mg/dl [4.0-6.0 mmol/l]) and with no history of myocardial infarction, treated for an average duration of 4.8 years with either a 40 mg daily dose of pravastatin or placebo as an adjunct to diet. In pravastatin-treated patients, results showed:

- a decrease in the risk of mortality from coronary disease and of non-lethal myocardial infarction (relative risk reduction RRR was 31%;  $p = 0.0001$  with an absolute risk of 7.9% in the placebo group, and 5.5% in pravastatin treated patients); the effects on these cumulative cardiovascular events rates being evident as early as 6 months of treatment;
- a decrease in the total number of deaths from a cardiovascular event (RRR 32%;  $p = 0.03$ );
- when risk factors were taken into account, an RRR of 24% ( $p = 0.039$ ) in total mortality was also observed among patients treated with pravastatin;
- a decrease in the relative risk for undergoing myocardial revascularisation procedures (coronary artery bypass graft surgery or coronary angioplasty) by 37% ( $p = 0.009$ ) and coronary angiography by 31% ( $p = 0.007$ ).

The benefit of the treatment on the criteria indicated above is not known in patients over the age of 65 years, who could not be included in the study.

In the absence of data in patients with hypercholesterolaemia associated with a triglyceride level of more than 6 mmol/l (5.3 g/l) after a diet for 8 weeks, in this study, the benefit of pravastatin treatment has not been established in this type of patient.

### *Secondary prevention*

The "Long-Term Intervention with Pravastatin in Ischemic Disease (LIPID)" was a multi-centre, randomised, double-blind, placebo-controlled study comparing the effects of pravastatin (40 mg OD) with placebo in 9014 patients aged 31 to 75 years for an average duration of 5.6 years with normal to elevated serum cholesterol levels (baseline total cholesterol = 155 to 271 mg/dl [4.0-7.0 mmol/l], mean total cholesterol = 219 mg/dl [5.66 mmol/l]) and with variable triglyceride levels of up to 443 mg/dl [5.0 mmol/l] and with a history of myocardial infarction or unstable angina pectoris in the preceding 3 to 36 months.

Treatment with pravastatin significantly reduced the relative risk of CHD death by 24% ( $p = 0.0004$ , with an absolute risk of 6.4% in the placebo group, and 5.3% in pravastatin-treated patients), the relative risk of coronary events (either CHD death or nonfatal MI) by 24% ( $p < 0.0001$ ) and the relative risk of fatal or non-fatal myocardial infarction by 29% ( $p < 0.0001$ ). In pravastatin-treated patients, results showed:

- a reduction in the relative risk of total mortality by 23% ( $p < 0.0001$ ) and cardiovascular mortality by 25% ( $p < 0.0001$ );
- a reduction in the relative risk of undergoing myocardial revascularisation procedures (coronary artery bypass grafting or percutaneous transluminal coronary angioplasty) by 20% ( $p < 0.0001$ );
- a reduction in the relative risk of stroke by 19% ( $p = 0.048$ ).

The "Cholesterol and Recurrent Events (CARE)" study was a randomised, double-blind, placebo-controlled study comparing the effects of pravastatin (40 mg OD) on coronary heart disease death and non-fatal myocardial infarction for an average of 4.9 years in 4,159 patients aged 21 to 75 years, with normal total cholesterol levels (baseline mean total cholesterol  $< 240$  mg/dl), who had experienced a myocardial infarction in the preceding 3 to 20 months.

Treatment with pravastatin significantly reduced:

- the rate of a recurrent coronary event (either coronary heart disease death or non-fatal MI) by 24% ( $p = 0.003$ , placebo 13.3%, pravastatin 10.4%);
- the relative risk of undergoing revascularisation procedures (coronary artery bypass grafting or percutaneous transluminal coronary angioplasty) by 27% ( $p < 0.001$ ).

The relative risk of stroke was also reduced by 32% ( $p = 0.032$ ), and stroke or transient ischaemic attack (TIA) combined by 27% ( $p = 0.02$ ).

The benefit of the treatment on the above criteria is not known in patients over the age of 75 years, who could not be included in the CARE and LIPID studies.

In the absence of data in patients with hypercholesterolaemia associated with a triglyceride level of more than 4 mmol/l (3.5 g/l) or more than 5 mmol/l (4.45 g/l) after following a diet for 4 or 8 weeks, in the CARE and LIPID studies, respectively, the benefit of treatment with pravastatin has not been established in this type of patient.

In the CARE and LIPID studies, about 80% of patients had received ASA as part of their regimen.

### *Heart and kidney transplantation*

The efficacy of pravastatin in patients receiving an immunosuppressant treatment following:

-Heart transplant was assessed in one prospective, randomised, controlled study (n = 97). Patients were treated concurrently with either pravastatin (20 - 40mg) or not, and a standard immunosuppressive regimen of ciclosporin, prednisone and azathioprine. Treatment with pravastatin significantly reduced the rate of cardiac rejection with haemodynamic compromise at one year, improved one-year survival (p = 0.025), and lowered the risk of coronary vasculopathy in the transplant as determined by angiography and autopsy (p = 0.049).

-Renal transplant was assessed in one prospective not controlled, not randomised study (n = 48) of 4 months duration. Patients were treated concurrently with either pravastatin (20 mg) or not, and a standard immunosuppressive regimen of ciclosporin, and prednisone. In patients following kidney transplantation, pravastatin significantly reduced both the incidence of multiple rejection episodes and the incidence of biopsy-proved acute rejection episodes, and the use of pulse injections of both prednisolone and Muromonab-CD3.

### *Children and adolescents (8-18 years of age)*

A double-blind placebo-controlled study in 214 paediatric patients with heterozygous familial hypercholesterolaemia was conducted over 2 years. Children (8-13 years) were randomised to placebo (n=63) or 20 mg of pravastatin daily (n=65) and the adolescents (14-18 years) were randomised to placebo (n=45) or 40 mg of pravastatin daily (n=41). Inclusion in the study required an LDL-C level > 95th percentile for age and sex and one parent with either a clinical or molecular diagnosis of familial hypercholesterolaemia. The mean baseline LDL-C value was 239 mg/dl and 237 mg/dl in the pravastatin (range: 151-405 mg/dl) and placebo (range: 154-375 mg/dl) groups, respectively.

There was a significant mean percent reduction in LDL-C of -22.9% and also in total cholesterol (-17.2%) from the pooled data analysis in both children and adolescents, similar to demonstrated efficacy in adults on 20 mg of pravastatin. Reductions in apolipoprotein B were also observed in both children and adolescents.

The effect of pravastatin treatment in the two age groups was similar. The mean achieved LDL-C was 186 mg/dl (range: 67-363 mg/dl) in the pravastatin group compared to 236 mg/dl (range: 105-438 mg/dl) in the placebo group. In subjects receiving pravastatin, there were no differences seen in any of the monitored endocrine parameters [ACTH, cortisol, DHEAS, FSH, LH, TSH, estradiol (girls) or testosterone (boys)] relative to placebo. There were no developmental differences, testicular volume changes, or Tanner score differences observed relative to placebo. The long-term efficacy of pravastatin therapy in childhood to reduce morbidity and mortality in adulthood has not been established.

## **5.2 Pharmacokinetic properties**

### **Absorption:**

Pravastatin is administered orally in the active form. It is rapidly absorbed; peak serum levels are achieved 1 to 1.5 hours after ingestion. On average, 34% of the orally administered dose is absorbed, with an absolute bioavailability of 17%.

The presence of food in the gastrointestinal tract leads to a reduction in the bioavailability, but the cholesterol-lowering effect of pravastatin is identical whether taken with or without food. After absorption, 66% of pravastatin undergoes a first-pass extraction through the liver, which is the primary site of its action and the primary site of cholesterol synthesis and clearance of LDL-cholesterol. *In vitro* studies demonstrated that pravastatin is transported into hepatocytes and with substantially less intake in other cells.

In view of this substantial first pass through the liver, plasma concentrations of pravastatin have only a limited value in predicting the lipid-lowering effect. The plasma concentrations are proportional to the doses administered.

### **Distribution:**

About 50% of circulating pravastatin is bound to plasma proteins. The volume of distribution is about 0.5 l/kg. A small quantity of pravastatin passes into the human breast milk.

### **Metabolism and elimination:**

Pravastatin is not significantly metabolised by cytochrome P450 nor does it appear to be a substrate or an inhibitor of P-glycoprotein but rather a substrate of other transport proteins. Following oral administration, 20% of the initial dose is eliminated in the urine and 70% in the faeces. Plasma elimination half-life of oral pravastatin is 1.5 to 2 hours. After intravenous administration, 47% of the dose is eliminated by the renal excretion and 53% by biliary excretion and biotransformation. The major degradation product of pravastatin is the 3- $\alpha$ -hydroxy isomeric metabolite.

This metabolite has one-tenth to one-fortieth the HMG-CoA reductase inhibitor activity of the parent compound. The systemic clearance of pravastatin is 0.81 l/h/kg and the renal clearance is 0.38 l/h/kg indicating tubular secretion.

**Populations at risk:**

Paediatric subjects: mean pravastatin  $C_{max}$  and AUC values for paediatric subjects pooled across age and gender were similar to those values observed in adults after a 20mg oral dose.

Hepatic failure: systemic exposure to pravastatin and metabolites in patients with alcoholic cirrhosis is enhanced by about 50% comparatively to patients with normal liver function.

Renal impairment: no significant modifications were observed in patients with mild renal impairment. However severe and moderate renal insufficiency may lead to a two fold increase of the systemic exposure to pravastatin and metabolites.

**5.3 Preclinical safety data**

Based on conventional studies of safety pharmacology, repeated dose toxicity and toxicity on reproduction, there are no other risks for the patient than those expected due to the pharmacological mechanism of action.

Repeated dose studies indicate that pravastatin may induce varying degrees of hepatotoxicity and myopathy; in general, substantive effects on these tissues were only evident at doses 50 or more times the maximum human mg/kg dose.

*In vitro* and *in vivo* genetic toxicology studies have shown no evidence of mutagenic potential.

In mice, a 2-year carcinogenicity study with pravastatin demonstrates at doses of 250 and 500 mg/kg/day ( $\geq 310$  times the maximum human mg/kg dose), a statistically significant increase in the incidence of hepatocellular carcinomas in males and females, and lung adenomas in females only. In rats, a 2-year carcinogenicity study demonstrates at a dose of 100mg/kg/day (125 times the maximum human mg/kg/dose) a statistically significant increase in the incidence of hepatocellular carcinomas in males only.

**6 PHARMACEUTICAL PARTICULARS****6.1 List of excipients**

Croscarmellose sodium  
Lactose monohydrate  
Magnesium stearate  
Heavy magnesium oxide  
Microcrystalline cellulose  
Povidone  
Yellow ferric oxide

**6.2 Incompatibilities**

Not applicable

**6.3 Shelf Life**

3 years

**6.4 Special precautions for storage**

This medicinal product does not require any special storage conditions.

## **6.5 Nature and contents of container**

Aluminium/aluminium blister packs.

Packs of 20, 28, 30, 50, 56, 60, 72, 90, 98, 100, 200 (10x20), 250 (5x50) and 500 (25x20) tablets.

Packs with perforated unit dose blisters of 20, 30, 50, 100, 200, 250 and 500 tablets.

Not all pack sizes may be marketed.

## **6.6 Special precautions for disposal of a used medicinal product or waste materials derived from such medicinal product and other handling of the product**

No special requirements.

## **7 MARKETING AUTHORISATION HOLDER**

Ratiopharm GmbH  
Graf-Arco-Strasse 3  
89079 ULM  
Germany

## **8 MARKETING AUTHORISATION NUMBER**

PA 0819/030/003

## **9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

29th September 2006

## **10 DATE OF REVISION OF THE TEXT**

December 2009