

# Summary of Product Characteristics

## 1 NAME OF THE MEDICINAL PRODUCT

Statease 40 mg Capsules, hard

## 2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each capsule contains fluvastatin 40 mg as fluvastatin sodium

For the full list of excipients, see section 6.1.

## 3 PHARMACEUTICAL FORM

Capsules, hard

Statease 40 mg Capsules are No. 1 hard gelatine, red capsules, with 'FL 40' printed on the cap and 'G' printed on the body, containing a white to pale yellow or brownish-pale yellow or reddish-pale yellow powder.

## 4 CLINICAL PARTICULARS

### 4.1 Therapeutic Indications

Dyslipidaemia

Treatment of adults with 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.

Secondary prevention in coronary heart disease

Secondary prevention of major adverse cardiac events in adults with coronary heart disease after percutaneous coronary interventions (see section 5.1).

### 4.2 Posology and method of administration

#### Posology

##### *Adults*

Dyslipidaemia

Prior to initiating treatment with fluvastatin, patients should be placed on a standard cholesterol lowering diet, which should be continued during treatment.

Starting and maintenance doses should be individualized according to the baseline LDL-C levels and the treatment goal to be accomplished.

The recommended dosing range is 20 to 80 mg/day. For patients requiring LDL-C reduction to a goal of < 25% a starting dose of 20 mg may be used as one capsule in the evening. For patients requiring LDL-C reduction to a goal of  $\geq 25\%$ , the recommended starting dose is 40 mg as one capsule in the evening. The dose may be uptitrated to 80 mg daily, administered as one 40 mg capsule given twice daily (one in the morning and one in the evening).

The maximum lipid-lowering effect with a given dose is achieved within 4 weeks. Dose adjustments should be made at intervals of 4 weeks or more.

### Secondary prevention of coronary heart disease

In patients with coronary heart disease after percutaneous coronary intervention the appropriate daily dose is 80 mg (one 40 mg capsule twice daily).

Fluvastatin is efficacious in monotherapy. When fluvastatin is used in combination with cholestyramine or other resins, it should be administered at least 4 hours after the resin to avoid significant interaction due to binding of the drug to the resin. In cases where coadministration with a fibrate or niacin is necessary, the benefit and the risk of concurrent treatment should be carefully considered (for use with fibrates or niacin see section 4.5).

### *Paediatric population*

#### *Children and adolescents with heterozygous familial hypercholesterolaemia:*

Prior to initiating treatment with fluvastatin in children and adolescents aged 9 years and older with heterozygous familial hypercholesterolaemia, the patient should be placed on a standard cholesterol-lowering diet and continued during treatment.

The recommended starting dose is one 20 mg capsule. Dose adjustments should be made at 6-week intervals. Doses should be individualised according to baseline LDL-C levels and the recommended goal of therapy to be accomplished. The maximum daily dose administered is 80 mg as one 40 mg capsule twice daily.

The use of fluvastatin in combination with nicotinic acid, cholestyramine, or fibrates in children and adolescents has not been investigated.

Fluvastatin has only been investigated in children of 9 years and older with heterozygous familial hypercholesterolaemia.

*Renal Impairment* Fluvastatin is cleared by the liver, with less than 6% of the administered dose excreted into the urine. The pharmacokinetics of fluvastatin remain unchanged in patients with mild to severe renal insufficiency. No dose adjustments are therefore necessary in these patients however, due to limited experience with doses >40mg/day in case of severe renal impairment (CrCL <0,5 mL/sec or 30 mL/min), these doses should be initiated with caution.

### *Hepatic Impairment*

Fluvastatin is contraindicated in patients with active liver disease or unexplained, persistent elevations in serum transaminases (see sections 4.3, 4.4 and 5.2).

### *Elderly population:*

No dose adjustments are necessary in this population.

### Method of administration

Fluvastatin capsules can be taken with or without meals and should be swallowed as whole with a glass of water.

## **4.3 Contraindications**

- Hypersensitivity to the active substance or to any of the excipients listed in section 6.1.
- Active liver disease, or unexplained, persistent elevations in serum transaminases (see sections 4.2, 4.4 and 4.8).

- Pregnancy and lactation (see section 4.6).

#### 4.4 Special warnings and precautions for use

##### Liver Function:

As with other lipid-lowering medicinal products, it is recommended that liver function tests be performed before the initiation of treatment and at 12 weeks following initiation of treatment or elevation in dose and periodically thereafter in all patients. Should an increase in aspartate aminotransferase (AST) or alanine aminotransferase (ALT) exceed 3 times the upper limit of normal and persist, therapy should be discontinued. In very rare cases, possibly drug-related hepatitis was observed that resolved upon discontinuation of treatment.

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

##### Skeletal Muscle:

Myopathy has rarely been reported with fluvastatin. Myositis and rhabdomyolysis have been reported very rarely. In patients with unexplained diffuse myalgias, muscle tenderness or muscle weakness, and/or marked elevation of creatine kinase (CK) values, myopathy, myositis or rhabdomyolysis have to be considered. Patients should therefore be advised to promptly report unexplained muscle pain, muscle tenderness or muscle weakness, particularly if accompanied by malaise or fever.

##### Creatine kinase measurement:

There is no current evidence to require routine monitoring of plasma total creatine kinase or other muscle enzyme levels in asymptomatic patients on statins. If CK has to be measured it should not be done following strenuous exercise or in the presence of any plausible alternative cause of CK increase as this makes the value interpretation difficult.

##### Before treatment:

As with all other statins physicians should prescribe fluvastatin with caution in patients with predisposing factors for rhabdomyolysis and its complications. A creatine kinase level should be measured before starting fluvastatin treatment in the following situations:

- Renal impairment
- Hypothyroidism
- Personal or familial history of hereditary muscular disorders
- Previous history of muscular toxicity with a statin or fibrate
- Alcohol abuse
- In elderly (age > 70 years), the necessity of such measurement should be considered, according to the presence of other predisposing factors for rhabdomyolysis.

In such situations the risk of treatment should be considered in relation to the possible benefit and clinical monitoring is recommended. If CK-levels are significantly elevated at baseline (> 5 x upper limit of normal), levels should be re-measured within 5 to 7 days to confirm the results. If CK-levels are still significantly elevated (> 5 x upper limit of normal) at baseline, treatment should not be started.

##### Whilst on treatment:

If muscular symptoms like pain, weakness or cramps occur in patients receiving fluvastatin, their CK-levels should be measured. Treatment should be stopped if these levels are found to be significantly elevated (> 5 x upper limit of normal).

If muscular symptoms are severe and cause daily discomfort, even if CK-levels are elevated to less than to  $\leq 5$  x ULN, treatment discontinuation should be considered.

Should the symptoms resolve and CK-levels return to normal, then re-introduction of fluvastatin or another statin may be considered at the lowest dose and under close monitoring.

The risk of myopathy is known to be increased in patients receiving immunosuppressive medicinal products (including ciclosporin), fibrates, nicotinic acid or erythromycin together with other HMGCoA reductase inhibitors. Isolated cases of myopathy have been reported post-marketing for concomitant administration of fluvastatin with ciclosporin and fluvastatin with colchicines. Fluvastatin should be used with caution in patients receiving such concomitant medication (see section 4.5).

#### Interstitial lung disease:

Exceptional cases of interstitial lung disease have been reported with some statins, especially with long term therapy (see section 4.8). Presenting features can include dyspnoea, non-productive cough and deterioration in general health (fatigue, weight loss and fever). If it is suspected a patient has developed interstitial lung disease, statin therapy should be discontinued.

#### Diabetes Mellitus

Some evidence suggests that statins as a class raise blood glucose and in some patients, at high risk of future diabetes, may produce a level of hyperglycaemia where formal diabetes care is appropriate. This risk, however, is outweighed by the reduction in vascular risk with statins and therefore should not be a reason for stopping statin treatment. Patients at risk (fasting glucose 5.6 to 6.9 mmol/L, BMI > 30 kg/m<sup>2</sup>, raised triglycerides, hypertension) should be monitored both clinically and biochemically according to national guidelines.

#### Paediatric population

##### Children and adolescents with heterozygous familial hypercholesterolaemia:

In patients aged < 18 years, efficacy and safety have not been studied for treatment periods longer than two years. No data are available about the physical, intellectual and sexual maturation for prolonged treatment period. The long-term efficacy of fluvastatin therapy in childhood to reduce morbidity and mortality in adulthood has not been established (see section 5.1).

Fluvastatin has only been investigated in children of 9 years and older with heterozygous familial hypercholesterolaemia (for details see section 5.1). In case of pre-pubertal children, as experience is very limited in this group, the potential risks and benefits should be carefully evaluated before the initiation of treatment.

##### Homozygous familial hypercholesterolaemia

No data are available for the use of fluvastatin in patients with the very rare condition of homozygous familial hypercholesterolaemia.

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

#### *Fibrates and niacin*

Concomitant administration of fluvastatin with bezafibrate, gemfibrozil, ciprofibrate or niacin (nicotinic acid) has no clinically relevant effect on the bioavailability of fluvastatin or the other lipid-lowering agent. Since an increased risk of myopathy and/or rhabdomyolysis has been observed in patients receiving HMG-CoA-reductase inhibitors together with any of these molecules, the benefit and the risk of concurrent treatment should be carefully weighed and these combinations should only be used with caution (see section 4.4).

*Colchicines:*

Myotoxicity, including muscle pain and weakness and rhabdomyolysis, has been reported in isolated cases with concomitant administration of colchicines. The benefit and the risk of concurrent treatment should be carefully weighed and these combinations should only be used with caution (see section 4.4).

*Ciclosporin:*

Studies in renal transplant patients indicate that bioavailability of fluvastatin (up to 40 mg/day) is not elevated to a clinically significant extent in patients on stable regimens of ciclosporin. The results from another study in which fluvastatin modified-release (80 mg fluvastatin) was administered to renal transplant patients who were on stable ciclosporin regimen showed that fluvastatin exposure (AUC) and maximum concentration (C<sub>max</sub>) were increased 2fold compared to historical data in healthy subjects. Although these increases in fluvastatin levels were not clinically significant, this combination should be used with caution (see section 4.4). Starting and maintenance dose of fluvastatin should be as low as possible when combined with ciclosporin.

Both fluvastatin capsules (40 mg) and fluvastatin modified-release 80mg had no effect on the bioavailability of ciclosporin when co-administered.

*Warfarin and other coumarin derivatives:*

In healthy volunteers, the use of fluvastatin and warfarin (single dose) did not adversely influence warfarin plasma levels and prothrombin times compared to warfarin alone.

However, isolated incidences of bleeding episodes and/or increased prothrombin times have been reported very rarely in patients on fluvastatin receiving concomitant warfarin or other coumarin derivatives. It is recommended that prothrombin times are monitored when fluvastatin treatment is

initiated, discontinued, or the dosage changed in patients receiving warfarin or other coumarin derivatives.

*Rifampicin:*

Administration of fluvastatin to healthy volunteers pre-treated with rifampicin (rifampin) resulted in a reduction of the bioavailability of fluvastatin by about 50%. Although at present there is no clinical evidence that fluvastatin efficacy in lowering lipid levels is altered, for patients undertaking long-term

rifampicin therapy (e.g. treatment of tuberculosis), appropriate adjustment of fluvastatin dosage may be warranted to ensure a satisfactory reduction in lipid levels.

*Oral antidiabetic agents:*

For patients receiving oral sulfonylureas (glibenclamide [glyburide], tolbutamide) for the treatment of non-insulin-dependent (type 2) diabetes mellitus (NIDDM), addition of fluvastatin does not lead to clinically significant changes in glycaemic control. In glibenclamide-treated NIDDM patients (n=32), administration of fluvastatin (40 mg twice daily for 14 days) increased the mean C<sub>max</sub>, AUC and t<sub>1/2</sub> for glibenclamide by approximately 50%, 69% and 121%, respectively. Glibenclamide (5 to 20 mg daily) increased the mean C<sub>max</sub> and AUC of fluvastatin by 44% and 51%, respectively. In this study there were no changes in glucose, insulin and C-peptide levels. However, patients on concomitant therapy with glibenclamide (glyburide) and fluvastatin should continue to be monitored appropriately

when their fluvastatin dose is increased to 80 mg per day.

*Bile acid sequestrants:*

Fluvastatin should be administered at least 4 hours after the resin (e.g. cholestyramine) to avoid a significant interaction due to drug binding of the resin.

*Fluconazole:*

Administration of fluvastatin to healthy volunteers pre-treated with fluconazole (CYP2C9 inhibitor) resulted in an increase in the exposure and peak concentration of fluvastatin by about 84% and 44% respectively. Although there was no clinical evidence that the safety profile of fluvastatin is altered in

patients pre-treated with fluconazole for 4 days, caution should be exercised when fluvastatin is administered concomitantly with fluconazole.

*Histamine H<sub>2</sub>-receptor antagonists and proton pump inhibitors:*

Concomitant administration of fluvastatin with cimetidine, ranitidine, or omeprazole results in an increase in the bioavailability of fluvastatin, which, however, is of no clinical relevance

*Phenytoin:*

The overall magnitude of the changes in the pharmacokinetics of phenytoin when coadministered with fluvastatin are relatively small and not clinically significant. Thus, routine monitoring of phenytoin plasma levels is sufficient during co-administration with fluvastatin.

*Cardiovascular agents:*

No clinically significant pharmacokinetic interactions occur when fluvastatin is concomitantly administered with propranolol, digoxin, losartan or amlodipine. Based on the pharmacokinetic data, no monitoring or dose adjustment is required when fluvastatin is concomitantly administered with these agents.

*Itraconazole and erythromycin:*

Concomitant administration of fluvastatin with the potent cytochrome P450 (CYP) 3A4 inhibitors itraconazole and erythromycin has minimal effects on the bioavailability of fluvastatin. Given the minimal involvement of this enzyme in the metabolism of fluvastatin, it is expected that other CYP3A4 inhibitors (e.g. ketoconazole, ciclosporin) are unlikely to affect the bioavailability of fluvastatin.

*Grapefruit juice.* Based on the lack of interaction of fluvastatin with other CYP3A4 substrates fluvastatin is not expected to interact with grapefruit juice.

## **4.6 Fertility, pregnancy and lactation**

Pregnancy

There is insufficient data on the use of fluvastatin during pregnancy.

Since HMG-CoA reductase inhibitors decrease the synthesis of cholesterol and possibly of other biologically active substances derived from cholesterol, they may cause foetal harm when administered to pregnant women. Therefore, fluvastatin is contraindicated during pregnancy (see section 4.3).

Women of childbearing potential have to use effective contraception.

If a patient becomes pregnant while taking fluvastatin, therapy should be discontinued.

Breastfeeding

Based on preclinical data, it is expected that fluvastatin is excreted into human milk. There is insufficient information on the effects of fluvastatin in newborns / infants.

Fluvastatin is contraindicated in breastfeeding women.

**4.7 Effects on ability to drive and use machines**

No studies on the effects on the ability to drive and use of machines have been performed

**4.8 Undesirable effects**

The most commonly reported adverse drug reactions are mild gastrointestinal symptoms, insomnia and headache.

Adverse reactions (Table 1) are ranked under heading of frequency, the most frequent first, using the following convention:

Very common	( $\geq 1/10$ )
Common	( $\geq 1/100$ to $< 1/10$ )
Uncommon	( $\geq 1/1,000$ to $< 1/100$ )
Rare	( $\geq 1/10,000$ to $< 1/1,000$ )
Very rare	( $< 1/10,000$ ), including isolated reports
Not known	(cannot be estimated from the available data).

Within each frequency grouping, adverse reactions are presented in order of decreasing seriousness.

Table 1 Adverse Reactions

<b>Blood and lymphatic system disorders</b> Very rare	Thrombocytopenia
<b>Immune system disorders</b> Very rare:	Anaphylactic reaction
<b>Psychiatric disorders</b> Common	Insomnia

<b>Nervous system disorders</b> Common  Very rare	Headache  Paraesthesia, dysaesthesia, hypoaesthesia also known to be associated with the underlying hyperlipidaemic disorders
<b>Vascular disorders</b> Very rare	Vasculitis
<b>Gastrointestinal disorders</b> Common Very rare	Dyspepsia, abdominal pain, nausea Pancreatitis
<b>Hepatobiliary disorders</b> Very rare	Hepatitis
<b>Skin and subcutaneous tissue disorders</b> Rare  Very rare	Hypersensitivity reactions such as rash, urticaria  Other skin reactions (e.g. eczema, dermatitis, bullous exanthema), face oedema, angioedema
<b>Musculoskeletal and connective tissue disorders</b>  Rare  Very rare	Myalgia, muscle weakness, myopathy  Rhabdomyolysis, myositis, lupus erythematosus-like reactions

The following adverse events have been reported with some statins:

- Sleep disturbances, including insomnia and nightmares
- Memory loss
- Sexual dysfunction
- Depression
- Exceptional cases of interstitial lung disease, especially with long term therapy (see section 4.4)
- Diabetes Mellitus: Frequency will depend on the presence or absence of risk factors (fasting blood glucose  $\geq 5.6$  mmol/L, BMI  $>30\text{kg/m}^2$ , raised triglycerides, history of hypertension).

#### Paediatric population

##### Children and adolescents with heterozygous familial hypercholesterolaemia

The safety profile of fluvastatin in children and adolescents with heterozygous familial hypercholesterolaemia assessed in 114 patients aged 9 to 17 years treated in two open-label non-comparative clinical trials was similar to the one observed in adults. In both clinical trials no effect was observed on growth and sexual maturation. The ability of the trials to detect any effect of treatment in this area was, however, low.

#### Laboratory Findings

Biochemical abnormalities of liver function have been associated with HMG-CoA reductase inhibitors and other lipid-lowering agents. Based on pooled analyses of controlled clinical trials confirmed elevations of alanine aminotransferase or aspartate aminotransferase levels to more than 3 times the upper limit of normal occurred in 0.2% on fluvastatin capsules 20 mg/day, 1.5% to 1.8% on fluvastatin 40 mg/day, 1.9% on fluvastatin modified-release tablets 80 mg/day and in 2.7% to 4.9% on twice daily fluvastatin capsules 40 mg. The majority of patients with these abnormal biochemical findings were asymptomatic. Marked elevations of CK levels to more than 5x ULN developed in a very small number of patients (0.3 to 1.0%).

## 4.9 Overdose

To date there has been limited experience with overdose of fluvastatin. Specific treatment is not available for

fluvastatin overdose. Should an overdose occur, the patient should be treated symptomatically and supportive measures instituted, as required. Liver function tests and serum CK levels should be monitored.

## 5 PHARMACOLOGICAL PROPERTIES

### 5.1 Pharmacodynamic properties

Pharmacotherapeutic group: HMG-CoA reductase inhibitor

ATC code: C10 AA04

#### Mechanism of action

Fluvastatin, a fully synthetic cholesterol-lowering agent, is a competitive inhibitor of HMG-CoA reductase, which is responsible for the conversion of HMG-CoA to mevalonate, a precursor of sterols, including cholesterol. Fluvastatin exerts its main effect in the liver and is mainly a racemate of the two erythro enantiomers of which one exerts the pharmacological activity. The inhibition of cholesterol biosynthesis reduces the cholesterol in hepatic cells, which stimulates the synthesis of LDL receptors and thereby increases the uptake of LDL particles. The ultimate result of these mechanisms is a reduction of the plasma cholesterol concentration.

Fluvastatin reduces total-C, LDL-C, Apo B, and triglycerides, and increases HDL-C in patients with hypercholesterolaemia and mixed dyslipidaemia.

#### Clinical efficacy and safety

In 12 placebo-controlled studies in patients with Type IIa or IIb hyperlipoproteinaemia, fluvastatin alone was administered to 1,621 patients in daily dose regimens of 20 mg, 40 mg and 80 mg (40 mg twice daily) for at least 6 weeks duration. In a 24-week analysis, daily doses of 20 mg, 40 mg and 80 mg produced dose-related reductions in total-C, LDL-C, Apo B and in triglycerides and increases in HDL-C (see Table 2).

Fluvastatin retard was administered to over 800 patients in three pivotal trials of 24 weeks active treatment duration and compared to fluvastatin 40 mg once or twice daily. Given as a single daily dose of 80 mg, fluvastatin retard tablets significantly reduced total-C, LDL-C, triglycerides (TG) and Apo

B (see Table 2).

Therapeutic response is well established within two weeks, and a maximum response is achieved within four weeks. After four weeks of therapy, the median decrease in LDL-C was 38% and at week 24 (endpoint) the median LDL-C decrease was 35%. Significant increases in HDL-C were also

observed.

**Table 2 Median percent change in lipid parameters from baseline to week 24 Placebo-controlled studies (fluvastatin) and active-controlled trials (fluvastatin modified-release)**

Dose	Total-C		TG		LDL-C		Apo B		HDL-C	
	N	%Δ	N	%Δ	N	%Δ	N	%Δ	N	%Δ
All patients										
Fluvastatin	747	-17	747	-12	747	-22	114	-19	747	+3

20mg <sup>1</sup>										
Fluvastatin 40mg <sup>1</sup>	748	-19	748	-14	748	-25	125	-18	748	+4
Fluvastatin 40mg twice daily <sup>1</sup>	257	-27	257	-18	257	-36	232	-28	257	+6
Fluvastatin retard 80mg <sup>2</sup>	750	-25	750	-19	748	-35	745	-27	750	+7
Baseline TG $\geq$ 200mg/dl										
Fluvastatin 20mg <sup>1</sup>	148	-16	148	-17	148	-22	23	-19	148	+6
Fluvastatin 40mg <sup>1</sup>	179	-18	179	-20	179	-24	47	-18	179	+7
Fluvastatin 40mg twice daily <sup>1</sup>	76	-27	76	-23	76	-35	69	-28	76	+9
Fluvastatin retard 80mg <sup>2</sup>	239	-25	239	-25	237	-33	235	-27	239	+11

<sup>1</sup> Data for fluvastatin from 12 placebo-controlled trials

<sup>2</sup> Data for fluvastatin modified-release 80 mg tablet from three 24-week controlled trials

In the Lipoprotein and Coronary Atherosclerosis Study (LCAS), the effect of fluvastatin on coronary atherosclerosis was assessed by quantitative coronary angiography in male and female patients (35 to 75 years old) with coronary artery disease and baseline LDL-C levels of 3.0 to 4.9 mmol/l (115 to 190 mg/dl). In this randomised, double-blind, controlled clinical study, 429 patients were treated with either fluvastatin 40 mg/day or placebo. Quantitative coronary angiograms were evaluated at baseline and after 2.5 years of treatment and were evaluable in 340 out of 429 patients. Fluvastatin treatment slowed the progression of coronary atherosclerosis lesions by 0.072 mm (95% confidence intervals for treatment difference from -0.1222 to 0.002 mm) over 2.5 years as measured by change in minimum lumen diameter (fluvastatin 0.028 mm vs. placebo 0.100 mm). No direct correlation between the angiographic findings and the risk of cardiovascular events has been demonstrated.

In the Lescol Intervention Prevention Study (LIPS), the effect of fluvastatin on major adverse cardiac events (MACE; i.e. cardiac death, non-fatal myocardial infarction and coronary revascularisation) was assessed in patients with coronary heart disease who had first successful percutaneous coronary intervention. The study included male and female patients (18 to 80 years old) and with baseline total-C levels ranging from 3.5 to 7.0 mmol/l (135 to 270 mg/dl).

In this randomised, double-blind, placebo-controlled trial fluvastatin (n=844), given as 80 mg daily over 4 years, significantly reduced the risk of the first MACE by 22% (p=0.013) as compared to placebo (n=833). The primary endpoint of MACE occurred in 21.4% of patients treated with fluvastatin vs 26.7% of patients treated with placebo (absolute risk difference: 5.2%; 95% CI: 1.1 to 9.3). These beneficial effects were particularly noteworthy in patients with diabetes mellitus and in patients with multivessel disease.

#### Paediatric population

##### Children and adolescents with heterozygous familial hypercholesterolaemia

The safety and efficacy of fluvastatin in children and adolescent patients aged 9 - 16 years of age with heterozygous familial hypercholesterolemia has been evaluated in 2 open label, uncontrolled clinical trials of 2 years' duration. 114 patients (66 boys and 48 girls) were treated with fluvastatin administered as either fluvastatin capsules 20 mg/day - 40 mg twice daily or fluvastatin 80 mg extended release once daily tablets using a dose-titration regimen based upon LDL-C response.

The first study enrolled 29 pre-pubertal boys, 9-12 years of age, who had an LDL-C level > 90th percentile for age and one parent with primary hypercholesterolemia and either a family history of premature ischemic heart disease or tendon xanthomas. The mean baseline LDL-C was 226 mg/dL equivalent to 5.8 mmol/L (range: 137 - 354 mg/dL equivalent to 3.6 – 9.2 mmol/L). All patients were started on fluvastatin capsules 20 mg daily with dose adjustments every 6 weeks to 40 mg daily then 80 mg daily (40 mg twice daily) to achieve an LDL-C goal of 96.7 to 123.7 mg/dL (2.5 mmol/L to 3.2 mmol/L).

The second study enrolled 85 male and female patients, 10 to 16 years of age, who had an LDL-C > 190 mg/dL (equivalent to 4.9 mmol/L) or LDL-C > 160 mg/dL (equivalent to 4.1 mmol/L) and one or more risk factors for coronary heart disease, or LDL-C > 160 mg/dL (equivalent to 4.1 mmol/L) and a proven LDL-receptor defect. The mean baseline LDL-C was 225 mg/dL equivalent to 5.8 mmol/L (range: 148 – 343 mg/dL equivalent to 3.8 – 8.9 mmol/L). All patients were started on fluvastatin capsules 20 mg daily with dose adjustments every 6 weeks to 40 mg daily then 80 mg daily (fluvastatin 80 mg extended release tablet) to achieve an LDL-C goal of < 130 mg/dL (3.4 mmol/L). 70 patients were pubertal or postpubertal (n=69 evaluated for efficacy)

In the first study (in pubertal boys), fluvastatin 20 to 80 mg daily doses decreased plasma levels of total-C and LDL-C by 21% and 27%, respectively. The mean achieved LDL-C was 161 mg/dL, equivalent to 4.2 mmol/L (range: 74 - 336 mg/dL, equivalent 1.9 - 8.7 mmol/L). In the second study (in postpubertal or prepubertal girls and boys), fluvastatin 20 to 80 mg daily doses decreased plasma levels of total-C and LDL-C by 22% and 28%, respectively. The mean achieved LDL-C was 159 mg/dL, equivalent to 4.1 mmol/L (range: 90 - 295 mg/dL, equivalent to 2.3 – 7.6 mmol/L).

The majority of patients in both studies (83% in the first study and 89% in the second study) were titrated to the maximum daily dose of 80 mg. At study endpoint, 26 to 30% of patients in both studies achieved a targeted LDL-C goal of < 130 mg/dL (3.4 mmol/L).

## 5.2 Pharmacokinetic properties

### Absorption:

Fluvastatin is absorbed rapidly and completely (98%) after oral administration of a solution to fasted volunteers. After oral administration of fluvastatin modified-release, and in comparison with the capsules, the absorption rate of fluvastatin is almost 60% slower while the mean residence time of fluvastatin is increased by approximately 4 hours. In a fed state, the substance is absorbed at a reduced rate,

### Distribution:

Fluvastatin exerts its main effect in the liver, which is also the main organ for its metabolism. The absolute bioavailability assessed from systemic blood concentrations is 24%. The apparent volume of distribution (V<sub>z</sub>/f) for the drug is 330 litres. More than 98% of the circulating drug is bound to plasma proteins, and this binding is not affected either by the concentration of fluvastatin, or by warfarin, salicylic acid or glyburide.

### Biotransformation

Fluvastatin is mainly metabolised in the liver. The major components circulating in the blood are fluvastatin and the pharmacologically inactive N-desisopropyl-propionic acid metabolite. The hydroxylated metabolites have pharmacological activity but do not circulate systemically. There are multiple, alternative cytochrome P450 (CYP450) pathways for fluvastatin biotransformation and thus fluvastatin metabolism is relatively insensitive to CYP450 inhibition.

Fluvastatin inhibited only the metabolism of compounds that are metabolised by CYP2C9. Despite the potential that

therefore exists for competitive interaction between fluvastatin and compounds that are CYP2C9 substrates, such as diclofenac, phenytoin, tolbutamide and warfarin, clinical data indicate that this interaction is unlikely.

### Elimination

Following administration of 3H-fluvastatin to healthy volunteers, excretion of radioactivity is about 6% in the urine and 93% in the faeces, and fluvastatin accounts for less than 2% of the total radioactivity excreted. The plasma clearance (CL/f) for fluvastatin in man is calculated to be  $1.8 \pm 0.8$  l/min. Steady-state plasma concentrations show no evidence of fluvastatin accumulation following administration of 80 mg daily. Following oral administration of 40 mg fluvastatin, the terminal disposition half-life for fluvastatin is  $2.3 \pm 0.9$  hours.

### Characteristics in patients

Plasma concentrations of fluvastatin do not vary as a function of either age or gender in the general population. However, enhanced treatment response was observed in women and in elderly people. Since fluvastatin is eliminated primarily via the biliary route and is subject to significant presystemic metabolism, the potential exists for drug accumulation in patients with hepatic insufficiency (see sections 4.3 and 4.4).

### Children and adolescents with heterozygous familial hypercholesterolaemia

No pharmacokinetic data in children are available.

## **5.3 Preclinical safety data**

The conventional studies, including safety pharmacology, genotoxicity, repeated dose toxicity, carcinogenicity and toxicity on reproduction studies did not indicate other risks for the patient than those expected due to the pharmacological mechanism of action. A variety of changes were identified in toxicity studies that are common to HMG-CoA reductase inhibitors. Based on clinical observations, liver function tests are already recommended (see section 4.4). Further toxicity seen in animals was either not relevant for human use or occurred at exposure levels sufficiently in excess of the maximum human exposure indicating little relevance to clinical use. Despite the theoretical considerations concerning the role of cholesterol in embryo development, animal studies did not suggest an embryotoxic and teratogenic potential of fluvastatin.

## **6 PHARMACEUTICAL PARTICULARS**

### **6.1 List of excipients**

#### Capsule content

Maize starch  
Crospovidone  
Talc  
Magnesium stearate

#### Capsule shell

Iron oxide red (E172)  
Titanium dioxide (E171)  
Gelatine  
Water

#### Black ink

Iron oxide black (E172)  
Shellac

### **6.2 Incompatibilities**

Not applicable.

### **6.3 Shelf life**

2 years

### **6.4 Special precautions for storage**

Do not store above 30°C.

Store in the original package in order to protect from moisture.

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

#### Blister Pack

OPA/aluminium/PVC/aluminium

Pack sizes 10, 14, 15, 28, 30, 50, 56, 98, 100, 500 capsules

Not all pack sizes may be marketed.

### **6.6 Special precautions for disposal and other handling**

Any unused product or waste material should be disposed of in accordance with local requirements.

## **7 MARKETING AUTHORISATION HOLDER**

McDermott Laboratories Ltd t/a Gerard Laboratories  
35/36 Baldoyle Industrial Estate  
Grange Road  
Dublin 13  
Ireland

## **8 MARKETING AUTHORISATION NUMBER**

PA 577/98/3

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