

Summary of Product Characteristics

1 NAME OF THE MEDICINAL PRODUCT

Diltam 90 mg Prolonged release tablets

2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each tablet contains 90mg diltiazem hydrochloride.

Excipient(s) with known effect: each tablet contains 30.0 mg lactose monohydrate

For the full list of excipients, see section 6.1.

3 PHARMACEUTICAL FORM

Prolonged – release tablet

White, round, biconvex tablets with a score notch on one side.

4 CLINICAL PARTICULARS

4.1 Therapeutic Indications

Mild to moderate hypertension and angina pectoris.

4.2 Posology and method of administration

Route of Administration:

Oral. Diltam 90 mg Prolonged release tablets should be swallowed with a little water and not chewed.

Adults:

Angina and Hypertension:

The usual starting dose is one tablet (90 mg) twice daily.

Patient responses may vary and dosage requirements can differ significantly between individual patients. Higher divided doses up to 480 mg/day have been used with benefit in some angina patients especially in unstable angina.

Doses of 360 mg/day may be required to provide adequate BP control in hypertensive patients.

Elderly and patients with impaired hepatic or renal function

Heart rate should be monitored in these patients and if it falls below 50 beats per minute the dose should not be increased.

Angina:

The recommended starting dose is one diltiazem 60 mg tablet twice daily. This dose may be increased to one Diltam 90 mg Prolonged release tablet twice daily.

Hypertension:

The starting dose should be one 120 mg diltiazem retard tablet daily. Dose adjustment to one Diltam 90 mg Prolonged release tablet twice daily may be required.

Paediatric population:

Safety and efficacy in children have not been established. Therefore diltiazem is not recommended for use in children.

4.3 Contraindications

Pregnancy, lactation and women of childbearing potential (see section 4.6).

Sick sinus syndrome except in the presence of a functioning ventricular pacemaker.

Second or third-degree AV block except in the presence of a functioning ventricular pacemaker.

Severe bradycardia (below 50 bpm)

Left ventricular failure with pulmonary congestion.

Concomitant use of dantrolene infusion (see section 4.5).

Hypersensitivity to the active substance or any of the excipients listed in section 6.1.

Combination with ivabradine (see section 4.5).

4.4 Special warnings and precautions for use

Close observation is necessary in patients with reduced left ventricular function, bradycardia (risk of exacerbation) or with a first degree AV block detected on the electrocardiogram (risk of exacerbation and rarely, of complete block).

Prior to general anaesthesia, the anaesthetist must be informed of ongoing diltiazem treatment. Depression of cardiac contractility, conductivity and automaticity as well as the vascular dilatation associated with anaesthetics may be potentiated by calcium channel blockers.

Increase of plasma concentrations of diltiazem may be observed in the elderly and patients with renal or hepatic insufficiency. The contraindications and precautions should be carefully observed and close monitoring, particularly of heart rate, should be carried out at the beginning of treatment.

Calcium channel blocking agents, such as diltiazem, may be associated with mood changes, including depression.

Like other calcium channel antagonists, diltiazem has an inhibitory effect on intestinal motility. Therefore it should be used with caution in patients at risk to develop an intestinal obstruction. Tablet residues from slow release formulations of the product may pass into the patient's stools; however, this finding has no clinical relevance.

Careful monitoring is necessary in patients with latent or manifest diabetes mellitus due to a possible increase in blood glucose.

The use of diltiazem may induce bronchospasm, including asthma aggravation, especially in patients with pre-existing bronchial hyper-reactivity. Cases have also been reported after dose increase. Patients should be monitored for signs and symptoms of respiratory impairment during diltiazem therapy.

Patients with rare hereditary problems of galactose intolerance, total lactase deficiency or glucose-galactose malabsorption should not take this medicine.

This medicine contains less than 1 mmol sodium (23 mg) per prolonged release tablet, that is to say essentially "sodium free".

4.5 Interaction with other medicinal products and other forms of interactions

Concomitant use contraindicated:

Dantrolene (infusion)

Lethal ventricular fibrillation is regularly observed in animals when intravenous verapamil and dantrolene are administered concomitantly. The combination of a calcium antagonist and dantrolene is therefore potentially dangerous (see section 4.3).

Ivabradine

Concomitant use with ivabradine is contraindicated due to the additional heart rate lowering effect of diltiazem to ivabradine (see section 4.3)

Concomitant use requiring caution:

Lithium

Risk of increase in lithium-induced neurotoxicity

Nitrate derivatives:

Increased hypotensive effects and faintness (additive vasodilating effects)

In all patients treated with calcium antagonists, the prescription of nitrate derivatives should only be carried out at gradually increasing doses.

Theophylline:

Increase in circulating theophylline levels.

Alpha-antagonists:

Increased anti-hypertensive effects.

Concomitant treatment with alpha-antagonists may produce or aggravate hypotension. The combination of diltiazem with an alpha antagonist should be considered only with strict monitoring of blood pressure.

Amiodarone, Digoxin:

Increased risk of bradycardia. Caution is required when these are combined with diltiazem, particularly in elderly subjects and when high doses are used.

Beta blockers:

Possibility of rhythm disturbances (pronounced bradycardia, sinus arrest), sino-atrial and atrio ventricular conduction disturbances and heart failure (synergistic effect).

Such a combination must only be used under close clinical and ECG monitoring, particularly at the beginning of treatment.

Depression has also been reported with concomitant use of diltiazem with beta-blockers (see section 4.5)

Other Antiarrhythmic agents:

Since diltiazem has antiarrhythmic properties, its concomitant prescription with other antiarrhythmic agents is not recommended (additive risk of increased cardiac adverse effects). This combination should only be used under close clinical and ECG monitoring.

X-Ray Contrast Media

Cardiovascular effects of an intravenous bolus of an ionic X-ray contrast media, such as hypotension, may be increased in patients treated with diltiazem.

Special caution is required in patients who concomitantly receive diltiazem and X-ray contrast media

Carbamazepine:

Increase in circulating carbamazepine levels.

It is recommended that the plasma carbamazepine concentrations be assayed and that the dose should be adjusted if necessary.

Ciclosporin:

Increase in circulating ciclosporin levels. It is recommended that the ciclosporin dose be reduced, renal function be monitored, circulating ciclosporin levels be assayed and that the dose should be adjusted during combination therapy and after its discontinuation.

Anti-H₂ agents (cimetidine and ranitidine):

Increase in plasma diltiazem concentrations. Patients currently receiving diltiazem therapy should be carefully monitored when initiating or discontinuing therapy with anti-H₂ agent. An adjustment in diltiazem daily dose may be necessary.

Rifampicin:

Risk of decrease in diltiazem plasma levels after initiating therapy with rifampicin. The patient should be carefully monitored when initiating or discontinuing rifampicin treatment.

Phenytoin

When co-administered with phenytoin, diltiazem may increase phenytoin plasma concentration

It is recommended that the phenytoin plasma concentrations be monitored.

mTOR (mechanistic target of rapamycin) inhibitors

Following concomitant oral administration of 10 mg sirolimus solution and 120 mg diltiazem, sirolimus C_{max} and AUC (CYP3A4 substrate) increased 1.4 and 1.6 fold, respectively. Diltiazem can increase the blood concentration of everolimus by inhibiting CYP3A4 metabolism or transport of everolimus from intestinal cells via P-glycoprotein. A dose reduction of mTOR inhibitors, such as sirolimus, temsirolimus or everolimus, may be necessary in concomitant use with diltiazem.

General information to be taken into account:

Due to the potential for additive effects, caution and careful titration are necessary in patients receiving diltiazem concomitantly with other agents known to affect cardiac contractility and/or conduction.

Ticagrelor

Exposure to ticagrelor may be increased when used concomitantly with diltiazem.

Cilostazol

Inhibition of cilostazol metabolism (CYP3A4). Diltiazem has been shown to increase cilostazol exposure and to enhance its pharmacological activity.

Grapefruit juice may increase diltiazem exposure (1.2 fold). Patients who consume grapefruit juice should be monitored for increased adverse effects of diltiazem. Grapefruit juice should be avoided if an interaction is suspected.

Diltiazem is metabolised by CYP3A4. A moderate (less than 2-fold) increase of diltiazem plasma concentration in cases of co-administration with a stronger CYP3A4 inhibitor has been documented. Diltiazem is also a CYP3A4 isoform inhibitor. Co-administration with other CYP3A4 substrates may result in an increase in plasma concentration of either co-administered drug. Co-administration of diltiazem with a CYP3A4 inducer may result in a decrease of diltiazem plasma concentrations.

Benzodiazepines (midazolam, triazolam):

Diltiazem significantly increases plasma concentrations of midazolam and triazolam and prolongs their half-life. Special care should be taken when prescribing short-acting benzodiazepines metabolized by the CYP3A4 pathway in patients using diltiazem.

Corticosteroids (methylprednisolone):

Inhibition of methylprednisolone metabolism (CYP3A4) and inhibition of P-glycoprotein.

The patient should be monitored when initiating methylprednisolone treatment. An adjustment in the dose of methylprednisolone may be necessary.

Statins:

Diltiazem is an inhibitor of CYP3A4 and has been shown to significantly increase the AUC of some statins. The risk of myopathy and rhabdomyolysis due to statins metabolised by CYP3A4 may be increased with concomitant use of diltiazem. When possible, a non CYP3A4-metabolised statin should be used together with diltiazem, otherwise close monitoring for signs and symptoms of a potential statin toxicity is required.

4.6 Fertility, pregnancy and lactation

Pregnancy

There is very limited data from the use of diltiazem in pregnant patients. Diltiazem has been shown to have reproductive toxicity in certain animal species (rat, mice, rabbit). Diltiazem is therefore not recommended during pregnancy, as well as in women of child-bearing potential not using effective contraception.

Breast-Feeding

As this drug is excreted in breast milk, breast feeding whilst taking diltiazem is contra-indicated.

4.7 Effects on ability to drive and use machines

On the basis of reported adverse drug reactions, i.e. dizziness (common), malaise (common), the ability to drive and use machines could be altered. However, no studies have been performed.

4.8 Undesirable effects

The following CIOMS frequency rating is used, when applicable: 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 $\leq 1/1,000$); very rare ($< 1/10,000$); not known (cannot be estimated from the available data).

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

	Very common	common	Uncommon	Rare	Not known
Blood and lymphatic					Thrombocytopenia

system disorders					
Psychiatric disorders			Nervousness, insomnia		Mood changes including depression
Nervous system disorders		Headache, dizziness			Extrapyramidal syndrome
Cardiac disorders		Atrioventricular block (may be of first, second or third degree; bundle branch block may occur), palpitations	Bradycardia		Sinoatrial block, congestive heart failure, sinus arrest, cardiac arrest (asystole)
Vascular disorders		Flushing	Orthostatic hypotension		Vasculitis (including leukocytoclastic vasculitis)
Respiratory, thoracic and mediastinal disorders					Bronchospasm (including asthma aggravation)
Gastrointestinal disorders		Constipation, dyspepsia, gastric pain, nausea	Vomiting, diarrhoea	Dry mouth	Gingival hyperplasia
Metabolism and nutrition disorders					Hyperglycemia
Hepatobiliary disorders			Hepatic enzymes increase (AST, ALT, LDH, ALP increase)		Hepatitis
Skin and subcutaneous tissue disorders		Erythema		Urticaria	Photosensitivity (including lichenoid keratosis at sun exposed skin areas), angioneurotic oedema, rash, erythema multiforme (including Steven-Johnson's syndrome and toxic epidermal necrolysis), sweating, exfoliative dermatitis, acute generalised exanthematous

					pustulosis, occasionally desquamative erythema with or without fever
Reproductive system and breast disorders					Gynecomastia
General disorders and administration site conditions	Peripheral oedema	Malaise			

Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via HPRA Pharmacovigilance, Earlsfort Terrace, IRL-Dublin 2; Tel: +353 1 6764971; Fax: +353 1 6762517.

Website: www.hpra.ie;

E-mail: medsafety@hpra.ie.

4.9 Overdose

The clinical effects of acute overdose can involve pronounced hypotension possibly leading to collapse and acute kidney injury, sinus bradycardia with or without isorhythmic dissociation, sinus arrest, atrioventricular conduction disturbances and cardiac arrest.

Treatment, in a hospital setting, will include gastric lavage and/or osmotic diuresis. Conduction disturbances may be managed by temporary cardiac pacing.

Proposed corrective treatments: atropine, vasopressors, inotropic agents, glucagon and calcium gluconate infusion.

5 PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

ATC Code: C08DB01

Pharmacotherapeutic Group: Calcium Channel Blockers

Calcium antagonist, anti-anginal agent, antihypertensive agent.

Diltiazem selectively restricts calcium entry into the slow calcium channel of vascular smooth muscle and myocardial muscle fibres in a voltage-dependent manner. By this mechanism, diltiazem reduces the concentration of intracellular calcium in the vicinity of contractile proteins.

In animals

Anti-anginal properties:

Diltiazem increases coronary blood flow without inducing any coronary steal phenomena. It acts both on small, large and collateral arteries. This vasodilator effect, which is moderate on peripheral systemic arterial territories, can be seen at doses that are not negatively inotropic.

The two major active circulating metabolites, i.e. desacetyl diltiazem and N-monodesmethyl diltiazem, induce coronary vasodilation corresponding to 10 and 20% respectively of that of the parent compound.

Antihypertensive properties:

Diltiazem reduces arterial smooth muscle tone by reducing calcium influx in vascular smooth muscle cells, and causes vasodilation which produces a decrease in total peripheral resistance.

Diltiazem reduces blood pressure without producing reflex tachycardia in various animal models of hypertension, particularly in the spontaneously hypertensive rat. It does not modify cardiac output and maintains renal blood flow.

Furthermore, it preferentially inhibits the vasoconstrictor effects of noradrenaline and angiotensin II. Diltiazem increases diuresis and reduces cardiac hypertrophy in the spontaneously hypertensive rat.

High doses of diltiazem lessen the development of arterial calcinosis arterialis in the rat. The two major active circulating metabolites (desacetyl diltiazem and N-monodesmethyl diltiazem) possess pharmacological activity which is approximately 50% that of diltiazem.

In humans

Anti-anginal properties:

Diltiazem increases coronary blood flow by reducing coronary resistance. Due to its moderate bradycardia-inducing activity and the reduction in systemic arterial resistance, diltiazem reduces cardiac workload. Electrophysiologically, diltiazem causes moderate bradycardia in normal subjects, marginally prolongs intranodal conduction and has no effect on hisian and infrahisian conduction.

Antihypertensive properties:

At a vascular level, the calcium antagonist effect of diltiazem produces moderate arterial vasodilation and improves large artery compliance. This well-balanced vasodilation leads to a decrease in blood pressure in the hypertensive subject, due to lowered peripheral resistance, without producing reflex tachycardia. On the contrary, slight slowing of the heart rate is observed. Visceral blood flow rates, in particular renal and coronary, are maintained or increased.

A slight natriuretic effect is observed following acute administration. Diltiazem does not stimulate the renin-angiotensin-aldosterone system during long-term therapy, and does not cause water and sodium retention, as evidenced by the absence of body weight variation and a lack of change in the water and electrolyte balance of the plasma.

Diltiazem acts as a coronary vasodilator on the heart, reducing left ventricular hypertrophy in the hypertensive subject. It has little effect on cardiac output.

Diltiazem reduces cardiac work by its moderate bradycardiac effect coupled with the lowering of systemic arterial resistance.

A negative inotropic effect has not been observed in a healthy myocardium. Diltiazem slows heart rate to a moderate extent and may exert a depressant effect on a diseased sinus node. It slows atrioventricular conduction and there is thus a risk of AV block.

Diltiazem does not affect conduction at the bundle of His or at infrahisian level.

Diltiazem does not affect glycoregulation. It does not adversely affect plasma lipoproteins or lipid metabolism.

5.2 Pharmacokinetic properties

Diltiazem is well absorbed (90%) in healthy volunteers following oral administration.

These formulations of diltiazem hydrochloride provide prolonged absorption of the active ingredient. Peak plasma concentrations occur between 4 and 8 hours post-dose.

Bioavailability of this formulation of diltiazem is approximately 90% of that of the conventional tablet. The mean apparent plasma half-life is 7 – 8 hours. After repeated administration there is an increase of 30% with respect to the theoretical value, in the following parameters: C_{max}, AUC, C_{min}. This increase is due to the partial saturation of hepatic first pass.

Diltiazem is 80 - 85% bound to plasma proteins. It is extensively metabolised by the liver.

The major circulating metabolite, N-monodesmethyl diltiazem accounts for approximately 35% of the circulating diltiazem.

Less than 5% of diltiazem is excreted unchanged in the urine.

During long term administration to any one patient, plasma concentrations of diltiazem remain constant.

Mean plasma concentrations in elderly subjects and patients with renal and hepatic insufficiency are higher than in young subjects.

Diltiazem and its metabolites are poorly dialysed.

Twice daily formulations of diltiazem have been shown to have different pharmacokinetic profiles and therefore it is not advised to substitute different brands for one another.

5.3 Preclinical safety data

In subacute and chronic dog and rat studies designed to produce toxicity, high doses of diltiazem retard 90 mg prolonged release tablets were associated with hepatic damage. In special subacute hepatic studies, oral doses of 125 mg/kg and higher in rats were associated with histological changes in the liver which were reversible when the drug was discontinued. In dogs, doses of 20 mg/kg were also associated with hepatic changes; however, these changes were reversible with continued dosing.

6 PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Hydrogenated castor oil
Lactose monohydrate
Povidone 25
Macrogol 6000
Microcrystalline cellulose
Sodium starch glycollate
Collodial anhydrous silica
Magnesium stearate

Film-Coating

Sepifilm LP 761 White

Containing:

Hypromellose
Microcrystalline cellulose (E460)
Stearic acid
Titanium dioxide (E171)

6.2 Incompatibilities

Not applicable.

6.3 Shelf life

3 years.

6.4 Special precautions for storage

Do not store above 25°C. Store in the original package.

6.5 Nature and contents of container

Diltam 90 mg Prolonged Release Tablets are packaged in blisters of polypropylene welded on an internally film-coated aluminium semi-rigid support, 6 and 10 blister strips of 10 tablets each are packed in outer cardboard cartons (Packs of 60 and 100).

Sample packs of one blister strip (10 tablets) are also available.

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

Rowex Ltd
Newtown
Bantry
Co. Cork
Ireland

8 MARKETING AUTHORISATION NUMBER

PA0711/004/002

9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION

Date of first authorisation: 12th December 1995

Date of last renewal: 12th December 2005

10 DATE OF REVISION OF THE TEXT

October 2019