

ISOPTIN®



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## 1. Product Name

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Isoptin, 5 mg/2 mL, solution for injection.

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## 2. Qualitative and Quantitative Composition

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Each ampoule contains 2.5 mg/mL verapamil hydrochloride (equivalent to 2.3 mg/mL verapamil) and sodium chloride 8.5 mg/mL in water for injection.

For the full list of excipients, see section 6.1.

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## 3. Pharmaceutical Form

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Verapamil hydrochloride injection is a sterile, nonpyrogenic solution that contains no bacteriostatic or antimicrobial agent and is intended for single-dose intravenous administration. It may contain hydrochloric acid for pH adjustment; pH is 4.9 (4.0 to 6.5).

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## 4. Clinical Particulars

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### 4.1 *Therapeutic indications*

- Tachycardias, such as paroxysmal supraventricular tachycardia, atrial fibrillation with rapid ventricular response, (except in WPW syndrome, see section 4.4), atrial flutter with rapid conduction, extrasystoles.
- For the prophylaxis and/or therapy of ectopic arrhythmias (predominantly ventricular extrasystoles) in halothane anaesthesia and in the application of adrenaline in halothane anaesthesia, respectively.
- Acute hypertension.
- Acute coronary insufficiency.

### 4.2 *Dose and method of administration*

#### **Dose**

#### **Adults**

5 mg slowly intravenously, in tachycardias and hypertensive crises repeated, if necessary, after 5 to 10 minutes. Drip infusion to maintain the therapeutic effect: 5-10 mg/hour in physiological saline, glucose, laevulose or similar solutions, on average up to a total dose of 100 mg/day.

#### **Special populations**

#### **Paediatric**

Newborn	0.75-1 mg (= 0.3-0.4 mL)
Infants	0.75-2 mg (= 0.3-0.8 mL)

Children	(aged 1-5 years)	2-3mg (= 0.8-1.2 mL)
	(aged 6-14 years)	2.5-5mg (= 1-2 mL)

of Isoptin, given intravenously, depending on age and action. The injection should be made slowly under electrocardiographic control and only until onset of the effect. Intravenous infusion in hypertensive crises; initially 0.05-0.1 mg/kg/hour; if the effect proves to be insufficient, the dose is increased at 30-60 minute intervals until twice the dose or more is reached. Average total dose up to 1.5 mg/kg/day.

### **Method of administration**

Verapamil should be given as a slow intravenous injection over at least 2 minutes under continuous ECG and blood pressure monitoring.

Intravenous injection should only be given by the physician.

### **4.3 Contraindications**

- Cardiogenic shock (except for arrhythmia induced shock), complicated acute myocardial infarction (bradycardia, hypotension, left ventricular failure), second and third degree AV block, sick sinus syndrome (bradycardia-tachycardia syndrome), manifest heart failure.
- In the presence of first degree AV block, sinus bradycardia and hypotension the use of Isoptin should be given critical consideration. In acute coronary insufficiency intravenous administration is only admissible with careful indication and continuous monitoring of the patient. Where heart failure is present, full compensation with cardiac glycosides must be achieved before the administration of Isoptin.
- Patients with atrial flutter or atrial fibrillation and an accessory bypass tract (e.g Wolff-Parkinson-White, Lown-Ganong-Levine syndromes). These patients are at risk to develop ventricular tachyarrhythmia including ventricular fibrillation if verapamil is administered.
- Patients with ventricular tachycardia. Administration of intravenous verapamil to patients with wide-complex ventricular tachycardia (QRS > 0.12 sec) can result in marked haemodynamic deterioration and ventricular fibrillation. Proper diagnosis and differentiation from wide-complex supraventricular tachycardia is imperative in the emergency room setting.
- Severe hypotension.
- Isoptin injection should not be administered intravenously to patients on beta-blockers (except in an intensive care setting).
- In patients with diminished hepatic function (parenchymal loss/reduced blood supply) the effect of Isoptin is intensified and prolonged depending on the severity of the disease due to impaired drug metabolism. In these cases, dosage should be adjusted with special care.
- Concomitant administration of verapamil and ivabradine is contraindicated (see section 4.5).
- Known hypersensitivity to verapamil hydrochloride.

### **4.4 Special warnings and precautions for use**

In atrial fibrillation and simultaneous WPW syndrome there is a risk of inducing ventricular fibrillation.

#### **Hypotension**

Severe hypotension has occasionally occurred following intravenous administration of the drug. On rare occasions this has been followed by a loss of consciousness. If severe hypotension develops, verapamil should be promptly discontinued and vasoconstrictor substances used.

In patients using antihypertensive drugs, the additional hypotensive effect should be taken into consideration.

## **Acute myocardial infarction**

Use with caution in patients with acute myocardial infarction complicated by bradycardia, marked hypotension, or left ventricular dysfunction.

## **Ventricular fibrillation**

Intravenous administration may precipitate ventricular fibrillation. Patients with atrial flutter/fibrillation and an accessory AV pathway may develop increased antegrade conduction across the aberrant pathway bypassing the AV node, producing a very rapid ventricular response after receiving intravenous verapamil. Its use in these patients is contraindicated (see section 4.3).

## **Bradycardia/asystole**

Isoptin slows conduction across the AV node and rarely may produce second or third degree AV block, bradycardia and in extreme cases, asystole. This is more likely to occur in patients with a sick sinus syndrome (SA nodal disease). Asystole in patients other than those with sick sinus syndrome is usually of short duration (a few seconds or less), with spontaneous return to AV nodal or normal sinus rhythm. If this does not occur promptly, appropriate treatment should be initiated immediately (see section 4.8).

## **Heart failure**

Because of the drug's negative inotropic effect, verapamil should not be used in patients with poorly compensated congestive heart failure, unless the failure is complicated by or caused by an arrhythmia. If verapamil is used in such patients, they must be digitalized prior to treatment. Continuous monitoring is mandatory when intravenous verapamil is used in digitalized patients. It has been reported that digoxin plasma levels may increase with chronic oral administration.

## **Use in hepatic impairment**

Verapamil should be used with caution in patients with hepatic impairment.

## **Use in renal impairment**

Although impaired renal function has been shown to have no effect on verapamil pharmacokinetics in patients with end-stage renal failure, verapamil should be used cautiously and with close monitoring in patients with impaired renal function. Verapamil cannot be removed by haemodialysis.

These patients should be monitored carefully for abnormal prolongation of the PR interval or other signs of excessive pharmacological effects.

## **Use in patients with impaired neuromuscular transmission**

Verapamil should be used with caution in the presence of diseases in which neuromuscular transmission is affected (myasthenia gravis, Lambert-Eaton syndrome, advanced Duchenne muscular dystrophy).

Intravenous verapamil can precipitate respiratory muscle failure in patients with progressive muscular dystrophy and should, therefore, be used with caution.

## **Increased intracranial pressure**

Intravenous verapamil has been seen to increase intracranial pressure in patients with supratentorial tumors at the time of anaesthesia induction. Caution should be taken and appropriate monitoring performed.

## **Sick sinus syndrome**

Precaution should be taken when treating any supraventricular arrhythmia on an emergency basis as it may be caused by an undiagnosed Sick Sinus Syndrome (see section 4.3).

## **Heart block**

Development of second or third degree AV block or unifascicular, bifascicular or trifascicular bundle branch block requires reduction in subsequent doses or discontinuation of verapamil and institution of appropriate therapy, if needed (see section 4.8).

## **Use in elderly**

No data available.

## **Paediatric use**

There have been rare cases of severe haemodynamic events – some fatal – after intravenous administration of verapamil to neonates and infants. Intravenous verapamil should not be administered to this group of patients unless it is absolutely necessary and there is no alternative.

## **Effects on laboratory tests**

No data available.

## **4.5 Interaction with other medicines and other forms of interaction**

Coadministration of verapamil and a drug primarily metabolized by CYP3A4 or being a P-gp substrate may be associated with elevations in drug concentrations that could increase or prolong both therapeutic and adverse effects of the concomitant drug.

### **Beta blockers**

During the simultaneous administration of Isoptin and drugs with cardiodepressive action and/or inhibitory effect on AV conduction watch should be kept for additive effects. Above all Isoptin should not be administered intravenously without compelling reason if the patient is on  $\beta$ -adrenergic blockers.

The concomitant administration of intravenous beta blockers and intravenous verapamil has resulted in serious adverse reactions, especially in patients with severe cardiomyopathy, congestive heart failure or recent myocardial infarction (see section 4.3).

The additional hypotensive effect of Isoptin should be borne in mind particularly in patients on antihypertensive drugs.

### **Diuretics, vasodilators**

Potential of the antihypertensive effect.

### **Digoxin**

Elevation of digoxin plasma levels because of diminished renal excretion. However since both drugs slow AV conduction, patients should be monitored for AV block or excessive bradycardia.

### **Quinidine**

Enhanced blood pressure lowering is possible. Pulmonary oedema may occur in patients with hypertrophic obstructive cardiomyopathy. Elevation of quinidine plasma level.

### **Flecainide**

May result in an additive negative inotropic effect and prolongation of atrioventricular conduction.

### **Disopyramide**

Possible additive effects and impairment of left ventricular function. Pending further accumulation of data, disopyramide should be discontinued 48 hours prior to initiating verapamil therapy and should not be reinstated until 24 hours after verapamil has been discontinued.

## **Ivabradine**

Concomitant administration of verapamil and ivabradine is contraindicated. Ivabradine use in combination with verapamil is associated with increased plasma concentrations of ivabradine and additional heart rate lowering effects (see section 4.3).

## **HMG-CoA reductase inhibitors**

Treatment with HMG-CoA reductase inhibitors (e.g., simvastatin or atorvastatin) in a patient taking verapamil should be started at the lowest possible dose and titrated upwards. If verapamil treatment is to be added to patients already taking an HMG-CoA reductase inhibitor (e.g., simvastatin or atorvastatin) consider a reduction in the statin dose and retitrate against serum cholesterol concentrations.

Verapamil hydrochloride may increase the serum levels of HMG-CoA reductase inhibitors primarily metabolised by CYP3A enzymes (e.g., atorvastatin and simvastatin). An interaction in healthy subjects demonstrated a 43% increase in verapamil AUC in combination with atorvastatin. Consider using caution when these HMG-CoA reductase inhibitors and verapamil are concomitantly administered.

Fluvastatin, pravastatin and rosuvastatin are not metabolized by CYP3A4 and are less likely to interact with verapamil.

## **Metformin**

Co-administration of verapamil with metformin may reduce the efficacy of metformin.

## **Inhalation anaesthetics**

Mutual potentiation of cardiovascular effects (higher-grade AV block, higher-grade lowering of heart rate, induction of heart failure, enhanced blood pressure lowering).

## **Carbamazepine**

Potentiation of carbamazepine effect, enhanced neurotoxicity.

## **Cimetidine**

Cimetidine reduces verapamil clearance following intravenous verapamil administration.

## **Lithium**

Increased sensitivity to the effects of lithium (neurotoxicity) has been reported during concomitant verapamil hydrochloride-lithium therapy with either no change or an increase in serum lithium levels. The addition of verapamil hydrochloride, however, has also resulted in the lowering of the serum lithium levels in patients receiving chronic stable oral lithium. Patients receiving both drugs should be monitored carefully.

## **Phenytoin, phenobarbital (phenobarbitone)**

Lowering of the plasma level and attenuation of the effects of verapamil.

## **Erythromycin, clarithromycin and telithromycin**

Erythromycin, clarithromycin and telithromycin therapy may increase serum levels of verapamil.

## **Rifampicin**

Blood pressure lowering effect may be reduced.

## **Sulfinpyrazone**

Blood pressure lowering effect may be reduced.

### **Theophylline**

Elevation of theophylline plasma levels.

### **Prazosin, terazosin**

Additive hypotensive effect.

### **HIV antiviral agents**

Due to the metabolic inhibitory potential of some of the HIV antiviral agents, such as ritonavir, plasma concentrations of verapamil may increase. Caution should be used or the dose of verapamil may be decreased.

### **Ciclosporin**

Elevation of ciclosporin plasma levels.

### **Everolimus, sirolimus and tacrolimus**

Verapamil therapy may increase serum levels of everolimus, sirolimus and tacrolimus.

### **Buspirone**

Verapamil therapy may increase plasma levels of buspirone.

### **Midazolam**

Elevation of midazolam.

### **Muscle relaxants**

Possible potentiation by verapamil.

### **Protein bound drugs**

As verapamil is highly protein bound, it should be administered with caution to patients receiving other highly protein bound drugs.

### **Dantrolene**

Animal studies suggest that concomitant use of IV verapamil and IV dantrolene may result in cardiovascular collapse.

### **Aspirin**

Increased tendency to bleed.

### **Ethanol (alcohol)**

Delayed ethanol breakdown and elevation of ethanol plasma levels, resulting in enhancement of the alcoholic effect through verapamil.

### **Grapefruit juice**

Increase in verapamil serum level has been reported. Therefore grapefruit and its juice should not be taken with verapamil.

### **Other direct oral anticoagulants (DOACs)**

Use of DOAC with verapamil may increase the absorption of DOACs since they are P-glycoprotein (P-gp) substrates. If applicable, coadministration with verapamil may also reduce elimination of DOACs which are metabolized by CYP3A4, and this may increase the systemic bioavailability of DOACs.

When co-administered with oral verapamil, the dose of DOAC may need to be reduced (refer to DOAC Product Information for DOAC dosing instruction) as the risk of bleeding may increase especially in patients with further risk factors.

### **Doxorubicin**

Caution should be used when oral verapamil is administered in combination with doxorubicin due to the potential for increased doxorubicin levels.

### **Colchicine**

Colchicine is a substrate for both CYP3A and the efflux transporter, P-glycoprotein (P-gp). Verapamil is known to inhibit CYP3A and P-gp. When verapamil and colchicine are administered together, inhibition of P-gp and/or CYP3A by verapamil may lead to increased exposure to colchicine. Combined use is not recommended.

### **Imipramine**

Verapamil therapy may increase serum levels of imipramine.

### **Glibenclamide**

Verapamil therapy may increase serum levels of glibenclamide.

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

### **Pregnancy**

Category C

Verapamil carries the potential to produce fetal hypoxia associated with maternal hypotension.

Verapamil should not be administered intravenously during the first six months of pregnancy. There are no data on use in the first and second trimester. Verapamil should not be used in the final trimester unless the benefits clearly outweigh the risks.

Reproduction studies have been performed in rabbits and rats at oral verapamil doses up to 180 mg/m<sup>2</sup>/day and 360 mg/m<sup>2</sup>/day (compared to a maximum recommended human oral daily dose of 317 mg/m<sup>2</sup>) and have revealed no evidence of teratogenicity. In the rat, however, a dose similar to the clinical dose (360 mg/m<sup>2</sup>) was embryocidal and retarded foetal growth and development. These effects occurred in the presence of maternal toxicity (reflected by reduced food consumption and weight gain of dams). This oral dose has also been shown to cause hypotension in rats. There are, however, no adequate and well controlled studies in pregnant women.

Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed.

### **Breast feeding**

Verapamil hydrochloride is excreted in human breast milk. There are currently no reports of verapamil injection or infusion use during breast feeding. Due to the potential for serious adverse reactions in nursing infants, intravenous verapamil is not recommended during breast feeding.

### **Fertility**

No data available.

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

The antihypertensive effect of verapamil may affect the ability to drive a vehicle or operate machinery. Special caution should be taken at the start of treatment, during dose titration and when switching from another medicine.

#### **4.8 Undesirable effects**

As with all drugs which inhibit AV conduction, Isoptin can produce first or second degree AV block; in extreme cases there may be complete block with or without subsequent asystole. Occasionally, heart failure may develop or existing heart failure may be exacerbated.

The risk of inducing ventricular fibrillation is minute, as Isoptin has no effect on the conduction velocity and refractory period in either atria or ventricles. By diminishing the peripheral resistance, the intravenous administration of Isoptin may lead to a slight and transient decrease of blood pressure even in normotensive patients. If the heart is no longer able to increase cardiac output for maintaining normal blood pressure, a critical blood pressure fall may occur. There are rare reports of symptoms such as palpitations and rapid heartbeat (tachycardia) in patients receiving verapamil.

Elevation of the pacing and sensing threshold cannot be ruled out in pacemaker wearers on verapamil hydrochloride.

Frequently, nausea (rarely, vomiting), bloating or constipation - in isolated cases to the point of ileus, abdominal discomfort and pain.

Occasionally, there may be headache, nervousness, dizziness or lightheadedness, fatigue, sensory disturbances such as tingling, numbness (paraesthesia, neuropathy), shakiness (tremor), and vertigo.

Flush has been observed occasionally.

Occasionally, allergic reactions such as erythema, pruritus, urticaria, maculopapular exanthema and erythromelalgia may occur. Rarely bronchospasm may occur.

Rarely – tinnitus. Peripheral oedema may occur as a result of local arteriole dilation.

Rarely, reversible elevation of liver enzymes has been observed, probably as a manifestation of allergic hepatitis.

Relevant lowering of glucose tolerance is rare.

There are rare reports of impotence.

Gynaecomastia has been observed very rarely in elderly patients on long term treatment. In the cases reported to date, the condition was reversible upon discontinuation of the drug. Elevated prolactin levels has been described, with isolated cases of milk (galactorrhoea).

Very rarely, there have been cases of purpura in the skin or mucous. There are isolated reports of photodermatitis.

Very rarely, muscular weakness or muscle and joint pain may occur.

There are isolated reports of angioneurotic oedema and Stevens-Johnson syndrome.

There may be isolated cases of gingival hyperplasia which is reversible when the drug is discontinued.



## **Adverse effects from post-marketing surveillance**

There has been a single post marketing report of paralysis (tetraparesis) associated with the combined use of verapamil and colchicine. This may have been caused by colchicine crossing the blood-brain barrier due to CYP3A and P-gp inhibition by verapamil. Combined use of verapamil and colchicine is not recommended.

Other adverse effects reported from post-marketing surveillance include erythema multiforme, extrapyramidal syndrome, hyperkalaemia, dyspnoea and renal failure.

## **Treatment of acute cardiovascular side effects**

### ***Cardiac arrest***

External cardiac massage, artificial respiration, ECG for differentiating between asystole and ventricular fibrillation; then appropriate intensive measures, such as defibrillation or pacemaker therapy, as required.

### ***Second or third degree AV block***

Atropine, isoprenaline, if necessary, pacemaker therapy.

### ***Development of myocardial insufficiency***

Dopamine, dobutamine, cardiac glycosides or calcium.

### ***Blood pressure fall***

Proper positioning, dopamine, dobutamine, noradrenaline (norepinephrine).

## **Reporting of suspected adverse reactions**

Reporting suspected adverse reactions after authorisation of the medicine is important. It allows continued monitoring of the benefit/risk balance of the medicine. Healthcare professionals are asked to report any suspected adverse reactions <https://nzphvc.otago.ac.nz/reporting/>

## **4.9 Overdose**

### **Symptoms**

Hypotension, bradycardia up to high degree AV block and sinus arrest, hyperglycemia, stupor and metabolic acidosis and acute respiratory distress syndrome. Fatalities have occurred as a result of overdose.

### **Treatment**

Treatment of overdosage should be supportive and individualized. Beta-adrenergic stimulation and/or parenteral administration of calcium injection (calcium chloride) have been effectively used in treatment of deliberate overdosage with oral verapamil hydrochloride. Verapamil hydrochloride cannot be removed by hemodialysis. Clinically significant hypotensive reactions or high-degree AV block should be treated with vasopressor agents or cardiac pacing, respectively. Asystole should be handled by the usual measures including isoproterenol hydrochloride, other vasopressor agents or cardiopulmonary resuscitation.

For further advice on management of overdose please contact the National Poisons Information Centre (0800 POISON or 0800 764 766).

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## 5. Pharmacological Properties

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### 5.1 *Pharmacodynamic properties*

Pharmacotherapeutic group: Selective calcium channel blockers with direct cardiac effects, phenylalkylamine derivatives, ATC code: C08DA01.

Verapamil hydrochloride is a white or practically white crystalline powder. It is practically odourless and has a bitter taste. It is soluble in water, freely soluble in chloroform, sparingly soluble in alcohol and practically insoluble in ether.

#### **Mechanism of action**

Isoptin is a calcium ion influx inhibitor (slow channel blocker or calcium ion antagonist) which exerts its pharmacologic effects by modulating the influx of ionic calcium across the cell membrane of the arterial smooth muscle as well as in conductile and contractile myocardial cells.

#### **Clinical efficacy and safety**

Verapamil has a pronounced antiarrhythmic action particularly in supraventricular cardiac arrhythmias. It prolongs impulse conduction in the AV node and thereby depending on the type of arrhythmia restores the sinus rhythm and/or normalises the ventricular rate.

The calcium antagonist verapamil reduces myocardial oxygen consumption directly by intervening in the energy consuming metabolic processes of the myocardial cell and indirectly by diminishing the peripheral resistance (afterload).

The decrease of the vascular smooth muscle tone moreover prevents coronary spasms and lowers raised blood pressure.

### 5.2 *Pharmacokinetic properties*

Impaired renal function has no effect on verapamil hydrochloride pharmacokinetics in patients with end-stage renal failure and subjects with healthy kidneys.

### 5.3 *Preclinical safety data*

#### **Genotoxicity**

Verapamil was not mutagenic in the Ames test in 5 test strains at 3 mg per plate, with or without metabolic activation.

#### **Carcinogenicity**

An 18-month toxicity study in rats, at a low multiple (6 fold) of the maximum recommended human dose, and not the maximum tolerated dose, did not suggest a tumorigenic potential. There was no evidence of carcinogenic potential of verapamil administered in the diet of rats for two years at doses of 10, 35 and 120 mg/kg/day or approximately 1x, 3.5x and 12x, respectively, the maximum recommended human daily dose (480 mg/day or 9.6 mg/kg/day).

#### **Animal pharmacology and/or animal toxicology**

In chronic animal toxicology studies verapamil caused lenticular and/or suture line changes at 30 mg/kg/day or greater and frank cataracts at 62.5 mg/kg/day or greater in the beagle dog but not the rat. Development of cataracts due to verapamil has not been reported in humans.

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## 6. Pharmaceutical Particulars

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### 6.1 *List of excipients*

In addition to the active ingredient, Isoptin solution for injection also contains sodium chloride and water for injections. It may contain hydrochloric acid for pH adjustment.

### 6.2 *Incompatibilities*

In the absence of compatibility studies, this medicine must not be mixed with other medicines.

### 6.3 *Shelf life*

3 years.

### 6.4 *Special precautions for storage*

Store at or below 25°C.

### 6.5 *Nature and contents of container*

Colourless 2 mL glass ampoule. Pack-size of 5 ampoules.

### 6.6 *Special precautions for disposal*

The solution contains no bacteriostatic or antimicrobial agent and is intended for single-dose intravenous administration.

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

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## 7. Medicines Schedule

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Prescription Medicine

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## 8. Sponsor Details

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Mylan New Zealand Ltd  
PO Box 11183  
Ellerslie  
AUCKLAND  
Telephone 0800 579 811

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## 9. Date of First Approval

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8 February 1973

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## 10. Date of Revision of the Text

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21 May 2021

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## Summary of changes

Section	
4.5	Added interaction with metformin.
4.9	Added acute respiratory distress syndrome as symptom of verapamil overdose.