



## **SUMMARY OF PRODUCT CHARACTERISTICS (SmPC)**

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### **1. NAME OF THE MEDICINAL PRODUCT**

RAMICARD 5 (Ramipril Tablets BP 5 mg)

### **2. QUALITATIVE AND QUANTITATIVE COMPOSITION**

Each uncoated tablet contains:

Ramipril BP .....5 mg

Excipients .....q.s.

For a full list of excipients, see section 6.1

### **3. PHARMACEUTICAL FORM**

**Dosage Form:** Solid Dosage form –Uncoated Tablet

**Visual & Physical characteristics of the product:** White coloured circular, uncoated table having a mark “CHCL” on one side and “CHANRAI” symbol on other side of the tablet.

### **4. CLINICAL PARTICULARS**

#### **4.1. Therapeutic Indications:**

- Treatment of hypertension.
- Treatment of renal disease: Incipient glomerular diabetic nephropathy as defined by the presence of microalbuminuria. Manifest glomerular diabetic nephropathy as defined by macro proteinuria in patients with at least one cardiovascular risk factor. Manifest glomerular non diabetic nephropathy as defined by macro proteinuria  $\geq 3$  g/day.
- Treatment of symptomatic heart failure.

**Secondary prevention after acute myocardial infarction:** reduction of mortality from the acute phase of myocardial infarction in patients with clinical signs of heart failure when started > 48 hours following acute myocardial infarction.

#### **4.2 Posology and Method of Administration:**

**Posology**

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It is recommended that Ramipril is taken each day at the same time of the day. Ramipril tablets can be taken before, with or after meals, because food intake does not modify its bioavailability. Ramipril tablets have to be swallowed with liquid.

### Adults

**Diuretic-Treated patients:** Hypotension may occur following initiation of therapy with Ramipril; this is more likely in patients who are being treated concurrently with diuretics. Caution is therefore recommended since these patients may be volume and/or salt depleted. If possible, the diuretic should be discontinued 2 to 3 days before beginning therapy with Ramipril. In hypertensive patients in whom the diuretic is not discontinued, therapy with Ramipril should be initiated with a 1.25mg dose. Renal function and serum potassium should be monitored. The subsequent dosage of Ramipril should be adjusted according to blood pressure target.

**Hypertension:** The dose should be individualised according to the patient profile and blood pressure control. Ramipril tablets may be used in monotherapy or in combination with other classes of antihypertensive medicinal products.

**Starting dose:** Ramipril tablets should be started gradually with an initial recommended dose of 2.5mg daily. Patients with a strongly activated renin-angiotensin-aldosterone system may experience an excessive drop in blood pressure following the initial dose. A starting dose of 1.25mg is recommended in such patients and the initiation of treatment should take place under medical supervision.

**Titration and maintenance dose:** The dose can be doubled at interval of two to four weeks to progressively achieve target blood pressure; the maximum permitted dose of Ramipril is 10mg daily. Usually, the dose is administered once daily. See also posology on Diuretic-Treated patients.

### Treatment of renal disease

#### In patients with diabetes and microalbuminuria

**Starting dose:** The recommended initial dose is 1.25mg of Ramipril once daily. Titration and maintenance dose: Depending on the patient's tolerability to the active substance, the dose is subsequently increased. Doubling the once daily dose to 2.5mg after two weeks and then to 5mg after a further two weeks is recommended.

#### In patients with diabetes and at least one cardiovascular risk

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**Starting dose:** The recommended initial dose is 2.5mg of Ramipril once daily.

**Titration and maintenance dose:** Depending on the patient's tolerability to the active substance, the dose is subsequently increased. Doubling the daily dose to 5mg Ramipril after one or two weeks and then to 10mg Ramipril after a further two or three weeks is recommended. The target daily dose is 10mg.

**In patients with non-diabetic nephropathy as defined by macro proteinuria  $\geq 3\text{g/day}$ .**

**Starting dose:** The recommended initial dose is 1.25mg of Ramipril once daily.

**Titration and maintenance dose:** Depending on the patient's tolerability to the active substance, the dose is subsequently increased. Doubling the once daily dose to 2.5mg after two weeks and then to 5mg after a further two weeks is recommended.

**See also posology on Diuretic-Treated patients.**

### **Symptomatic heart failure**

**Starting dose:** In patients stabilized on diuretic therapy, the recommended initial dose is 1.25mg daily.

**Titration and maintenance dose:** Ramipril should be titrated by doubling the dose every one to two weeks up to a maximum daily dose of 10mg. Two administrations per day are preferable.

**See also posology on Diuretic-Treated patients.**

### **Secondary prevention after acute myocardial infarction and with heart failure**

**Starting dose:** After 48 hours, following myocardial infarction in a clinically and haemodynamically stable patient, the starting dose is 2.5mg twice daily for three days. If the initial 2.5mg dose is not tolerated a dose of 1.25mg twice a day should be given for two days before increasing to 2.5mg and 5mg twice a day. If the dose cannot be increased to 2.5mg twice a day, the treatment should be withdrawn.

**Titration and maintenance dose:** The daily dose is subsequently increased by doubling the dose at intervals of one to three days up to the target maintenance dose of 5mg twice daily. The maintenance dose is divided in 2 administrations per day where possible. If the dose cannot be increased to 2.5mg twice a day treatment should be withdrawn. Sufficient experience is still lacking in the treatment of patients with severe (NYHA IV) heart failure immediately after myocardial infarction. Should the decision be taken to treat these patients, it is recommended that

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therapy be started at 1.25mg once daily and that particular caution be exercised in any dose increase. See also posology on Diuretic-Treated patients.

### Special populations

#### Patients with renal impairment

Daily dose in patients with renal impairment should be based on creatinine clearance:

- If creatinine clearance is  $\geq 60$ ml/min, it is not necessary to adjust the initial dose (2.5mg/day); the maximal daily dose is 10mg;
- If creatinine clearance is between 30-60ml/min, it is not necessary to adjust the initial dose (2.5mg/day); the maximal daily dose is 5mg;
- If creatinine clearance is between 10-30ml/min, the initial dose is 1.25mg/day and the maximal daily dose is 5mg;
- In haemodialysed hypertensive patients: Ramipril is slightly dialysable; the initial dose is 1.25mg/day and the maximal daily dose is 5mg; the medicinal product should be administered few hours after haemodialysis is performed.

**Patients with hepatic impairment:** In patients with hepatic impairment, treatment with Ramipril must be initiated only under close medical supervision and the maximum daily dose is 2.5mg Ramipril.

**Elderly:** Initial doses should be lower and subsequent dose titration should be more gradual because of greater chance of undesirable effects especially in very old and frail patients. A reduced initial dose of 1.25mg Ramipril should be considered.

**Paediatric population:** The safety and efficacy of Ramipril in children aged 2 – 16 years has not yet been established.

#### Method of administration

For oral administration.

#### 4.3 Contraindications:

- Hypersensitivity to the active substance or to any of the excipients or any other ACE (Angiotensin Converting Enzyme) inhibitors.
  - History of angioedema (hereditary, idiopathic or due to previous angioedema with ACE inhibitors or AIIRAs).
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- Extracorporeal treatments leading to contact of blood with negatively charged surfaces.
- Significant bilateral renal artery stenosis or renal artery stenosis in a single functioning kidney.
- 2nd and 3rd trimester of pregnancy.
- Ramipril must not be used in patients with hypotensive or hemodynamically unstable states.
- Ramipril must not be used with aliskiren-containing medicinal products in patients with diabetes mellitus or with moderate to severe renal impairment (creatinine clearance <60ml/min).

### **4.4 Special Warnings and Precautions for use:**

#### **Special populations**

**Pregnancy:** ACE inhibitors such as Ramipril, or Angiotensin II Receptor Antagonists (AIIRAs) should not be initiated during pregnancy. Unless continued ACE inhibitors/AIIRAs therapy is considered essential, patients planning pregnancy should be changed to alternative antihypertensive treatments which have an established safety profile for use in pregnancy. When pregnancy is diagnosed, treatment with ACE inhibitors/AIIRAs should be stopped immediately, and, if appropriate, alternative therapy should be started. Patients at particular risk of hypotension

- Patients with strongly activated renin-angiotensin-aldosterone system Patients with strongly activated renin-angiotensin-aldosterone system are at risk of an acute pronounced fall in blood pressure and deterioration of renal function due to ACE inhibition, especially when an ACE inhibitor or a concomitant diuretic is given for the first time or at first dose increase.

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

- Dual blockade of the renin-angiotensin-aldosterone system (RAAS) with aliskiren containing medicinal products. Dual blockade of the renin-angiotensin-aldosterone system by combining Ramipril with aliskiren is not recommended since there is an increased risk of hypotension, hyperkalemia and changes in renal function. The use of Ramipril in combination with aliskiren is contraindicated in patients with diabetes mellitus or renal impairment (creatinine clearance <60ml/min).
- Transient or persistent heart failure post MI
- Patients at risk of cardiac or cerebral ischemia in case of acute hypotension

The initial phase of treatment requires special medical supervision.

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### **Elderly patients**

**Surgery:** It is recommended that treatment with angiotensin converting enzyme inhibitors such as Ramipril should be discontinued where possible one day before surgery.

**Monitoring of renal function:** Renal function should be assessed before and during treatment and dosage adjusted especially in the initial weeks of treatment. Particularly careful monitoring is required in patients with renal impairment. There is a risk of impairment of renal function, particularly in patients with congestive heart failure or after a renal transplant.

**Angioedema:** Angioedema has been reported in patients treated with ACE inhibitors including Ramipril. In case of angioedema, Ramipril tablets must be discontinued. Emergency therapy should be instituted promptly. Patient should be kept under observation for at least 12 to 24 hours and discharged after complete resolution of the symptoms. Intestinal angioedema has been reported in patients treated with ACE inhibitors including Ramipril. These patients presented with abdominal pain (with or without nausea or vomiting).

**Hypersensitivity/angioedema:** Concomitant use of mTOR inhibitors (e.g. sirolimus, everolimus, temsirolimus) Patients taking concomitant mTOR inhibitors (e.g. sirolimus, everolimus, temsirolimus) therapy may be at increased risk for angioedema (e.g. swelling of the airways or tongue, with or without respiratory impairment).

**Anaphylactic reactions during desensitization:** The likelihood and severity of anaphylactic and anaphylactoid reactions to insect venom and other allergens are increased under ACE inhibition. A temporary discontinuation of Ramipril tablets should be considered prior to desensitization.

**Electrolyte Monitoring:** Hyperkalemia has been observed in some patients treated with ACE inhibitors including Ramipril. Patients at risk for development of hyperkalemia include those with renal insufficiency, age (> 70 years), uncontrolled diabetes mellitus, hyperaldosteronism, or those using potassium salts, potassium retaining diuretics and other plasma potassium increasing active substances (e.g. co-trimoxazole also known as trimethoprim/sulfamethoxazole), or conditions such as dehydration, acute cardiac decompensation, metabolic acidosis. If concomitant use of the above-mentioned agents is deemed appropriate, regular monitoring of serum potassium is recommended.

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**Electrolyte Monitoring:** Hyponatremia Syndrome of Inappropriate Anti-Diuretic Hormone (SIADH) and subsequent hyponatremia has been observed in some patients treated with Ramipril. It is recommended that serum sodium levels be monitored regularly in the elderly and in other patients at risk of hyponatremia.

**Neutropenia/agranulocytosis:** Neutropenia/agranulocytosis, as well as thrombocytopenia and anaemia, have been rarely seen and bone marrow depression has also been reported. It is recommended to monitor the white blood cell count to permit detection of a possible leucopenia. More frequent monitoring is advised in the initial phase of treatment and in patients with impaired renal function, those with concomitant collagen disease (e.g. lupus erythematosus or scleroderma), and all those treated with other medicinal products that can cause changes in the blood picture.

**Ethnic differences:** ACE inhibitors cause higher rate of angioedema in black patients than in nonblack patients. As with other ACE inhibitors, Ramipril may be less effective in lowering blood pressure in black people than in non-black patients, possibly because of a higher prevalence of hypertension with low renin level in the black hypertensive population.

**Cough:** Cough has been reported with the use of ACE inhibitors. Characteristically, the cough is nonproductive, persistent and resolves after discontinuation of therapy. ACE inhibitor-induced cough should be considered as part of the differential diagnosis of cough.

**Lactose content:** Patients with rare hereditary problems of galactose intolerance, the Lapp lactase deficiency or glucose-galactose malabsorption should not take this medicine.

### 4.6. Pregnancy, Lactation and Fertility

**Pregnancy:** Ramipril is not recommended during the first trimester of pregnancy and contraindicated during the second and third trimesters of pregnancy. Epidemiological evidence regarding the risk of teratogenicity following exposure to ACE inhibitors during the first trimester of pregnancy has not been conclusive; however, a small increase in risk cannot be excluded. Unless continued ACE inhibitor therapy is considered essential, patients planning pregnancy should be changed to alternative anti-hypertensive treatments which have an established safety profile for use in pregnancy. When pregnancy is diagnosed, treatment with ACE inhibitors should be stopped immediately, and, if appropriate, alternative therapy should be started. Exposure to ACE inhibitor therapy during the second and third trimesters is known to induce human

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foetotoxicity (decreased renal function, oligohydramnios, skull ossification retardation) and neonatal toxicity (renal failure, hypotension, hyperkalemia). Should exposure to ACE inhibitors have occurred from the second trimester of pregnancy, ultrasound check of renal function and skull is recommended. Infants whose mothers have taken ACE inhibitors should be closely observed for hypotension.

**Lactation:** Because insufficient information is available regarding the use of Ramipril during breastfeeding, Ramipril is not recommended and alternative treatments with better established safety profiles during breast-feeding are preferable, especially while nursing a newborn or preterm infant.

**Fertility:** No fertility data are available

### 4.7. Effects on Ability to Drive and Use Machines:

Some adverse effects (e.g. symptoms of a reduction in blood pressure such as dizziness) may impair the patient's ability to concentrate and react and, therefore, constitute a risk in situations where these abilities are of particular importance (e.g. operating a vehicle or machinery). This can happen especially at the start of treatment, or when changing over from other preparations. After the first dose or subsequent increases in dose it is not advisable to drive or operate machinery for several hours.

### 4.8. Undesirable Effects:

The safety profile of Ramipril includes persistent dry cough and reactions due to hypotension. Serious adverse reactions include angioedema, hyperkalemia, renal or hepatic impairment, pancreatitis, severe skin reactions and neutropenia/agranulocytosis. Adverse reactions frequency is defined 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 ( $< 1/10,000$ ), not known (cannot be estimated from the available data). Within each frequency grouping, undesirable effects are presented in order of decreasing seriousness.

System/ Organ class	Frequency of Undesirable Effects				
	Common	Uncommon	Rare	Very rare	Not Known
Cardiac disorders		Myocardial ischemia Including angina pectoris or myocardial infarction, tachycardia, arrhythmia, palpitations, oedema			





# Bharat Parenterals Limited

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CIN NO: U24231GJ1992PLC018237

## SUMMARY OF PRODUCT CHARACTERISTICS (SmPC)

		peripheral			
Blood and lymphatic system disorders		Eosinophilia	White blood cell counts decreased (Including neutropenia or agranulocytosis), red blood cell counts decreased, haemoglobin decreased, platelet count decreased		one marrow failure, pancytopenia, hemolytic anaemia
Nervous system disorders	Headache, dizziness	Vertigo, paraesthesia, ageusia, dysgeusia,	Tremor, balance Disorder		Cerebral ischemia including ischemic stroke and transient Ischemic attack, psychomotor skills impaired, burning sensation, parosmia
Eye disorders		Visual disturbance Including blurred vision	Conjunctivitis		
Ear and labyrinth disorders			Hearing impaired, tinnitus		
Respiratory, thoracic and Mediastinal disorders	Nonproductive Tickling cough, bronchitis, sinusitis, dyspnoea	Bronchospasm including Asthma aggravated, Nasal congestion			
Gastrointestinal disorders	Gastrointestinal inflammation, Digestive disturbances, abdominal discomfort, dyspepsia, diarrhoea, nausea, vomiting	Pancreatitis (Cases of fatal outcome have been very exceptionally reported with ACE inhibitors), pancreatic Enzymes increased, small bowel ngioedema, abdominal pain upper including gastritis, constipation, dry mouth	Glossitis		Aphthous stomatitis
Renal and urinary disorders		Renal impairment including renal failure acute, urine output increased, worsening of a pre-existing proteinuria, blood urea increased, blood creatinine increased			



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Skin and subcutaneous Tissue disorders	Rash in particular maculopapular	Angioedema; very exceptionally, the airway obstruction resulting from angioedema may have a fatal outcome; pruritus, hyperhidrosis	Exfoliative dermatitis, urticaria, onycholysis,	Photosensitivity reaction	Toxic epidermal necrolysis, Stevens Johnson syndrome, erythema multiforme, pemphigus, psoriasis aggravated, dermatitis psoriasiform, emphygoid or lichenoid exanthema or enanthema, alopecia
Musculoskeletal and connective Tissue disorders	Muscle spasms, myalgia	Arthralgia			
Endocrine disorders					Syndrome of inappropriate antidiuretic hormone secretion (SIADH)
Metabolism and nutrition disorders	Blood potassium increased	Anorexia, decreased appetite,			Blood sodium decreased
Vascular disorders	Hypotension, Orthostatic blood pressure decreased, syncope	Flushing	Vascular stenosis, hypo perfusion, vasculitis		Raynaud's phenomenon
General disorders and Administration site conditions	Chest pain, fatigue	Pyrexia	Asthenia		
Immune system disorders					Anaphylactic or anaphylactoid reactions, antinuclear antibody increased
Hepatobiliary disorders		Hepatic enzymes and/or bilirubin conjugated increased,	Jaundice cholestatic, Hepatocellular damage		Acute hepatic failure, cholestatic or cytolytic hepatitis (fatal outcome has been very exceptional).
Reproductive system and Breast disorders		Transient erectile impotence, libido decreased			Gynecomastia
Psychiatric disorders		Depressed mood, anxiety, nervousness, restlessness, sleep disorder including somnolence	Confusional state		Disturbance in attention

### Paediatric Population

The safety of Ramipril was monitored in 325 children and adolescents, aged 2-16 years' old during 2 clinical trials. Whilst the nature and severity of the adverse events are similar to that of the adults, the frequency of the following is higher in the children:

- Tachycardia, nasal congestion and rhinitis, "common" (i.e.  $\geq 1/100$  to  $< 1/10$ ) in paediatric,



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and "uncommon" (i.e.  $\geq 1/1,000$  to  $< 1/100$ ) in adult population.

- Conjunctivitis "common" (i.e.  $\geq 1/100$  to  $< 1/10$ ) in paediatric while "rare" (i.e.  $\geq 1/10,000$  to  $< 1/1,000$ ) in adult population.
- Tremor and urticaria "uncommon" (i.e.  $\geq 1/1,000$  to  $< 1/100$ ) in paediatric population while "rare" (i.e.  $\geq 1/10,000$  to  $< 1/1,000$ ) in adult population.

The overall safety profile for Ramipril in paediatric patients does not differ significantly from the safety profile in adults.

### 4.9. Overdose:

Symptoms associated with overdosage of ACE inhibitors may include excessive peripheral vasodilatation (with marked hypotension, shock), bradycardia, electrolyte disturbances, and renal failure. The patient should be closely monitored and the treatment should be symptomatic and supportive. Suggested measures include primary detoxification (gastric lavage, administration of adsorbents) and measures to restore hemodynamic stability, including, administration of alpha 1 adrenergic agonists or angiotensin II (angiotensin amide) administration. Ramipril at, the active metabolite of Ramipril is poorly removed from the general circulation by haemodialysis.

## 5. PHARMACOLOGICAL PROPERTIES

### 5.1. Pharmacodynamic Properties:

**Pharmacotherapeutic group:** ACE Inhibitors, plain

**ATC Code:** C09AA05.

**Mechanism of action:** Ramipril at, the active metabolite of the prodrug Ramipril, inhibits the enzyme dipeptidylcarboxypeptidase I (synonyms: angiotensin-converting enzyme; kininase II). In plasma and tissue this enzyme catalyses the conversion of angiotensin I to the active vasoconstrictor substance angiotensin II, as well as the breakdown of the active vasodilator bradykinin. Reduced angiotensin II formation and inhibition of bradykinin breakdown lead to vasodilatation. Since angiotensin II also stimulates the release of aldosterone, Ramipril at causes a reduction in aldosterone secretion. The average response to ACE inhibitor monotherapy was lower in black (Afro-Caribbean) hypertensive patients (usually a low-renin hypertensive population) than in non-black patients.

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### Pharmacodynamic effects

Antihypertensive properties Administration of ramipril causes a marked reduction in peripheral arterial resistance. Generally, there are no major changes in renal plasma flow and glomerular filtration rate. Administration of ramipril to patients with hypertension leads to a reduction in supine and standing blood pressure without a compensatory rise in heart rate. In most patients the onset of the antihypertensive effect of a single dose becomes apparent 1 to 2 hours after oral administration. The peak effect of a single dose is usually reached 3 to 6 hours after oral administration. The antihypertensive effect of a single dose usually lasts for 24 hours. The maximum antihypertensive effect of continued treatment with ramipril is generally apparent after 3 to 4 weeks. It has been shown that the antihypertensive effect is sustained under long term therapy lasting 2 years. Abrupt discontinuation of ramipril does not produce a rapid and excessive rebound increase in blood pressure.

**Heart failure:** In addition to conventional therapy with diuretics and optional cardiac glycosides, ramipril has been shown to be effective in patients with functional classes II-IV of the New-York Heart Association. The drug had beneficial effects on cardiac hemodynamics (decreased left and right ventricular filling pressures, reduced total peripheral vascular resistance, increased cardiac output and improved cardiac index). It also reduced neuroendocrine activation.

### Clinical efficacy and safety:

**Cardiovascular prevention/Nephroprotection;** A preventative placebo-controlled study (the HOPE-study), was carried out in which ramipril was added to standard therapy in more than 9,200 patients. Patients with increased risk of cardiovascular disease following either atherothrombotic cardiovascular disease (history of coronary heart disease, stroke or peripheral vascular disease) or diabetes mellitus with at least one additional risk factor (documented microalbuminuria, hypertension, elevated total cholesterol level, low high-density lipoprotein cholesterol level or cigarette smoking) were included in the study. The study showed that Ramipril statistically significantly decreases the incidence of myocardial infarction, death from cardiovascular causes and stroke, alone and combined (primary combined events). The HOPE Study: Main Results;

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	<b>Ramipril</b> %	<b>Placebo</b> %	<b>Relative risk</b> <b>(95% Confidence interval)</b>	<b>p-value</b>
<b>All patients</b>	<b>n=4,645</b>	<b>N=4,652</b>		
<b>Primary combined events</b>	<b>14.0</b>	<b>17.8</b>	<b>0.78(0.70-0.86)</b>	<b>&lt;0.001</b>
Myocardial infarction	9.9	12.3	0.80(0.70-0.90)	<0.001
Death from cardiovascular causes	6.1	8.1	0.74(0.64-0.87)	<0.001
Stroke	3.4	4.9	0.68(0.56-0.84)	<0.001
<b>Secondary endpoints</b>				
Death from any cause	10.4	12.2	0.84(0.75-0.95)	0.005
Need for Revascularisation	16.0	18.3	0.85(0.77-0.94)	0.002
Hospitalisation for unstable angina	12.1	12.3	0.98(0.87-1.10)	NS
Hospitalisation for heart failure	3.2	3.5	0.88(0.70-1.10)	0.25
Complications related to diabetes	6.4	7.6	0.84(0.72-0.98)	0.03

The MICRO-HOPE study investigated the effect of the addition of Ramipril 10 mg to the current medical regimen versus placebo in 3,577 patients at least  $\geq 55$  years old (with no upper limit of age), with a majority of type 2 diabetes (and at least another CV risk factor), normotensive or hypertensive. The primary analysis showed that 117 (6.5 %) participants on Ramipril and 149 (8.4 %) on placebo developed overt nephropathy, which corresponds to a RRR 24 %; 95 % CI [3-40],  $p = 0.027$ . The REIN study, a multicenter randomized, double-blind parallel group, placebo-controlled study aimed at assessing the effect of treatment with Ramipril on the rate of decline of glomerular function rate (GFR) in 352 normotensive or hypertensive patients (18-70 years old)



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suffering from mild (i.e. mean urinary protein excretion  $> 1$  and  $< 3$  g/24 h) or severe proteinuria ( $\geq 3$  g/24 h) due to chronic non-diabetic nephropathy. Both subpopulations were prospectively stratified. The main analysis of patients with the most severe proteinuria (stratum prematurely disrupted due to benefit in Ramipril group) showed that the mean rate of GFR decline per month was lower with Ramipril than with placebo;  $-0.54$  ( $0.66$ ) vs.  $-0.88$  ( $1.03$ ) ml/min/month,  $p = 0.038$ . The intergroup difference was thus  $0.34$  [ $0.03$ - $0.65$ ] per month, and around  $4$  ml/min/year;  $23.1$  % of the patients in the ramipril group reached the combined secondary endpoint of doubling of baseline serum creatinine concentration and/or end-stage renal disease (ESRD) (need for dialysis or renal transplantation) vs.  $45.5$  % in the placebo group ( $p = 0.02$ ). Secondary prevention after acute myocardial infarction The AIRE study included more than 2,000 patients with transient/persistent clinical signs of heart failure after documented myocardial infarction. The ramipril treatment was started 3 to 10 days after the acute myocardial infarction. The study showed that after an average follow up Time of 15 months the mortality in Ramipril-treated patients was  $16.9$  % and in the placebo, treated patients was  $22.6$  %. This means an absolute mortality reduction of  $5.7$  % and a relative risk reduction of  $27$  % ( $95$  % CI [ $11$ - $40$  %]).

### **Paediatric Population**

In a randomized, double-blind clinical study involving 244 paediatric patients with hypertension ( $73$  % primary hypertension), aged 6-16 years, patients received either low dose, medium dose or high dose of Ramipril to achieve plasma concentrations of Ramipril at corresponding to the adult dose range of  $1.25$  mg,  $5$  mg and  $20$  mg on the basis of body weight. At the end of 4 weeks, Ramipril was ineffective in the endpoint of lowering systolic blood pressure but lowered diastolic blood pressure at the highest dose. Both medium and high doses of Ramipril showed significant reduction of both systolic and diastolic BP in children with confirmed hypertension.

This effect was not seen in a 4 weeks' dose-escalation, randomized, double-blind withdrawal study in 218 paediatric patients aged 6-16 years ( $75$  % primary hypertension), where both diastolic and systolic blood pressures demonstrated a modest rebound but not a statistically significant return to the baseline, in all three dose levels tested low dose ( $0.625$  mg –  $2.5$  mg), medium dose ( $2.5$  mg –  $10$  mg) or high dose ( $5$ mg –  $20$  mg) Ramipril based on weight. Ramipril did not have a linear dose response in the paediatric population studied. Two large randomized, controlled trials

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(ONTARGET (Ongoing Telmisartan Alone and in combination with Ramipril Global Endpoint Trial) and VA NEPHRON-D (The Veterans Affairs Nephropathy in Diabetes)) have examined the use of the combination of an ACE inhibitor with an angiotensin II receptor blocker.

ONTARGET was a study conducted in patients with a history of cardiovascular or cerebrovascular disease, or type 2 diabetes mellitus accompanied by evidence of end-organ damage. VA NEPHRON-D was a study in patients with type 2 diabetes mellitus and diabetic nephropathy. These studies have shown no significant beneficial effect on renal and/or cardiovascular outcomes and mortality, while an increased risk of hyperkalemia, acute kidney injury and/or hypotension as compared to monotherapy was observed. Given their similar Pharmacodynamic properties, these results are also relevant for other ACE-inhibitors and angiotensin II receptor blockers. ACE-inhibitors and angiotensin II receptor blockers should therefore not be used concomitantly in patients with diabetic nephropathy. ALTITUDE (Aliskiren Trial in Type 2 Diabetes Using Cardiovascular and Renal Disease Endpoints) was a study designed to test the benefit of adding aliskiren to a standard therapy of an ACE-inhibitor or an angiotensin II receptor blocker in patients with type 2 diabetes mellitus and chronic kidney disease, cardiovascular disease, or both. The study was terminated early because of an increased risk of adverse outcomes. Cardiovascular death and stroke were both numerically more frequent in the aliskiren group than in the placebo group and adverse events and serious adverse events of interest (hyperkalemia, hypotension and renal dysfunction) were more frequently reported in the aliskiren group than in the placebo group.

### 5.2. Pharmacokinetic Properties:

#### Pharmacokinetics and Metabolism

**Absorption:** Following oral administration Ramipril is rapidly absorbed from the gastrointestinal tract: peak plasma concentrations of Ramipril are reached within one hour. Based on urinary recovery, the extent of absorption is at least 56 % and is not significantly influenced by the presence of food in the gastrointestinal tract. The bioavailability of the active metabolite Ramipril at after oral administration of 2.5 mg and 5 mg Ramipril is 45 %. Peak plasma concentrations of Ramipril at, the sole active metabolite of Ramipril are reached 24 hours after Ramipril intake. Steady state plasma concentrations of Ramipril at after once daily dosing with The usual doses of Ramipril are reached by about the fourth day of treatment.

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**Distribution:** The serum protein binding of Ramipril is about 73 % and that of Ramiprilat at about 56 %.

**Metabolism:** Ramipril is almost completely metabolised to Ramiprilat and to the diketopiperazine ester, the diketopiperazine acid, and the glucuronides of Ramipril and ramiprilat.

**Elimination:** Excretion of the metabolites is primarily renal. Plasma concentrations of ramiprilat decline in a polyphasic manner. Because of its potent, saturable binding to ACE and slow dissociation from the enzyme, ramiprilat shows a prolonged terminal elimination phase at very low plasma concentrations. After multiple once-daily doses of ramipril, the effective half-life of ramiprilat concentrations was 13-17 hours for the 5-10 mg doses and longer for the lower 1.25-2.5 mg doses. This difference is related to the saturable capacity of the enzyme to bind ramiprilat. A single oral dose of ramipril produced an undetectable level of ramipril and its metabolite in breast milk. However, the effect of multiple doses is not known.

### **Other special populations**

#### **Patients with renal impairment:**

Renal excretion of ramiprilat is reduced in patients with impaired renal function, and renal ramiprilat clearance is proportionally related to creatinine clearance. This results in elevated plasma concentrations of ramiprilat, which decrease more slowly than in subjects with normal renal function.

#### **Patients with hepatic impairment**

In patients with impaired liver function, the metabolism of ramipril to ramiprilat was delayed, due to diminished activity of hepatic esterases, and plasma ramipril levels in these patients were increased. Peak concentrations of ramiprilat in these patients, however, are not different from those seen in subjects with normal hepatic function.

#### **Paediatric Population**

The pharmacokinetic profile of ramipril was studied in 30 paediatric hypertensive patients, aged 2-16 years, weighing >10 kg. After doses of 0.05 to 0.2 mg/kg, ramipril was rapidly and extensively metabolized to ramiprilat. Peak plasma concentrations of ramiprilat occurred within 2-3 hours. Ramiprilat clearance highly correlated with the log of body weight ( $p<0.01$ ) as well as dose ( $p<0.001$ ). Clearance and volume of distribution increased with increasing children age for each

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## **SUMMARY OF PRODUCT CHARACTERISTICS (SmPC)**

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dose group. The dose of 0.05 mg /kg in children achieved exposure levels comparable to those in adults treated with ramipril 5mg. The dose of 0.2 mg/kg in children resulted in exposure levels higher than the maximum recommended dose of 10 mg per day in adults.

### **5.3. Preclinical Safety Data**

Not Known

## **6. PHARMACEUTICAL PARTICULARS:**

### **6.1 List of Excipients:**

- Lactose Monohydrate Granulated DCL-15
- Microcrystalline Cellulose Grade 112
- Croscarmellose Sodium
- Calcium Stearate
- Sodium Carbonate Anhydrous
- Purified Talc

### **6.2 Incompatibilities:**

Not applicable

### **6.3 Shelf Life:**

3 years

### **6.4 Special Precautions for Storage:**

Store below 25°C. in a dry place, away from light.

Keep out of reach of children.

### **6.5 Nature and Contents of Container:**

**Primary Packing:** 10 tablets are packed in ALU-PVC blister.

**Secondary Packing:** Such 3-b blister packed in printed mono carton along with package insert.

### **6.6 Special Precautions for Disposal:**

No special requirements.

## **7. APPLICANT/ MANUFACTURER**

**APPLICANT:**

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## **Bharat Parenterals Limited**

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CIN NO: U24231GJ1992PLC018237

### **SUMMARY OF PRODUCT CHARACTERISTICS (SmPC)**

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#### **MANUFACTURER:**

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