

SUMMARY OF PRODUCT CHARACTERISTICS

1 NAME OF THE MEDICINAL PRODUCT

Akto 5 mg/ 10 mg hard capsules

Ramipril/Amlodipine 5 mg/ 10 mg hard capsules

2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each capsule contains 5 mg of ramipril and 10 mg of amlodipine (as amlodipine besilate).

For the full list of excipients, see section 6.1

3 PHARMACEUTICAL FORM

Hard gelatin capsules with white body and blue cap, content is white or almost white powder or slightly compacted agglomerates; size of capsules is approximately 19,4 mm x 6,9 mm (No.1.)

4 CLINICAL PARTICULARS

4.1 Therapeutic indications

Treatment of hypertension in adults.

Ramipril/Amlodipine is indicated as substitution therapy of patients with blood pressure adequately controlled with ramipril and amlodipine given concurrently at the same dose level as in the combination, but as separate tablets.

4.2 Posology and method of administration

Posology

Ramipril/Amlodipine should not be used for initiating treatment of hypertension. The doses of each component should be individualized according to the patient profile and blood pressure control.

If a dose change is required, the dosing regimen should be individually determined using the individual components of ramipril and amlodipine first, and once established, it could be changed to Ramipril/Amlodipine.

The recommended dose is one capsule daily. The maximum daily dose is one capsule 10 mg/10 mg.

Special populations

Elderly population

Lower initial dosage is recommended in the elderly and increase of the dosage should take place with care.

Renal impairment

To find the optimal starting dose and maintenance dose of patients with renal impairment, the patients should be individually titrated using the individual components of amlodipine and ramipril.

The maximum daily dose of *ramipril* in patients with renal impairment should be based on creatinine clearance.

- if creatinine clearance is ≥ 60 ml/min, the maximal daily dose is 10 mg
- if creatinine clearance is between 10 – 60 ml/min, the maximal daily dose is 5 mg
- in haemodialysed hypertensive patients: ramipril is slightly dialysable; the maximal daily dose is 5 mg; the medicinal product should be administered few hours after haemodialysis is performed.

No dosage adjustment of *amlodipine* is required for patients with renal impairment.

Amlodipine is not dialysable. Amlodipine should be administered with particular caution to patients undergoing dialysis.

Renal function and serum potassium levels should be monitored during therapy with Ramipril/Amlodipine. In the case of renal function deterioration, the use of Ramipril/Amlodipine should be discontinued and replaced by the individual components adequately adjusted.

Hepatic impairment

The maximum daily dose is 2.5 mg ramipril.

Dosages with 2.5 mg ramipril cannot be achieved with Ramipril/Amlodipine.

Paediatric population

The safety and efficacy of Ramipril/Amlodipine in children has not been established. Currently available data are described in section 4.8, 5.1, 5.2 and 5.3 but no recommendation on a posology can be made.

Method of administration

Since food does not affect absorption of ramipril and amlodipine, Ramipril/Amlodipine may be taken irrespective of meals. It is recommended that Ramipril/Amlodipine is taken at the same time of the day.

4.3 Contraindications

Related to ramipril/Amlodipine

- Hypersensitivity to ramipril, amlodipine, other ACE (Angiotensin Converting Enzyme) inhibitors, dihydropyridine derivatives or to any of the excipients listed in section 6.1.

Related to ramipril

- Concomitant use of Ramipril/Amlodipine with aliskiren-containing products is contraindicated in patients with diabetes mellitus or renal impairment (GFR) < 60 ml/min/1.73 m²) (see sections 4.5 and 5.1).
- Concomitant use with sacubitril/valsartan therapy. Ramipril must not be initiated earlier than 36 hours after the last dose of sacubitril/valsartan (see also sections 4.4 and 4.5).
- History of angioedema (hereditary, idiopathic or due to previous angioedema with ACE inhibitors or angiotensin II receptor antagonists).
- Extracorporeal treatments leading to contact of blood with negatively charged surfaces (see section 4.5).
- Significant bilateral renal artery stenosis or renal artery stenosis in a single functioning kidney.
- Second and third trimesters of pregnancy (see sections 4.4 and 4.6).
- Hypotensive or haemodynamically unstable states.

Related to amlodipine

- Severe hypotension.
- Shock (including cardiogenic shock).
- Obstruction of the outflow tract of the left ventricle (e.g., high grade aortic stenosis).
- Haemodynamically unstable heart failure after acute myocardial infarction.

4.4 Special warnings and precautions for use

All warnings related to each monocomponent, as listed below, should also apply to the fixed combination of ramipril/amlodipine.

Caution is recommended in patients who are being treated concurrently with diuretics since these patients may be volume and/or salt depleted. Renal function and serum potassium should be monitored.

Related to ramipril

Dual blockade of the renin-angiotensin-aldosterone system (RAAS)

There is evidence that the concomitant use of ACE-inhibitors, angiotensin II receptor blockers or aliskiren increases the risk of hypotension, hyperkalaemia and decreased renal function (including acute renal failure). Dual blockade of RAAS through the combined use of ACE-inhibitors, angiotensin II receptor blockers or aliskiren is therefore not recommended (see sections 4.5 and 5.1).

If dual blockade therapy is considered absolutely necessary, this should only occur under specialist supervision and subject to frequent close monitoring of renal function, electrolytes and blood pressure.

ACE-inhibitors and angiotensin II receptor blockers should not be used concomitantly in patients with diabetic nephropathy.

Special populations

Pregnancy

ACE inhibitors should not be initiated during pregnancy. 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 (see sections 4.3 and 4.6).

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.

Significant activation of renin-angiotensin-aldosterone system is to be anticipated and medical supervision including blood pressure monitoring is necessary, for example in:

- patients with severe hypertension
- patients with decompensated congestive heart failure
- patients with haemodynamically relevant left ventricular inflow or outflow impediment (e.g. stenosis of the aortic or mitral valve)
- patients with unilateral renal artery stenosis with a second functional kidney
- patients in whom fluid or salt depletion exists or may develop (including patients with diuretics)
- patients with liver cirrhosis and/or ascites
- patients undergoing major surgery or during anaesthesia with agents that produce hypotension

Generally, it is recommended to correct dehydration, hypovolaemia or salt depletion before initiating treatment (in patients with heart failure, however, such corrective action must be carefully weighed out against the risk of volume overload).

- Transient or persistent heart failure post myocardial infarction.
- Patients at risk of cardiac or cerebral ischemia in case of acute hypotension.

The initial phase of treatment requires special medical supervision.

Elderly patients

See section 4.2.

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 (see section 4.2). 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 (see section 4.8).

Concomitant use of ACE inhibitors with sacubitril/valsartan is contraindicated due to the increased risk of angioedema. Treatment with sacubitril/valsartan must not be

initiated earlier than 36 hours after the last dose of ramipril. Treatment with ramipril must not be initiated earlier than 36 hours after the last dose of sacubitril/valsartan (see sections 4.3 and 4.5).

Concomitant use of ACE inhibitors with racecadotril, mTOR (mammalian target of rapamycin) inhibitors (e.g. temsirolimus, everolimus, sirolimus) and vildagliptin may lead to an increased risk of angioedema (e.g. swelling of the airways or tongue, with or without respiratory impairment) (see section 4.5). Caution should be used when starting racecadotril, mTOR inhibitors (e.g. sirolimus, everolimus, temsirolimus) and vildagliptin in a patient already taking an ACE inhibitor.

In case of angioedema, ramipril 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 (see section 4.8). These patients presented with abdominal pain (with or without nausea or vomiting).

Anaphylactic reactions during desensitisation

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 should be considered prior to desensitisation.

Electrolyte monitoring: Hyperkalaemia

ACE inhibitors, including ramipril, can cause hyperkalaemia because they inhibit the release of aldosterone. The effect is usually not significant in patients with normal renal function. However, in patients with impaired renal function, age (> 70 years), uncontrolled diabetes mellitus, and/or in patients taking potassium supplements (including salt substitutes), potassium sparing diuretics and other plasma potassium increasing active substances (e.g. heparin, trimethoprim or co trimoxazole also known as trimethoprim/sulfamethoxazole) and especially aldosterone antagonists or angiotensin-receptor blockers or in patients with conditions such as dehydration, acute cardiac decompensation, metabolic acidosis, hyperkalaemia can occur.

Potassium-sparing diuretics and angiotensin-receptor blockers should be used with caution in patients receiving ACE inhibitors, and serum potassium and renal function should be monitored (see section 4.5).

Electrolyte monitoring: Hyponatraemia

Syndrome of Inappropriate Anti-diuretic Hormone (SIADH) and subsequent hyponatraemia 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 if hyponatraemia.

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 (see sections 4.5 and 4.8).

Ethnic differences

ACE inhibitors cause higher rate of angioedema in black patients than in non-black 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 non-productive, persistent and resolves after discontinuation of therapy. ACE inhibitor-induced cough should be considered as part of the differential diagnosis of cough.

Related to amlodipine

The safety and efficacy of amlodipine in hypertensive crisis has not been established.

Special populations

Patients with cardiac failure

Patients with heart failure should be treated with caution. In a long-term, placebo controlled study in patients with severe heart failure (NYHA class III and IV) the reported incidence of pulmonary oedema was higher in the amlodipine treated group than in the placebo group (see section 5.1). Calcium channel blockers, including amlodipine, should be used with caution in patients with congestive heart failure, as they may increase the risk of future cardiovascular events and mortality.

Patients with impaired hepatic function

The half-life of amlodipine is prolonged and AUC values are higher in patients with impaired liver function; dosage recommendations have not been established. Caution should be used, when increasing the dose. Careful monitoring may be required in patients with severe hepatic impairment.

Elderly patients

In the elderly increase of the dosage should take place with care (see sections 4.2 and 5.2).

4.5 Interaction with other medicinal products and other forms of interaction

Related to ramipril

Contraindicated combinations

Clinical trial data has shown that dual blockade of the renin-angiotensin-aldosterone system (RAAS) through the combined use of ACE-inhibitors, angiotensin II receptor blockers or aliskiren is associated with a higher frequency of adverse events such as hypotension, hyperkalaemia and decreased renal function (including acute renal failure) compared to the use of a single RAAS-acting agent (see sections 4.3, 4.4 and 5.1).

Medicines increasing the risk of angioedema

Concomitant use of ACE inhibitors with sacubitril/valsartan is contraindicated as this increases the risk of angioedema (see sections 4.3 and 4.4).

Extracorporeal treatments leading to contact of blood with negatively charged surfaces such as dialysis or haemofiltration with certain high-flux membranes (e.g. polyacrylonitril membranes) and low density lipoprotein apheresis with dextran sulphate due to increased risk of severe anaphylactoid reactions (see section 4.3). If such treatment is required, consideration should be given to using a different type of dialysis membrane or a different class of antihypertensive agent.

Precautions for use

Potassium sparing diuretics, potassium supplements or potassium-containing salt substitutes

Although serum potassium usually remains within normal limits, hyperkalaemia may occur in some patients treated with ramipril. Potassium sparing diuretics (e.g. spironolactone, triamterene, or amiloride), potassium supplements, potassium containing salt substitutes, heparin other plasma potassium increasing active substances (including Angiotensin II antagonists, tacrolimus) may lead to significant increases in serum potassium. Care should also be taken when ramipril is coadministered with other agents that increase serum potassium, such as trimethoprim and co-trimoxazole (trimethoprim/sulfamethoxazole) as trimethoprim is known to act as a potassium-sparing diuretic like amiloride. Therefore, the combination of ramipril with the above-mentioned drugs is not recommended. If concomitant use is indicated, they should be used with caution and with frequent monitoring of serum potassium.

Ciclosporin

Hyperkalaemia may occur during concomitant use of ACE inhibitors with ciclosporin. Monitoring of serum potassium is recommended.

Heparin

Hyperkalaemia may occur during concomitant use of ACE inhibitors with heparin. Monitoring of serum potassium is recommended.

Antihypertensive agents (e.g. diuretics) and other substances that may decrease blood pressure (e.g. nitrates, tricyclic antidepressants, anaesthetics, acute alcohol intake, baclofen, alfuzosin, doxazosin, prazosin, tamsulosin, terazosin): Potentiation of the risk of hypotension is to be anticipated (see section 4.2 for diuretics)

Vasopressor sympathomimetics and other substances (e.g. isoproterenol, dobutamine, dopamine, epinephrine) that may reduce the antihypertensive effect of ramipril: Blood pressure monitoring is recommended.

Allopurinol, immunosuppressants, corticosteroids, procainamide, cytostatics and other substances that may change the blood cell count: Increased likelihood of haematological reactions (see section 4.4).

Lithium salts: Excretion of lithium may be reduced by ACE inhibitors and therefore lithium toxicity may be increased. Lithium level must be monitored.

Antidiabetic agents including insulin: Hypoglycaemic reactions may occur. Blood glucose monitoring is recommended.

Non-steroidal anti-inflammatory drugs and acetylsalicylic acid: Reduction of the antihypertensive effect of ramipril is to be anticipated. Furthermore, concomitant treatment of ACE inhibitors and NSAIDs may lead to an increased risk of worsening of renal function and to an increase in kalaemia.

Concomitant use of ACE inhibitors with racecadotril, mTOR inhibitors (e.g. temsirolimus, everolimus, sirolimus) and vildagliptin may lead to an increased risk for angioedema (see section 4.4).

Related to amlodipine

Effects of other medicinal products on Amlodipine

CYP3A4 inhibitors: Concomitant use of amlodipine with strong or moderate CYP3A4 inhibitors (protease inhibitors,azole antifungals, macrolides like erythromycin or clarithromycin, verapamil or diltiazem) may give rise to significant increase in amlodipine exposure. The clinical translation of these PK variations may

be more pronounced in the elderly. Clinical monitoring and dose adjustment may thus be required.

CYP3A4 inducers: Upon co-administration of known inducers of the CYP3A4, the plasma concentration of amlodipine may vary. Therefore, blood pressure should be monitored and dose regulation considered both during and after concomitant medication particularly with strong CYP3A4 inducers (e.g. rifampicin, *hypericum perforatum*).

Administration of amlodipine with grapefruit or grapefruit juice is not recommended as bioavailability may be increased in some patients resulting in increased blood pressure lowering effects.

Dantrolene (infusion): In animals, lethal ventricular fibrillation and cardiovascular collapse are observed in association with hyperkalaemia after administration of verapamil and intravenous dantrolene. Due to risk of hyperkalaemia, it is recommended that the co-administration of calcium channel blockers such as amlodipine be avoided in patients susceptible to malignant hyperthermia and in the management of malignant hyperthermia.

Effects of amlodipine on other medicinal products

The blood pressure lowering effects of amlodipine adds to the blood pressure lowering effects of other medicinal products with antihypertensive properties.

In clinical interaction studies, amlodipine did not affect the pharmacokinetics of atorvastatin, digoxin or warfarin.

Simvastatin: Co-administration of multiple doses of 10 mg of amlodipine with 80 mg simvastatin resulted in a 77 % increase in exposure to simvastatin compared to simvastatin alone. Limit the dose of simvastatin to 20 mg daily in patients on amlodipine.

Tacrolimus: There is a risk of increased tacrolimus blood levels when co administered with amlodipine. In order to avoid toxicity of tacrolimus, administration of amlodipine in a patient treated with tacrolimus requires monitoring of tacrolimus blood levels and dose adjustment of tacrolimus when appropriate.

Mechanistic Target of Rapamycin (mTOR) Inhibitors: mTOR inhibitors such as sirolimus, temsirolimus, and everolimus are CYP3A substrates. Amlodipine is a weak CYP3A inhibitor. With concomitant use of mTOR inhibitors, amlodipine may increase exposure of mTOR inhibitors.

Ciclosporin: No drug interaction studies have been conducted with ciclosporin and amlodipine in healthy volunteers or other populations with the exception of renal

transplant patients, where variable trough concentration increases (average 0 % - 40 %) of ciclosporin were observed. Consideration should be given for monitoring cyclosporine levels in renal transplant patients on amlodipine, and cyclosporine dose reductions should be made as necessary.

4.6 Fertility, pregnancy and lactation

Given the effects of the individual components in this combination product on pregnancy and lactation:

Ramipril/amlodipine is not recommended during the first trimester of pregnancy and is contraindicated during the second and third trimesters of pregnancy.

Ramipril/amlodipine is not recommended during lactation. A decision on whether to continue/discontinue breast-feeding or to continue/discontinue therapy with ramipril/amlodipine should be made taking into account the benefit of breast-feeding to the child and the benefit of amlodipine therapy to the mother.

Pregnancy

Related to ramipril

The use of ACE inhibitors is not recommended during the first trimester of pregnancy (see section 4.4). The use of ACE inhibitors is contraindicated during the second and third trimesters of pregnancy (see sections 4.3 and 4.4).

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 foetotoxicity (decreased renal function, oligohydramnios, skull ossification retardation) and neonatal toxicity (renal failure, hypotension, hyperkalaemia) (see section 5.3). 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; oliguria and hyperkalaemia (see sections 4.3 and 4.4).

Related to Amlodipine

The safety of amlodipine in human pregnancy has not been established.

In animal studies, reproductive toxicity was observed at high doses (see section 5.3). Use in pregnancy is only recommended when there is no safer alternative and when the disease itself carries greater risk for the mother and foetus.

Breast-feeding

Related to ramipril

Because insufficient information is available regarding the use of ramipril during breast-feeding (see section 5.2), 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.

Related to Amlodipine

Amlodipine is excreted in human milk. The proportion of the maternal dose received by the infant has been estimated with an interquartile range of 3 – 7 %, with a maximum of 15 %. The effect of amlodipine on infants is unknown. A decision on whether to continue/discontinue breast-feeding or to continue/discontinue therapy with amlodipine should be made taking into account the benefit of breast-feeding to the child and the benefit of amlodipine therapy to the mother.

Fertility

Reversible biochemical changes in the head of spermatozoa have been reported in some patients treated by calcium channel blockers. Clinical data are insufficient regarding the potential effect of amlodipine on fertility. In one rat study, adverse effects were found on male fertility (see section 5.3).

4.7 Effects on ability to drive and use machines

Ramipril/amlodipine can have minor or moderate influence on the ability to drive and use machines. Some adverse effects (e.g. symptoms of a reduction in blood pressure such as dizziness, headache, fatigue) 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. Caution is recommended especially at the start of treatment.

4.8 Undesirable effects

The safety profile of ramipril includes persistent dry cough and reactions due to hypotension. Serious adverse reactions include stroke, myocardial infarction, angioedema, hyperkalaemia, renal or hepatic impairment, pancreatitis, severe skin reactions and neutropenia/agranulocytosis.

The most commonly reported adverse reactions during treatment with amlodipine are somnolence, dizziness, headache, palpitations, flushing, abdominal pain, nausea, ankle swelling, oedema and fatigue.

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).

The following adverse drug reactions have been reported during the treatment with ramipril and amlodipine independently.

System organ class	Frequency	Ramipril	Amlodipine
Blood and lymphatic system disorders	Uncommon	Eosinophilia	
	Rare	White blood cells count decreased(including neutropenia or agranulocytosis), red blood cell count decreased, haemoglobin decreased, platelet count decreased.	
	Very rare		Leukocytopenia, thrombocytopenia.
	Not known	Bone marrow failure, pancytopenia, Haemolytic anaemia.	
Immune system Disorders	Very rare		Allergic reactions.
	Not known	Anaphylactic or anaphylactoid reactions, antinuclear antibody increased.	
Metabolism and nutrition disorders	Common	Blood potassium increased.	
	Uncommon	Anorexia, decreased appetite.	
	Very rare		Hyperglycaemia.
	Not known	Blood sodium decreased.	
Endocrine disorders	Not known	Syndrome of inappropriate antidiuretic hormone secretion (SIADH).	
Psychiatric disorders	Uncommon	Depressed mood, anxiety, nervousness, restlessness, sleep disorder including somnolence	Insomnia, mood changes (including anxiety), depression.
	Rare	Confusional state.	Confusion

	Not known	Disturbance in attention.	
Nervous system Disorders	Common	Headache, dizziness	Somnolence, dizziness, headache (especially at the beginning of the treatment).
	Uncommon	Vertigo, paraesthesia, ageusia, dysgeusia.	Tremor, dysgeusia, syncope, hypoesthesia, paraesthesia.
	Rare	Tremor, balance disorder.	
	Very rare		Hypertonia, peripheral neuropathy.
	Not known	Cerebral ischemia including ischaemic stroke and transient ischaemic attack, psychomotor skills impaired, burning sensation, parosmia.	Extrapyramidal disorder.
Eye disorders	Uncommon	Visual disturbance including blurred vision.	Visual disturbance (including diplopia).
	Rare	Conjunctivitis.	
Ear and labyrinth disorders	Uncommon		Tinnitus.
Cardiac disorders	Rare	Hearing impaired, tinnitus.	
	Common		Palpitations.
	Uncommon	Myocardial ischemia including angina pectoris or myocardial infarction, tachycardia, arrhythmia, palpitations, oedema peripheral.	Arrhythmia, (including bradycardia, ventricular tachycardia and atrial fibrillation).
	Very rare		Myocardial infarction.
Vascular disorders	Common	Hypotension, orthostatic blood pressure decreased, syncope.	Flushing.
	Uncommon	Flushing.	Hypotension
	Rare	Vascular stenosis, hypoperfusion, vasculitis.	
	Very rare		Vasculitis.
	Not known	Raynaud's phenomenon	
Respiratory,	Common	Non-productive tickling	

thoracic and mediastinal disorders		cough, bronchitis, sinusitis, dyspnoea.	
	Uncommon	Bronchospasm including asthma aggravated, nasal congestion.	Dyspnoea, rhinitis.
	Very rare		Cough.
Gastrointestinal Disorders	Common	Gastrointestinal inflammation, digestive disturbances, abdominal discomfort, dyspepsia, diarrhoea, nausea, vomiting.	Abdominal pain, nausea, dyspepsia, altered bowel habits (including diarrhoea and constipation).
	Uncommon	Pancreatitis (cases of fatal outcome have been very exceptionally reported with ACE inhibitors), pancreatic enzymes increased, small bowel angioedema, abdominal pain upper including gastritis, constipation, dry mouth.	Vomiting, dry mouth.
	Rare	Glossitis.	
	Very rare		Pancreatitis, gastritis, gingival hyperplasia
	Not known	Aphthous stomatitis.	
Hepatobiliary Disorders	Uncommon	Hepatic enzymes and/or bilirubin conjugated increased.	
	Rare	Jaundice cholestatic, hepatocellular damage.	
	Very rare		Hepatitis, jaundice, hepatic enzymes increased*.
	Not known	Acute hepatic failure, cholestatic or cytolytic hepatitis (fatal outcome has been very exceptional).	
Skin and subcutaneous	Common	Rash in particular maculo-papular.	

tissue disorders	Uncommon	Angioedema; very exceptionally, the airway obstruction resulting from angioedema may have a fatal outcome, pruritus, hyperhidrosis.	Alopecia, purpura, skin discolouration, hyperhidrosis, pruritus, rash, exanthema urticaria.
	Rare	Exfoliative dermatitis, urticaria, onycholysis.	
	Very rare	Photosensitivity reaction.	Angioedema, erythema multiforme, exfoliative dermatitis, Stevens-Johnson syndrome, Quincke oedema, photosensitivity.
	Not known	Toxic epidermal necrolysis, Stevens-Johnson syndrome, erythema multiforme, pemphigus, psoriasis aggravated, dermatitis psoriasiform, pemphigoid or lichenoid exanthema or enanthema, alopecia.	Toxic epidermal necrolysis.
Musculoskeletal and connective tissue disorders	Common	Muscle spasms, myalgia	Ankle swelling, muscle cramps.
	Uncommon	Arthralgia.	Arthralgia, myalgia, back pain.
Renal and urinary disorders	Uncommon	Renal impairment including renal failure acute, urine output increased, worsening of a preexisting proteinuria, blood urea increased, blood creatinine increased.	Micturition disorder, nocturia, increased urinary frequency.
Reproductive system and breast disorders	Uncommon	Transient erectile impotence, libido decreased.	Impotence, Gynaecomastia.
	Not known	Gynaecomastia.	
General disorders and administration site conditions	Very common		Oedema.
	Common	Chest pain, fatigue.	Fatigue, asthenia.
	Uncommon	Pyrexia.	Chest pain, pain,

			malaise.
	Rare	Asthenia.	
Investigations	Uncommon		Weight increase, weight decrease.

* most commonly with cholestasis

Paediatric population

Related to ramipril

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, 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 and "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 and "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.

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 the Yellow Card Scheme at www.mhra.gov.uk/yellowcard or search for 'MHRA Yellow Card' in the Google Play or Apple App Store.

4.9 Overdose

Related to ramipril

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 haemodynamic stability, including, administration of alpha 1 adrenergic agonists or angiotensin II (angiotensinamide) administration. Ramiprilat, the active metabolite of ramipril is poorly removed from the general circulation by haemodialysis.

Related to amlodipine

In humans experience with intentional overdose is limited.

Symptoms

Available data suggest that gross overdosage could result in excessive peripheral vasodilatation and possibly reflex tachycardia. Marked and probably prolonged systemic hypotension up to and including shock with fatal outcome have been reported.

Non-cardiogenic pulmonary oedema has rarely been reported as a consequence of amlodipine overdose that may manifest with a delayed onset (24-48 hours post-ingestion) and require ventilatory support. Early resuscitative measures (including fluid overload) to maintain perfusion and cardiac output may be precipitating factors.

Treatment

Clinically significant hypotension due to amlodipine overdosage calls for active cardiovascular support including frequent monitoring of cardiac and respiratory function, elevation of extremities, and attention to circulating fluid volume and urine output.

A vasoconstrictor may be helpful in restoring vascular tone and blood pressure, provided that there is no contraindication to its use. Intravenous calcium gluconate may be beneficial in reversing the effects of calcium channel blockade.

Gastric lavage may be worthwhile in some cases. In healthy volunteers the use of charcoal up to 2 hours after administration of amlodipine 10 mg has been shown to reduce the absorption rate of amlodipine. Since amlodipine is highly protein-bound, dialysis is not likely to be of benefit.

5 PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: an angiotensin-converting enzyme inhibitor and calcium channel blocker, ATC code: C09 BB07.

Ramipril

Mechanism of action

Ramiprilat, 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, ramiprilat 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.

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.

Clinical efficacy and safety

Dual blockade of the renin-angiotensin-aldosterone system (RAAS)

Two large randomised, controlled trials (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 endorgan 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 hyperkalaemia, 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 (hyperkalaemia, hypotension and renal dysfunction) were more frequently reported in the aliskiren group than in the placebo group.

Paediatric population

In a randomised, double-blind, placebo-controlled 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 ramiprilat 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 blood pressure in children with confirmed hypertension.

This effect was not seen in a 4 week dose-escalation, randomised, 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.

Amlodipine

Mechanism of action

Amlodipine is a calcium ion influx inhibitor of the dihydropyridine group (slow channel blocker or calcium ion antagonist) and inhibits the transmembrane influx of calcium ions into cardiac and vascular smooth muscle.

The mechanism of the antihypertensive action of amlodipine is due to a direct relaxant effect on vascular smooth muscle.

In patients with hypertension, once daily dosing provides clinically significant reductions of blood pressure in both the supine and standing positions throughout the 24 hour interval. Due to the slow onset of action, acute hypotension is not a feature of amlodipine administration.

Amlodipine has not been associated with any adverse metabolic effects or changes in plasma lipids and is suitable for use in patients with asthma, diabetes, and gout.

Use in Patients with Heart Failure

Long term, placebo controlled study (PRAISE-2) of amlodipine in patients with NYHA III and IV heart failure without clinical symptoms or objective findings suggestive or underlying ischaemic disease, on stable doses of ACE inhibitors, digitalis, and diuretics, amlodipine had no effect on total cardiovascular mortality. In this same population amlodipine was associated with increased reports of pulmonary oedema.

Treatment to prevent heart attack trial (ALLHAT)

A randomised double-blind morbidity-mortality study called the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) was performed to compare newer drug therapies: amlodipine 2.5-10 mg/d (calcium channel blocker) or lisinopril 10-40 mg/d (ACE-inhibitor) as first-line therapies to that of the thiazide-diuretic, chlorthalidone 12.5-25 mg/d in mild to moderate hypertension.

A total of 33,357 hypertensive patients aged 55 or older were randomised and followed for a mean of 4.9 years. The patients had at least one additional CHD risk factor, including: previous myocardial infarction or stroke (> 6 months prior to enrolment) or documentation of other atherosclerotic CVD (overall 51.5 %), type 2 diabetes (36.1 %), HDL-C < 35 mg/dL (11.6 %), left ventricular hypertrophy diagnosed by electrocardiogram or echocardiography (20.9 %), current cigarette smoking (21.9 %).

The primary endpoint was a composite of fatal CHD or non-fatal myocardial infarction. There was no significant difference in the primary endpoint between amlodipine-based therapy and chlorthalidone-based therapy: RR 0.98 95 % CI (0.90-1.07) p = 0.65. Among secondary endpoints, the incidence of heart failure (component of a composite combined cardiovascular endpoint) was significantly higher in the amlodipine group as compared to the chlorthalidone group (10.2 % vs 7.7 %, RR 1.38, 95 % CI [1.25-1.52] p < 0.001). However, there was no significant difference in all-cause mortality between amlodipine-based therapy and chlorthalidone-based therapy. RR 0.96 95 % CI [0.89-1.02] p = 0.20.

Paediatric population (aged 6 years and older)

In a study involving 268 children aged 6-17 years with predominantly secondary hypertension, comparison of a 2.5 mg dose, and 5.0 mg dose of amlodipine with placebo, showed that both doses reduced Systolic Blood Pressure significantly more than placebo. The difference between the two doses was not statistically significant.

The long-term effects of amlodipine on growth, puberty and general development have not been studied. The long-term efficacy of amlodipine on therapy in childhood to reduce cardiovascular morbidity and mortality in adulthood have also not been established.

The European Medicines Agency has waived the obligation to submit the results of studies with the reference medicinal product containing ramipril/amlodipine in all subsets of the paediatric population in the granted indication (see section 4.2 for information on paediatric use).

5.2 Pharmacokinetic properties

Ramipril

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 ramiprilat after oral administration of 2.5 mg and 5 mg ramipril is 45 %. Peak plasma concentrations of ramiprilat, the sole active metabolite of ramipril are reached 2-4 hours after ramipril intake. Steady state plasma

concentrations of ramiprilat after once daily dosing with the usual doses of ramipril are reached by about the fourth day of treatment.

Distribution

The serum protein binding of ramipril is about 73 % and that of ramiprilat about 56 %.

Biotransformation

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.

Patients with renal impairment (see section 4.2)

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 (see section 4.2)

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.

Lactation

One single 10 mg oral dose of ramipril produced an undetectable level in breast milk. However the effect of multiple doses is not known.

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 metabolised 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 dose group. The dose of 0.05 mg/kg in children achieved exposure levels comparable to those in adults treated with ramipril 5 mg. 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.

Amlodipine

Absorption, distribution, plasma protein binding

After oral administration of therapeutic doses, amlodipine is well absorbed with peak blood levels between 6-12 hours post dose. Absolute bioavailability has been estimated to be between 64 and 80 %. The volume of distribution is approximately 21 l/kg. *In vitro* studies have shown that approximately 97.5 % of circulating amlodipine is bound to plasma proteins.

The bioavailability of amlodipine is not affected by food intake.

Biotransformation/elimination

The terminal plasma elimination half-life is about 35-50 hours and is consistent with once daily dosing. Amlodipine is extensively metabolised by the liver to inactive metabolites with 10 % of the parent compound and 60 % of metabolites excreted in the urine.

Use in hepatic impairment

Very limited clinical data are available regarding amlodipine administration in patients with hepatic impairment. Patients with hepatic insufficiency have decreased clearance of amlodipine resulting in a longer half-life and an increase in AUC of approximately 40-60 %.

Use in the elderly

The time to reach peak plasma concentrations of amlodipine is similar in elderly and younger subjects. Amlodipine clearance tends to be decreased with resulting increases in AUC and elimination half-life in elderly patients. Increases in AUC and elimination half-life in patients with congestive heart failure were as expected for the patient age group studied.

Use in children

A population PK study has been conducted in 74 hypertensive children aged from 1 to 17 years (with 34 patients aged 6 to 12 years and 28 patients aged 13 to 17 years) receiving amlodipine between 1.25 and 20 mg given either once or twice daily. In children 6 to 12 years and in adolescents 13-17 years of age the typical oral clearance (CL/F) was 22.5 and 27.4 L/hr respectively in males and 16.4 and 21.3 L/hr respectively in females. Large variability in exposure between individuals was observed. Data reported in children below 6 years is limited.

5.3 Preclinical safety data

Related to ramipril

Oral administration of ramipril has been found to be devoid of acute toxicity in rodents and dogs.

Studies involving chronic oral administration have been conducted in rats, dogs and monkeys.

Indications of plasma electrolyte shifts and changes in blood picture have been found in the 3 species.

As an expression of the pharmacodynamic activity of ramipril, pronounced enlargement of the juxtaglomerular apparatus has been noted in the dog and monkey from daily doses of 250 mg/kg/d.

Rats, dogs and monkeys tolerated daily doses of 2, 2.5 and 8 mg/kg/d respectively without harmful effects.

Reproduction toxicology studies in the rat, rabbit and monkey did not disclose any teratogenic properties.

Fertility was not impaired either in male or in female rats.

The administration of ramipril to female rats during the foetal period and lactation produced irreversible renal damage (dilatation of the renal pelvis) in the offspring at daily doses of 50 mg/kg body weight or higher.

Extensive mutagenicity testing using several test systems has yielded no indication that ramipril possesses mutagenic or genotoxic properties.

Irreversible kidney damage has been observed in very young rats given a single dose of ramipril.

Related to amlodipine

Reproductive toxicology

Reproductive studies in rats and mice have shown delayed date of delivery, prolonged duration of labour and decreased pup survival at dosages approximately 50 times greater than the maximum recommended dosage for humans based on mg/kg.

Impairment of fertility

There was no effect on the fertility of rats treated with amlodipine (males for 64 days and females 14 days prior to mating) at doses up to 10 mg/kg/day (8 times * the maximum recommended human dose of 10 mg on a mg/m² basis).

In another rat study in which male rats were treated with amlodipine besilate for 30 days at a dose comparable with the human dose based on mg/kg, decreased plasma follicle-stimulating hormone and testosterone were found as well as decreases in sperm density and in the number of mature spermatids and Sertoli cells.

Carcinogenesis, mutagenesis

Rats and mice treated with amlodipine in the diet for two years, at concentrations calculated to provide daily dosage levels of 0.5, 1.25, and 2.5 mg/kg/day showed no evidence of carcinogenicity. The highest dose (for mice, similar to, and for rats twice * the maximum recommended clinical dose of 10 mg on a mg/m² basis) was close to the maximum tolerated dose for mice but not for rats.

Mutagenicity studies revealed no drug related effects at either the gene or chromosome levels.

* Based on patient weight of 50 kg

6 PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Capsule content:

Cellulose, Microcrystalline

Hypromellose

Crosspovidone

Glycerol dibehenate

Capule Cap/Capsule Body:

Gelatin

Titanium dioxide (E171)

Indigo carmine (E132)

6.2 Incompatibilities

Not applicable.

6.3 Shelf life

36 months

6.4 Special precautions for storage

Do not store above 25°C.

6.5 Nature and contents of container

Ramipril/Amlodipine capsules are available in Al/OPA/Al/PVC blister packs containing 28, 30, 50, 56, 60, 98, 100, 200,300 capsules.

Not all pack sizes may be marketed.

6.6 Special precautions for disposal

None.

7 MARKETING AUTHORISATION HOLDER

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