# SUMMARY OF PRODUCT CHARACTERISTICS

## 1. NAME OF THE MEDICINAL PRODUCT

**Atacand® 4 mg, 8 mg and 16 mg tablets.**

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Each tablet contains 4 mg, 8 mg or 16 mg candesartan cilexetil.
Excipient with known effect:
4 mg: Each tablet contains 93.4 mg lactose monohydrate
8 mg: Each tablet contains 89.4 mg lactose monohydrate
16 mg: Each tablet contains 81.4 mg lactose monohydrate

## 3. PHARMACEUTICAL FORM

Tablets.

Atacand 4 mg: round (diameter 7 mm), white tablets with a score and marked A/CF on one side and marked 004 on the other side.

Atacand 8 mg: round (diameter 7 mm), light pink tablets with a score and marked A/CG on one side and marked 008 on the other side.

Atacand 16 mg: round (diameter 7 mm), pink tablets with a score and marked A/CH on one side and marked 016 on the other side.

The tablet can be divided into equal doses.

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

hypertension

Treatment of patients with heart failure and impaired left ventricle systolic function (left ventricular ejection fraction ≤ 40%) as add-on therapy to ACE inhibitors or when ACE inhibitors are not tolerated (see section 5.1 Pharmacodynamic properties).

### 4.2 Posology and method of administration

**Dosage in Hypertension**

The recommended initial dose and usual maintenance dose is 8 mg once daily. Most of the antihypertensive effect is attained within 4 weeks. In some patients whose blood pressure is not adequately controlled, the dose can be increased to a maximum of 16 mg once daily.

Therapy should be adjusted according to blood pressure response.

Atacand may also be administered with other antihypertensive agents (see sections 4.3, 4.4, 4.5 and 5.1). Addition of hydrochlorothiazide has been shown to have an additive antihypertensive effect with various doses of Atacand.

*Use in the elderly*
No initial dosage adjustment is necessary in elderly patients.

*Use in patients with intravascular volume depletion*
An initial dose of 4 mg may be considered in patients at risk for hypotension, such as patients with possible volume depletion (see also 4.4 Special warnings and special precautions for use).

*Use in impaired renal function*
The starting dose is 4 mg in patients with renal impairment, including patients on haemodialysis. The dose should be titrated according to response. There is limited experience in patients with very severe or end-stage renal impairment (Clcreatinine < 15 ml/min). See section 4.4 Special warnings and special precautions for use.

*Use in impaired hepatic function*
Patients with hepatic impairment: An initial dose of 2 mg once daily is recommended in patients with mild to moderate hepatic impairment. The dose may be adjusted according to response.
Atacand is contraindicated in patients with severe hepatic impairment and/or cholestasis (see section 4.3).

*Black patients*
The antihypertensive effect of candesartan is less pronounced in black patients than in non-black patients. Consequently, uptitration of Atacand and concomitant

therapy may be more frequently needed for blood pressure control in black patients than in non-black patients (see section 5.1).

**Dosage in Heart Failure**

The usual recommended initial dose of Atacand is 4 mg once daily. Up-titration to the target dose of 32 mg once daily (maximum dose) or the highest tolerated dose is done by doubling the dose at intervals of at least 2 weeks (see section 4.4 Special warnings and special precautions for use). Evaluation of patients with heart failure should always comprise assessment of renal function including monitoring of serum creatinine and potassium. Atacand can be administered with other heart failure treatment, including ACE-inhibitors, beta-blockers, diuretics and digitalis or a combination of these medicinal products. Atacand may be co-administered with an ACE-inhibitor in patients with symptomatic heart failure despite optimal standard heart failure therapy when mineralocorticoid receptor antagonists are not tolerated. The combination of an ACE-inhibitor, a potassium-sparing diuretic and Atacand is not recommended and should be considered only after careful evaluation of the potential benefits and risks (see sections 4.4, 4.8 and 5.1).

*Special patient populations*

No initial dose adjustment is necessary for elderly patients or in patients with intravascular volume depletionrenal or renal impairment or mild to moderate hepatic impairment.

*Paediatric Population*

The safety and efficacy of Atacand in children aged between birth and 18 years have not been established in the treatment of heart failure. No data are available.

**Method of administration**

Oral use.

Atacand should be taken once daily with or without food.

The bioavailability of candesartan is not affected by food.

## 4.3 Contraindications

Hypersensitivity to candesartan cilexetil or to any of the excipients listed in section 6.1.

Second and third trimesters of pregnancy (see sections 4.4 and 4.6).

Severe hepatic impairment and/or cholestasis.

The concomitant use of Atacand with aliskiren-containing products is contraindicated in patients with diabetes mellitus or renal impairment (GFR<60ml/min/1.73m2). (See sections 4.5 and 5.1).

## 4.4 Special warnings and precautions for use

*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 section 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.

*Renal impairment*
As with other agents inhibiting the renin-angiotensin-aldosterone system, changes in renal function may be anticipated in susceptible patients treated with Atacand.

When Atacand is used in hypertensive patients with renal impairment, periodic monitoring of serum potassium and creatinine levels is recommended. There is limited experience in patients with very severe or end-stage renal impairment (i.e., $CL_{creatinine}$<15 ml/min). In these patients Atacand should be carefully titrated with thorough monitoring of blood pressure.

Evaluation of patients with heart failure should include periodic assessments of renal function, especially in elderly patients 75 years or older, and patients with impaired renal function. During dose titration of Atacand, monitoring of serum creatinine and potassium is recommended. Clinical trials in heart failure did not include patients with serum creatinine >265 μmol/L (>3 mg/dL)

*Concomitant therapy with an ACE inhibitor in heart failure*
The risk of adverse reactions, especially hypotension, hyperkaaemia and decreased renal function (including acute renal failure), may increase when Atacand is used in combination with an ACE inhibitor. Triple combination of an ACE-inhibitor, a mineralocorticoid receptor antagonist and candesartan is also not recommended.

Use of these combinations should be 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

*Haemodialysis*
During dialysis the blood pressure may be particularly sensitive to AT1-receptor blockade as a result of reduced plasma volume and activation of the renin-angiotensin-aldosterone system. Therefore, Atacand should be carefully titrated with thorough monitoring of blood pressure in patients on haemodialysis.

*Renal artery stenosis*
Medicinal products that affect the renin-angiotensin-aldosterone, system, including angiotensin II receptor antagonists (AIIRAs), may increase blood urea and serum creatinine in patients with bilateral renal artery stenosis or stenosis of the artery to a solitary kidney.

*Kidney transplantation*
There is limited clinical evidence regarding Atacand use in patients who have undergone renal transplant.

*Hypotension*
Hypotension may occur during treatment with Atacand in heart failure patients. It may also occur in hypertensive patients with intravascular volume depletion such as those receiving high dose diuretics. Caution should be observed when initiating therapy and correction of hypovolemia should be attempted.

*Anaesthesia and surgery*
Hypotension may occur during anaesthesia and surgery in patients treated with angiotensin II antagonists due to blockade of the renin-angiotensin system. Very rarely, hypotension may be severe such that it may warrant the use of intravenous fluids and/or vasopressors.

*Aortic and mitral valve stenosis or obstructive hypertrophic cardiomyopathy*
As with other vasodilators, special caution is indicated in patients suffering from haemodynamically relevant aortic or mitral valve stenosis, or obstructive hypertrophic cardiomyopathy.

*Primary hyperaldosteronism*
Patients with primary hyperaldosteronism will not generally respond to antihypertensive medicinal products acting through inhibition of the renin-angiotensin-aldosterone system. Therefore, the use of Atacand is not recommended in this population.

*Hyperkalaemia*
Concomitant use of Atacand with potassium-sparing diuretics, potassium supplements, salt substitutes containing potassium, or other medicinal products that may increase potassium levels (e.g. heparin and combination of trimetoprim/sulfametoxazol) may lead to increases in serum potassium in hypertensive patients. Monitoring of potassium should be undertaken as appropriate.

In heart failure patients treated with Atacand, hyperkalaemia may occur, periodic monitoring of serum potassium is recommended. The combination of an ACE-inhibitor, a potassium-sparing diuretic (e.g. spironolactone) and Atacand is not recommended and should be considered only after careful evaluation of the potential benefits and risks.

*General*

In patients whose vascular tone and renal function depend predominantly on the activity of the renin-angiotensin-aldosterone system (e.g. patients with severe congestive heart failure or underlying renal disease, including renal artery stenosis), treatment with other medicinal products that affect this system has been associated with acute hypotension, azotaemia, oliguria or, rarely, acute renal failure.
The possibility of similar effects cannot be excluded with AIIRAs As with any antihypertensive agent, excessive blood pressure decrease in patients with ischaemic cardiopathy or ischaemic cerebrovascular disease could result in a myocardial infarction or stroke.

The antihypertensive effect of candesartan may be enhanced by other medicinal products with blood pressure lowering properties, whether prescribed as an antihypertensive or prescribed for other indications.

Atacand contains lactose. Patients with rare hereditary problems of galactose intolerance, the Lapp lactase deficiency or glucose-galactose malabsorption should not take this medicinal product.

*Pregnancy*
AIIRAs should not be initiated during pregnancy. Unless continued AIIRA 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 AIIRAs should be stopped immediately, and, if appropriate, alternative therapy should be started (see sections 4.3 and 4.6).
In post-menarche patients the possibility of pregnancy should be evaluated on a regular basis.
Appropriate information should be given and/or action taken to prevent the risk of exposure during pregnancy (see sections 4.3 and 4.6)

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

Compounds which have been investigated in clinical pharmacokinetic studies include hydrochlorothiazide, warfarin, digoxin, oral contraceptives (i.e. ethinylestradiol/levonorgestrel), glibenclamide, nifedipine and enalapril.
No clinically significant pharmacokinetic interactions with these medicinal products have been identified.
Concomitant use of potassium-sparing diuretics, potassium supplements, salt substitutes containing potassium, or other medicinal products (e.g. heparin) may increase potassium levels. Monitoring of potassium should be undertaken as appropriate (see section 4.4).

Reversible increases in serum lithium concentrations and toxicity have been reported during concomitant administration of lithium with ACE inhibitors. A similar effect may occur with AIIRAs Use of candesartan with lithium is not recommended. If the combination proves necessary, careful monitoring of serum lithium levels is recommended.

When AIIRAs are administered simultaneously with non-steroidal anti-inflammatory drugs (NSAIDs) (i.e. selective COX-2 inhibitors, acetylsalicylic acid (> 3 g/day) and non-selective NSAIDs), attenuation of the antihypertensive effect may occur.

As with ACE inhibitors, concomitant use of AIIRAs and NSAIDs may lead to an increased risk of worsening of renal function, including possible acute renal failure,

and an increase in serum potassium, especially in patients with poor pre-existing renal function. The combination should be administered with caution, especially in the elderly. Patients should be adequately hydrated and consideration should be given to monitoring renal function after initiation of concomitant therapy and periodically thereafter.

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).

## 4.6 Fertility, Pregnancy and lactation

*Pregnancy*

The use of AIIRAs is not recommended during the first trimester of pregnancy (see section 4.4). The use of AIIRAs 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. Whilst there is no controlled epidemiological data on the risk with AIIRAs, similar risks may exist for this class of drugs. Unless continued AIIRA 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 AIIRAs should be stopped immediately and, if appropriate, alternative therapy should be started. Exposure to AIIRA therapy during the second and third trimesters is known to induce human fetotoxicity (decreased renal function, oligohydramnios, skull ossification retardation) and neonatal toxicity (renal failure, hypotension, hyperkalaemia) (see section 5.3). Should exposure to AIIRAs have occurred from the second trimester of pregnancy, ultrasound check of renal function and skull is recommended. Infants whose mothers have taken AIIRAs should be closely observed for hypotension (see sections 4.3 and 4.4).

*Breast feeding*

Because no information is available regarding the use of Atacand during breastfeeding, Atacand is not recommended and alternative treatments with better established safety profiles during breastfeeding are preferable, especially while nursing a new-born or preterm infant.

## 4.7 Effects on ability to drive and use machines

No studies on the effects of candesartan on the ability to drive and use machines have been performed. However, it should be taken into account that occasionally dizziness or weariness may occur during treatment with Atacand.

## 4.8 Undesirable effects

**Treatment of Hypertension**

In controlled clinical studies adverse reactions were mild and transient. The overall incidence of adverse events showed no association with dose or age. Withdrawals from treatment due to adverse events were similar with candesartan cilexetil (3.1%) and placebo (3.2%).

In a pooled analysis of clinical trial data of hypertensive patients, adverse reactions with candesartan cilexetil were defined based on an incidence of adverse events with candesartan cilexetil at least 1% higher than the incidence seen with placebo. By this definition, the most commonly reported adverse reactions were dizziness/vertigo, headache and respiratory infection.

The table below presents adverse reactions from clinical trials and post-marketing experience.

The frequencies used in the tables throughout section 4.8 are: very common (≥1/10), common (≥1/100 to < 1/10), uncommon (≥1/1,000 to < 1/100), rare (≥1/10,000 to
< 1/1,000) and very rare (< 1/10,000) and not known (cannot be estimated from the available data).

| System Organ Class | Frequency | Undesirable Effect |
|---|---|---|
| Infections and infestations | Common | Respiratory infection |
| Blood and lymphatic system disorders | Very rare | Leukopenia, neutropenia and agranulocytosis |
| Metabolism and nutrition | Very rare | Hyperkalaemia, |

| | | |
|---|---|---|
| disorders | | hyponatraemia |
| Nervous system disorders | Common | Dizziness/vertigo, headache |
| Respiratory, thoracic and mediastinal disorders | Very rare | Cough |
| Gastrointestinal disorders | Very rare | Nausea |
| | Not known | Diarrhoea |
| Hepato-biliary disorders | Very rare | Increased liver enzymes, abnormal hepatic function or hepatitis |
| Skin and subcutaneous tissue disorders | Very rare | Angioedema, rash, urticaria, pruritus |
| Musculoskeletal and connective tissue disorders | Very rare | Back pain, arthralgia, myalgia |
| Renal and urinary disorders | Very rare | Renal impairment, including renal failure in susceptible patients (see section 4.4) |

*Laboratory findings*

In general, there were no clinically important influences of Atacand on routine laboratory variables. As for other inhibitors of the renin-angiotensin-aldosterone system, small decreases in haemoglobin have been seen. No routine monitoring of laboratory variables is usually necessary for patients receiving Atacand. However, in patients with renal impairment, periodic monitoring of serum potassium and creatinine levels is recommended.

**Treatment of Heart Failure**

The adverse experience profile of Atacand in adult heart failure patients was consistent with the pharmacology of the drug and the health status of the patients. In the CHARM clinical programme, comparing Atacand in doses up to 32 mg (n=3,803) to placebo (n=3,796), 21.0% of the candesartan cilexetil group and 16.1% of the placebo group discontinued treatment because of adverse events. The most commonly reported adverse reactions were hyperkalaemia, hypotension and renal impairment. These events were more common in patients over 70 years of age, diabetics, or subjects who received other medicinal products which affect the renin-angiotensin-aldosterone system, in particular an ACE-inhibitor and/or spironolactone. The table below presents adverse reactions from clinical trials and post-marketing experience.

| System Organ Class | Frequency | Undesirable Effect |
|---|---|---|
| Blood and lymphatic system disorders | Very rare | Leukopenia, neutropenia and agranulocytosis |
| Metabolism and nutrition disorders | Common | Hyperkalaemia |
| | Very rare | hyponatraemia |
| Nervous system disorders | Very rare | Dizziness, headache |
| Vascular disorders | Common | Hypotension |
| Respiratory, thoracic and mediastinal disorders | Very rare | Cough |
| Gastrointestinal disorders | Very rare | Nausea |
| | Not known | Diarrhoea |
| Hepato-biliary disorders | Very rare | Increased liver enzymes, abnormal hepatic function or hepatitis |
| Skin and subcutaneous tissue disorders | Very rare | Angioedema, rash, urticaria, pruritus |
| Musculoskeletal and connective tissue disorders | Very rare | Back pain, arthralgia, myalgia |
| Renal and urinary disorders | Common | Renal impairment, including renal failure in susceptible patients (see section 4.4) |

*Laboratory findings:*
Hyperkalaemia and renal impairment are common in patients treated with Atacand for the indication of heart failure. Periodic monitoring of serum creatinine and potassium is recommended (see section 4.4).

**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. Any suspected adverse events should be reported to the Ministry of Health according to the National Regulation by using an online form: https://sideeffects.health.gov.il

## 4.9 Overdose

*Symptoms*
Based on pharmacological considerations, the main manifestation of an overdose is likely to be symptomatic hypotension and dizziness. In individual case reports of overdose (of up to 672 mg candesartan cilexetil) in an adult, patient recovery was uneventful.

*Management*
If symptomatic hypotension should occur, symptomatic treatment should be instituted and vital signs monitored. The patient should be placed supine with the legs elevated. If this is not sufficient, plasma volume should be increased by infusion of, for example, isotonic saline solution.
Sympathomimetic medicinal products may be administered if the above-mentioned measures are not sufficient.

## 5. PHARMACOLOGICAL PROPERTIES

### 5.1 Pharmacodynamic properties

Pharmacotherapeutic group:
Angiotensin II antagonists, plain, ATC code C09CA06.

Mechanism of Action
Angiotensin II is the primary vasoactive hormone of the renin-angiotensin-aldosterone system and plays a role in the pathophysiology of hypertension, heart failure and other cardiovascular disorders.
It also has a role in the pathogenesis of end organ hypertrophy and damage. The major physiological effects of angiotensin II, such as vasoconstriction, aldosterone stimulation, regulation of salt and water homeostasis and stimulation of cell growth, are mediated via the type 1 (AT1) receptor.

Pharmacodynamic effects
Candesartan cilexetil is a prodrug suitable for oral use. It is rapidly converted to the active substance, candesartan, by ester hydrolysis during absorption from the gastrointestinal tract. Candesartan is an AIIRA, selective for AT1 receptors, with tight binding to and slow dissociation from the receptor. It has no agonist activity.

Candesartan does not inhibit ACE, which converts angiotensin I to angiotensin II and degrades bradykinin. There is no effect on ACE and no potentiation of bradykinin, or substance P. In controlled clinical trials comparing candesartan with ACE inhibitors, the incidence of cough was lower in patients receiving candesartan

cilexetil. Candesartan does not bind to or block other hormone receptors or ion channels known to be important in cardiovascular regulation. The antagonism of the angiotensin II (AT1) receptors results in dose related increases in plasma renin levels, angiotensin I and angiotensin II levels, and a decrease in plasma aldosterone concentration.

Clinical efficacy and safety

**Hypertension**

In hypertension, candesartan causes a dose-dependent, long-lasting reduction in arterial blood pressure. The antihypertensive action is due to decreased systemic peripheral resistance, without reflex increase in heart rate. There is no indication of serious or exaggerated first dose hypotension or rebound effect after cessation of treatment.

After administration of a single dose of candesartan cilexetil, onset of antihypertensive effect generally occurs within 2 hours. With continuous treatment, most of the reduction in blood pressure with any dose is generally attained within four weeks and is sustained during long-term treatment. According to a meta-analysis, the average additional effect of a dose increase from 16 mg to 32 mg once daily was small. Taking into account the inter-individual variability, a more than average effect can be expected in some patients. Candesartan cilexetil once daily provides effective and smooth blood pressure reduction over 24 hours, with little difference between maximum and trough effects during the dosing interval.

The antihypertensive effect and tolerability of candesartan and losartan were compared in two randomised, double-blind studies, the blood pressure lowering effects of Atacand and losartan were evaluatedin a total of 1,268 patients with mild to moderate hypertension. The trough blood pressure reduction (systolic/diastolic) was 13.1/10. 5mmHg with candesrtan cilexetil 32 mg once daily and 10.0/8.7 mmHg with losartan potassium 100 mg once daily (difference in blood pressure reduction 3.1/1.8 mmHg, $p<0.0001/p<0.0001$).

When candesartan cilexetil is used together with hydrochlorothiazide, the reduction in blood pressure is additive. An increased antihypertensive effect is also seen when candesartan cilexetil is combined with amlodipine or felodipine. Medicinal products that block the renin-angiotensin-aldosterone system have less pronounced antihypertensive effect in black patients (usually a low-renin population) than in non-black patients. This is generally true for drugs that block the renin-angiotensin-aldosterone system. In an open label clinical experience trial in 5,156 patients with diastolic hypertension, the blood pressure reduction during candesartan treatment was significantly less in black than non-black patients (14.4/10.3 mmHg vs 19.0/12.7 mmHg, $p<0.0001/p<0.0001$).

Candesartan increases renal blood flow and either has no effect on or increases glomerular filtration rate while renal vascular resistance and filtration fraction are reduced. In a 3-month clinical study in hypertensive patients with type 2 diabetes mellitus and microalbuminuria, antihypertensive treatment with candesartan cilexetil reduced urinary albumin excretion (albumin/creatinine ratio, mean 30%, 95%CI 15-42%). There is currently no data on the effect of candesartan on the progression to diabetic nephropathy.

The effects of candesartan cilexetil 8-16 mg (mean dose 12 mg), once daily on cardiovascular morbidity and mortality, were evaluated in a randomised clinical trial with 4,937 elderly patients (aged 70-89 years; 21% aged 80 or above) with mild to moderate hypertension followed for a mean of 3.7 years (Study on COgnition and Prognosis in the Elderly). Patients received candesartan cilexetil or placebo with other antihypertensive treatment added as needed. The blood pressure was reduced from 166/90 to 145/80 mmHg in the candesartan group, and from 167/90 to 149/82 mmHg in the control group. There was no statistically significant difference in the primary endpoint, major cardiovascular events (cardiovascular mortality, non-fatal stroke and non-fatal myocardial infarction). There were 26.7 events per 1000 patient-years in the candesartan group versus 30.0 events per 1000 patient-years in the control group (relative risk 0.89, 95%CI 0.75 to 1.06, p=0.19).

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 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 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.

**Heart Failure**

Treatment with candesartan cilexetil reduces mortality, reduces hospitalisation due to heart failure, and improves symptoms in patients with left ventricular systolic dysfunction as shown in the Candesartan in Heart failure – Assessment of Reduction in Mortality and morbidity (CHARM) programme.

This placebo controlled, double-blind study programme in chronic heart failure (CHF) patients with NYHA functional class II to IV consisted of three separate studies: CHARM-Alternative (n=2,028) in patients with LVEF ≤40% not treated with an ACE inhibitor because of intolerance (mainly due to cough, 72%), CHARM-Added (n=2,548) in patients with LVEF ・ 40% and treated with an ACE inhibitor,, and CHARM-Preserved (n=3,023) in patients with LVEF >40%. Patients on optimal CHF therapy baseline were randomised to placebo or candesartan cilexetil (titrated from 4 mg or 8 mg once daily to 32 mg once daily or the highest tolerated dose, mean dose 24 mg) and followed for a median of 37.7 months. After 6 months of treatment 63% of the patients still taking candesartan cilexetil (89%) were at the target dose of 32 mg.

In CHARM-Alternative, the composite endpoint of cardiovascular mortality or first CHF hospitalisation was significantly reduced with candesartan in comparison with placebo (hazard ratio (HR) 0.77, 95% CI 0.67 to0.89, p<0.001) This corresponds to a relative risk reduction of 23%. Of candesartan patients 33.0% (95%CI: 30.1 to 36.0) and of placebo patients 40.0% (95%CI: 37.0 to 43.1) experienced this endpoint, absolute difference 7.0% (95%CI: 11.2 to 2.8). Fourteen patients needed to be treated for the duration of the study to prevent one patient from dying of a cardiovascular event or being hospitalised for treatment of heart failure. The composite endpoint of all-cause mortality or first CHF hospitalisation was also significantly reduced with candesartan, HR 0.80 (95%CI: 0.70 to 0.92, p=0.001). Of

candesartan patients 36.6% (95%CI: 33.7 to 39.7) and of placebo patients 42.7% (95%CI: 39.6 to 45.8) experienced this endpoint, absolute difference 6.0% (95%CI: 10.3 to 1.8). Both the mortality and morbidity (CHF hospitalisation) components of these composite endpoints contributed to the favourable effects of candesartan. Treatment with candesartan cilexetil resulted in improved NYHA functional class (p=0.008).

In CHARM-Added, the composite endpoint of cardiovascular mortality or first CHF hospitalisation was significantly reduced with candesartan in comparison with placebo, HR 0.85 (95%CI: 0.75 to 0.96, p=0.011). This corresponds to a relative risk reduction of 15%. Of candesartan patients 37.9% (95%CI: 35.2 to 40.6) and of placebo patients 42.3% (95%CI: 39.6 to 45.1) experienced this endpoint, absolute difference 4.4% (95%CI: 8.2 to 0.6). Twenty-three patients needed to be treated for the duration of the study to prevent one patient from dying of a cardiovascular event or being hospitalised for treatment of heart failure. The composite endpoint of all-cause mortality or first CHF hospitalisation was also significantly reduced with candesartan, HR 0.87 (95%CI: 0.78 to 0.98, p=0.021). Of candesartan patients 42.2% (95%CI: 39.5 to 45.0) and of placebo patients 46.1% (95%CI: 43.4 to 48.9) experienced this endpoint, absolute difference 3.9% (95%CI: 7.8 to 0.1). Both the mortality and morbidity components of these composite endpoints contributed to the favourable effects of candesartan. Treatment with candesartan cilexetil resulted in improved NYHA functional class (p=0.020).

In CHARM-Preserved, no statistically significant reduction was achieved in the composite endpoint of cardiovascular mortality or first CHF hospitalisation, HR 0.89 (95%CI: 0.77 to 1.03, p=0.118).

All-cause mortality was not statistically significant when examined separately in each of the three CHARM studies. However, all-cause mortality was also assessed in pooled populations, CHARMAlternative and CHARM-Added, HR 0.88 (95%CI: 0.79 to 0.98, p=0.018) and all three studies, HR 0.91 (95%CI: 0.83 to 1.00, p=0.055).

The beneficial effects of candesartan were consistent irrespective of age, gender and concomitant medication. Candesartan was effective also in patients taking both beta-blockers and ACE inhibitors at the same time, and the benefit was obtained whether or not patients were taking ACE inhibitors at the target dose recommended by treatment guidelines. In patients with CHF and depressed left ventricular systolic function (left ventricular ejection fraction, LVEF ・40%), candesartan decreases systemic vascular resistance and pulmonary capillary

wedge pressure, increases plasma renin activity and angiotensin II concentration, and decreases aldosterone levels.

## 5.2 Pharmacokinetic properties

*Absorption and distribution*
Following oral administration, candesartan cilexetil is converted to the active substance candesartan. The absolute bioavailability of candesartan is approximately 40% after an oral solution of candesartan cilexetil.
The relative bioavailability of the tablet formulation compared with the same oral solution is approximately 34% with very little variability. The estimated absolute bioavailability of the tablet is therefore 14%. The mean peak serum concentration (Cmax) is reached 3-4 hours following tablet intake. The candesartan serum concentrations increase linearly with increasing doses in the therapeutic dose range. No gender related differences in the pharmacokinetics of candesartan have been observed. The area under the serum concentration versus time curve (AUC) of candesartan is not significantly affected by food.

Candesartan is highly bound to plasma protein (more than 99%). The apparent volume of distribution of candesartan is 0.1 l/kg.

The bioavailability of candesartan is not affected by food.

Biotransformation *and elimination*
Candesartan is mainly eliminated unchanged via urine and bile and only to a minor extent eliminated by hepatic metabolism (CYP2C9). Available interaction studies indicate no effect on CYP2C9 and CYP3A4. Based on in vitro data, no interaction would be expected to occur in vivo with drugs whose metabolism is dependent upon cytochrome P450 isoenzymes CYP1A2, CYP2A6, CYP2C9, CYP2C19, CYP2D6, CYP2E1 or CYP3A4. The terminal half-life of candesartan is approximately 9 hours. There is no accumulation following multiple doses.

Total plasma clearance of candesartan is about 0.37 ml/min/kg, with a renal clearance of about 0.19 ml/min/kg. The renal elimination of candesartan is both by glomerular filtration and active tubular secretion.
Following an oral dose of $^{14}$C-labelled candesartan cilexetil, approximately 26% of the dose is excreted in the urine as candesartan and 7% as an inactive metabolite while approximately 56% of the dose is recovered in the faeces as candesartan and 10% as the inactive metabolite.

*Pharmacokinetics in special populations*

In the elderly (over 65 years) Cmax and AUC of candesartan are increased by approximately 50% and 80%, respectively in comparison to young subjects. However, the blood pressure response and the incidence of adverse events are similar after a given dose of Atacand in young and elderly patients (see section 4.2).

In patients with mild to moderate renal impairment Cmax and AUC of candesartan increased during repeated dosing by approximately 50% and 70%, respectively, but $t_{½}$ was not altered, compared to patients with normal renal function. The corresponding changes in patients with severe renal impairment were approximately 50% and 110%, respectively. The terminal t½ of candesartan was approximately doubled in patients with severe renal impairment. The AUC of candesartan in patients undergoing haemodialysis was similar to that in patients with severe renal impairment.

In two studies, both including patients with mild to moderate hepatic impairment, there was an increase in the mean AUC of candesartan of approximately 20%. in one study and 80% in the other study (see section 4.2). There is no experience in patients with severe hepatic impairment

## 5.3 Preclinical safety data

There was no evidence of abnormal systemic or target organ toxicity at clinically relevant doses. In preclinical safety studies candesartan had effects on the kidneys and on red cell parameters at high doses in mice, rats, dogs and monkeys. Candesartan caused a reduction of red blood cell parameters (erythrocytes, haemoglobin, haematocrit). Effects on the kidneys (such as interstitial nephritis, tubular distension, basophilic tubules; increased plasma concentrations of urea and creatinine) were induced by candesartan which could be secondary to the hypotensive effect leading to alterations of renal perfusion. Furthermore, candesartan induced hyperplasia/hypertrophy of the juxtaglomerular cells. These changes were considered to be caused by the pharmacological action of candesartan. For therapeutic doses of candesartan in humans, the hyperplasia/hypertrophy of the renal juxtaglomerular cells does not seem to have any relevance. In preclinical studies in normotensive neonatal and juvenile rats, candesartan caused a reduction in body weight and heart weight. As in adult animals, these effects are considered to result from the pharmacological action of candesartan. At the lowest dose of 10 mg/kg exposure to candesartan was between 12 and 78 times the levels found in children aged 1 to <6 who received candesartan cilexetil at a dose of 0.2 mg/kg and 7 to 54 times those found in children aged 6 to <17 who received candesartan cilexetil at a dose of 16 mg. As a no observed effect level was not identified in these studies, the safety margin for

the effects on heart weight and the clinical relevance of the finding is unknown. Foetotoxicity has been observed in late pregnancy (see section 4.6).
The renin-angiotensin-aldosterone system plays a critical role in kidney development. Renin-angiotensin-aldosterone system blockade has been shown to lead to abnormal kidney development in very young mice. Administering drugs that act directly on the renin-angiotensin-aldosterone system can alter normal renal development. Therefore, children aged less than 1 year must not receive Atacand (see section 4.3).

There was no evidence of carcinogenicity.

## 6. PHARMACEUTICAL PARTICULARS

### 6.1 List of excipients

Carmellose calcium, hydroxypropyl cellulose, iron oxide reddish-brown E 172 (only 8 mg and 16 mg tablets), lactose monohydrate, magnesium stearate, maize starch and polyethylene glycol (macrogol).

### 6.2 Incompatibilities

Not applicable.

### 6.3 Shelf-life

The expiry date of the product indicated on the package materials.

### 6.4 Special precautions for storage

Do not store above 30°C

### 6.5 Nature and contents of container

Packs of 30
PVC/PVDC blisters - Press through packages of thermoformed PVC/PVDC with an aluminium foil as enclosure web.

4 mg tablet: Blister packs of 7, 10, 28, 30 tablets
8 mg tablet: Blister packs of 7, 10, 14, 28, 30, 56 and 98 tablets
16 mg tablet: Blister packs of 7, 10, 14, 28, 30, 56 and 98 tablets
Not all packs are marketed.

### 6.6 Instructions for use/handling

No special requirements.

## 7. Manufacturer

CHEPLAPHARM Arzneimittel GmbH
Ziegelhof 24
17489 Greifswald
Germany

## 8. Registration Numbers

Atacand 4 mg tablets: 109 08 29183 00
Atacand 8 mg tablets: 109 09 09184 00
Atacand 16 mg tablets: 109 10 29185 00

## 9. License Holder

Tzamal Bio-Pharma Ltd
20 Hamagshimin St.
Kiryat Matalon
Petah-Tikva

*The content of this leaflet was approved by the Ministry of Health in April 2017 and updated according to the guidelines of the ministry of Health in Oct 2022*