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## SUMMARY OF PRODUCT CHARACTERISTICS

### 1. NAME OF THE MEDICINAL PRODUCT

#### LOSEC® CAPSULES

### 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Each capsule contains omeprazole 10 or 20 mg.

For excipients, see 6.1.

### 3. PHARMACEUTICAL FORM

Hard gelatin capsules.

Losec Capsules 10 mg: hard gelatin capsules with an opaque pink body, marked 10 and an opaque pink cap marked A/OS in black ink. Each capsule contains omeprazole 10 mg as enteric coated pellets, with an aqueous based coating.

Losec Capsules 20 mg: hard gelatin capsules with an opaque pink body, marked 20 and an opaque reddish-brown cap marked A/OM in black ink. Each capsule contains omeprazole 20 mg as enteric coated pellets, with an aqueous based coating.

### 4. CLINICAL PARTICULARS

#### 4.1 Therapeutic indications

- Acute Duodenal Ulcer.
- Acute Gastric Ulcer.
- *Helicobacter Pylori*-Associated Peptic Ulcer Disease in combination with antibiotics.
- Reflux Esophagitis.
  - Treatment
  - Long-Term Management
  - Maintenance Treatment for the Prevention of Relapse in Patients with Severe Reflux Esophagitis
  - Severe Reflux Esophagitis in Children from One Year of Age and Older

- Maintenance Treatment for the Prevention of Relapse in Patients with Poorly Responsive Peptic Ulcer.
- Zollinger-Ellison Syndrome.
- Treatment and prevention of NSAID-associated duodenal and gastric ulcers or erosions in high risk patients.

#### **4.2 Posology and method of administration**

Losec capsules should be taken before meals, and are recommended to be given in the morning and swallowed whole with liquid.

For patients with swallowing difficulties the capsule might be opened and the contents swallowed or suspended in a slightly acidic fluid e.g. fruit juice, yoghurt soured milk, or in non-carbonated water. The suspended contents should be taken within 30 minutes. Alternatively these patients can suck the capsule and swallow the contents.

The contents of the capsule should not be chewed or crushed.

For children who are unable to swallow the capsule whole, or swallow the contents of the opened capsule, or suck the capsule and swallow its contents, Losec must only be administered by opening the capsules and suspending its contents in a slightly acidic fluid as directed above.

##### *Acute Duodenal Ulcer*

The recommended dosage is 20 mg once daily. Symptom resolution is rapid and in most patients healing occurs within 4 weeks. For those patients who may not have fully healed after the initial course, healing usually occurs during a further 4 weeks treatment period.

In patients with poorly responsive duodenal ulcer, Losec 40 mg once daily is recommended and healing is usually achieved within 4 weeks.

The effectiveness of Losec is not affected by concomitant NSAID treatment and the usual duration of treatment is recommended.

##### *Acute Gastric Ulcer*

The recommended dosage is 20 mg once daily. Symptom resolution is rapid and in most patients healing occurs within 4 weeks. For those patients who may not have fully healed after the initial course, healing usually occurs during a further 4 weeks treatment period.

In patients with poorly responsive gastric ulcer, 40 mg Losec once daily has been used and healing is usually achieved within 8 weeks.

The effectiveness of Losec is not affected by concomitant NSAID treatment and the usual duration of treatment is recommended.

*Helicobacter Pylori-Associated Peptic Ulcer Disease.*

The recommended alternative treatment regimens for eradication of *H pylori* are:

*Triple Therapy Regimen*

This involves 3 alternatives:

1. Losec 20 mg, amoxicillin 1 g, and clarithromycin 500 mg, all twice a day for 1 week.
2. Losec 20 mg, clarithromycin 250 mg, and metronidazole 400 mg (or tinidazole 500 mg), all twice a day for 1 week.
3. Losec 40 mg once daily, with amoxicillin 500 mg and metronidazole 400 mg, both 3 times a day for 1 week.

*Dual Therapy Regimen*

Losec 40-80 mg daily with amoxicillin 2 g daily in divided doses for two weeks. In clinical studies daily doses of 1.5-3 g of amoxicillin have been used, with or without addition of metronidazole 400 mg t.i.d.

To ensure healing in patients with active peptic ulcer disease refer to dosage recommendations for duodenal and gastric ulcer.

In each regimen, if the patient is still *H pylori*-positive, therapy may be repeated.

*Reflux Esophagitis**Treatment*

In patients with reflux esophagitis the recommended dosage is 20 mg Losec once daily, given for 4 weeks.

For those patients not fully healed after the initial course, healing usually occurs during a further 4 weeks treatment. Losec has also been used in a dose of 40 mg once daily in patients with reflux esophagitis refractory to other therapy. Healing usually occurred within 8 weeks.

*Long-Term Management*

For the long-term management of patients with healed reflux esophagitis the recommended dose is Losec 10 mg once daily. If needed the dose can be increased to Losec 20-40 mg once daily.

*Maintenance Treatment for the Prevention of Relapse in Patients with Severe Reflux Esophagitis*

For the prevention of relapse in patients with severe reflux esophagitis, 20 mg Losec once daily is recommended. In case of recurrence the dose can be increased to 40 mg Losec once daily.

*Severe Reflux Esophagitis in Children from One Year of Age and Older*

The recommended dosage regimen for healing is as follows:

Weight	Dosage
10-20 kg body weight	Losec 10 mg once daily, which may be increased to 20 mg if needed.
Over 20 kg body weight	Losec 20 mg once daily, which may be increased to 40 mg if needed.

*Maintenance Treatment for the Prevention of Relapse in Patients with Poorly Responsive Peptic Ulcer*

For the prevention of relapse in patients with poorly responsive peptic ulcer, 20 mg Losec once daily is recommended. In case of recurrence the dose can be increased to 40 mg Losec once daily.

*Zollinger-Ellison Syndrome*

The recommended initial dosage is 60 mg Losec once daily. The dosage should be adjusted individually and treatment continued as long as is clinically indicated. More than 90% of patients with severe disease and inadequate response to other therapies have been effectively controlled on doses of 20-120 mg daily. With doses above 80 mg daily, the dose should be divided and given twice daily.

*NSAID-Associated Duodenal Ulcers, Gastric Ulcers, or Gastroduodenal Erosions in Patients with or without Continued NSAID Treatment*

*Treatment:* The recommended dosage of Losec is 20 mg once daily.

Symptom resolution is rapid, and in most patients healing occurs within 4 weeks. For those patients who may not be fully healed after the initial course, healing usually occurs during a further 4 weeks treatment period.

*Prevention:* For the prevention of NSAID-associated duodenal ulcers, gastric ulcers, gastroduodenal erosions, and dyspeptic symptoms, the recommended dosage of Losec is 20 mg once daily.

*Use in the Elderly*

No dosage adjustment is necessary in the elderly.

*Use in Patients with Impaired Hepatic Function*

As bioavailability and half-life can increase in patients with impaired hepatic function, the dose requires adjustment with a maximum daily dose of 20 mg.

### *Use in Patients with Impaired Renal Function*

Dose adjustment is not required in patients with impaired renal function.

### Method of administration

It is recommended to take Losec capsules in the morning, preferably without food, swallowed whole with half a glass of water. The capsules must not be chewed or crushed.

*For patients with swallowing difficulties and for children who can drink or swallow semi-solid food*

Patients can open the capsule and swallow the contents with half a glass of water or after mixing the contents in a slightly acidic fluid e.g., fruit juice or applesauce, or in non-carbonated water. Patients should be advised that the dispersion should be taken immediately (or within 30 minutes) and always be stirred just before drinking and rinsed down with half a glass of water.

Alternatively patients can suck the capsule and swallow the pellets with half a glass of water. The enteric-coated pellets must not be chewed.

### **4.3 Contraindications**

Known hypersensitivity to omeprazole, substituted benzimidazoles, or to any of the other constituents of the formulation.

Omeprazole like other proton pump inhibitors (PPIs) should not be administered with nelfinavir (see section 4.5).

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

Subacute cutaneous lupus erythematosus (SCLE)

Proton pump inhibitors are associated with very infrequent cases of SCLE. If lesions occur, especially in sun-exposed areas of the skin, and if accompanied by arthralgia, the patient should seek medical help promptly and the health care professional should consider stopping Losec. SCLE after previous treatment with a proton pump inhibitor may increase the risk of SCLE with other proton pump inhibitors.

In the presence of any alarm symptom (e.g. significant unintentional weight loss, recurrent vomiting, dysphagia, haematemesis or melena) and when gastric ulcer is suspected or present, malignancy should be excluded, as treatment may alleviate symptoms and delay diagnosis.

Co-administration of atazanavir with proton pump inhibitors is not recommended (see section 4.5). If the combination of atazanavir with a proton pump inhibitor is judged unavoidable, close clinical monitoring (e.g virus load) is recommended in combination with an increase in the dose of atazanavir to 400 mg with 100 mg of ritonavir; omeprazole 20 mg should not be exceeded.

Omeprazole, as all acid-blocking medicines, may reduce the absorption of vitamin B<sub>12</sub> (cyanocobalamin) due to hypo- or achlorhydria. This should be considered in patients with

reduced body stores or risk factors for reduced vitamin B<sub>12</sub> absorption on long-term therapy.

Omeprazole is a CYP2C19 inhibitor. When starting or ending treatment with omeprazole, the potential for interactions with drugs metabolised through CYP2C19 should be considered. An interaction is observed between clopidogrel and omeprazole (see section 4.5). The clinical relevance of this interaction is uncertain. As a precaution, concomitant use of omeprazole and clopidogrel should be discouraged.

Severe hypomagnesaemia has been reported in patients treated with proton pump inhibitors (PPIs) like omeprazole for at least three months, and in most cases for a year. Serious manifestations of hypomagnesaemia such as fatigue, tetany, delirium, convulsions, dizziness and ventricular arrhythmia can occur but they may begin insidiously and be overlooked. In most affected patients, hypomagnesaemia improved after magnesium replacement and discontinuation of the PPI.

For patients expected to be on prolonged treatment or who take PPIs with medications such as digoxin or drugs that may cause hypomagnesemia (e.g., diuretics), health care professionals should consider monitoring magnesium levels prior to initiation of PPI treatment and periodically during treatment .

Proton pump inhibitors, especially if used in high doses and over long durations (>1 year), may modestly increase the risk of hip, wrist and spine fracture, predominantly in the elderly or in presence of other recognised risk factors. Observational studies suggest that proton pump inhibitors may increase the overall risk of fracture by 10-40%. Some of this increase may be due to other risk factors. Patients at risk of osteoporosis should receive care according to current clinical guidelines and they should have an adequate intake of vitamin D and calcium.

#### *Interference with laboratory tests*

Increased CgA level may interfere with investigations for neuroendocrine tumours. To avoid this interference the omeprazole treatment should be stopped for at least 14 days before CgA measurements.

Some children with chronic illnesses may require long-term treatment although it is not recommended.

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

Treatment with proton pump inhibitors may lead to slightly increased risk of gastrointestinal infections such as Salmonella and Campylobacter (see section 5.1).

As in all long-term treatments, especially when exceeding a treatment period of 1 year, patients should be kept under regular surveillance.

## **4.5 Interactions with other medicinal products and other forms of interaction**

### Effects of omeprazole on the pharmacokinetics of other active substances

#### Active substances with pH dependent absorption

The decreased intragastric acidity during treatment with omeprazole might increase or decrease the absorption of active substances with a gastric pH dependent absorption.

*Nelfinavir, atazanavir*

The plasma levels of nelfinavir and atazanavir are decreased in case of co-administration with omeprazole.

Concomitant administration of omeprazole with nelfinavir is contraindicated (see section 4.3). Co-administration of omeprazole (40 mg once daily) reduced mean nelfinavir exposure by ca. 40% and the mean exposure of the pharmacologically active metabolite M8 was reduced by ca. 75-90%. The interaction may also involve CYP2C19 inhibition.

Concomitant administration of omeprazole with atazanavir is not recommended (see section 4.4). Concomitant administration of omeprazole (40 mg once daily) and atazanavir 300 mg/ritonavir 100 mg to healthy volunteers resulted in a 75% decrease of the atazanavir exposure. Increasing the atazanavir dose to 400 mg did not compensate for the impact of omeprazole on atazanavir exposure. The co-administration of omeprazole (20 mg once daily) with atazanavir 400 mg/ritonavir 100 mg to healthy volunteers resulted in a decrease of approximately 30% in the atazanavir exposure as compared to atazanavir 300 mg/ritonavir 100 mg once daily.

#### *Digoxin*

Concomitant treatment with omeprazole (20 mg daily) and digoxin in healthy subjects increased the bioavailability of digoxin by 10%. Digoxin toxicity has been rarely reported. However caution should be exercised when omeprazole is given at high doses in elderly patients. Therapeutic drug monitoring of digoxin should be then be reinforced.

#### *Clopidogrel*

Results from studies in healthy subjects have shown a pharmacokinetic (PK)/pharmacodynamic (PD) interaction between clopidogrel (300 mg loading dose/75 mg daily maintenance dose) and omeprazole (80 mg p.o. daily) resulting in a decreased exposure to the active metabolite of clopidogrel by an average of 46% and a decreased maximum inhibition of (ADP induced) platelet aggregation by an average of 16%.

Inconsistent data on the clinical implications of a PK/PD interaction of omeprazole in terms of major cardiovascular events have been reported from both observational and clinical studies. As a precaution, concomitant use of omeprazole and clopidogrel should be discouraged (see section 4.4).

#### *Other active substances*

The absorption of posaconazole, erlotinib, ketoconazole and itraconazole is significantly reduced and thus clinical efficacy may be impaired. For posaconazole and erlotinib concomitant use should be avoided.

#### Active substances metabolised by CYP2C19

Omeprazole is a moderate inhibitor of CYP2C19, the major omeprazole metabolising enzyme. Thus, the metabolism of concomitant active substances also metabolised by CYP2C19, may be decreased and the systemic exposure to these substances increased. Examples of such drugs are R-warfarin and other vitamin K antagonists, cilostazol, diazepam and phenytoin.

#### *Cilostazol*

Omeprazole, given in doses of 40 mg to healthy subjects in a cross-over study, increased  $C_{max}$  and AUC for cilostazol by 18% and 26% respectively, and one of its active metabolites by 29% and 69% respectively.

*Phenytoin*

Monitoring phenytoin plasma concentration is recommended during the first two weeks after initiating omeprazole treatment and, if a phenytoin dose adjustment is made, monitoring and a further dose adjustment should occur upon ending omeprazole treatment.

Unknown mechanism*Saquinavir*

Concomitant administration of omeprazole with saquinavir/ritonavir resulted in increased plasma levels up to approximately 70% for saquinavir associated with good tolerability in HIV-infected patients.

*Tacrolimus*

Concomitant administration of omeprazole has been reported to increase the serum levels of tacrolimus. A reinforced monitoring of tacrolimus concentrations as well as renal function (creatinine clearance) should be performed, and dosage of tacrolimus adjusted if needed.

*Methotrexate*

When given together with proton-pump inhibitors, methotrexate levels have been reported to increase in some patients. In high-dose methotrexate administration a temporary withdrawal of omeprazole may need to be considered.

Effects of other active substances on the pharmacokinetics of omeprazole*Inhibitors of CYP2C19 and/or CYP3A4*

Since omeprazole is metabolised by CYP2C19 and CYP3A4, active substances known to inhibit CYP2C19 or CYP3A4 (such as clarithromycin and voriconazole) may lead to increased omeprazole serum levels by decreasing omeprazole's rate of metabolism. Concomitant voriconazole treatment resulted in more than doubling of the omeprazole exposure. As high doses of omeprazole have been well-tolerated adjustment of the omeprazole dose is not generally required. However, dose adjustment should be considered in patients with severe hepatic impairment and if long-term treatment is indicated.

*Inducers of CYP2C19 and/or CYP3A4*

Active substances known to induce CYP2C19 or CYP3A4 or both (such as rifampicin and St John's wort) may lead to decreased omeprazole serum levels by increasing omeprazole's rate of metabolism.

**4.6 Pregnancy and lactation**

Results from three prospective epidemiological studies (more than 1000 exposed outcomes) indicate no adverse effects of omeprazole on pregnancy or on the health of the foetus/newborn child. Omeprazole can be used during pregnancy.

Omeprazole is excreted in breast milk but is not likely to influence the child when therapeutic doses are used.

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

LOSEC is not likely to affect the ability to drive or use machines. Adverse drug reactions such as dizziness and visual disturbances may occur (see section 4.8). If affected, patients should not drive or operate machinery.

#### 4.8 Undesirable effects

The most common side effects (1-10% of patients) are headache, abdominal pain, constipation, diarrhoea, flatulence and nausea/vomiting.

The following adverse drug reactions have been identified or suspected in the clinical trials programme for omeprazole and post-marketing. None was found to be dose-related. Adverse reactions listed below are classified according to frequency and System Organ Class (SOC). Frequency categories are defined according to 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).

SOC/frequency	Adverse reaction
<b>Blood and lymphatic system disorders</b>	
Rare:	Leukopenia, thrombocytopenia
Very rare:	Agranulocytosis, pancytopenia
<b>Immune system disorders</b>	
Rare:	Hypersensitivity reactions e.g. fever, angioedema and anaphylactic reaction/shock
<b>Metabolism and nutrition disorders</b>	
Rare:	Hyponatraemia
Very rare:	Hypomagnesaemia; severe hypomagnesaemia may result in hypocalcaemia
<b>Psychiatric disorders</b>	
Uncommon:	Insomnia
Rare:	Agitation, confusion, depression
Very rare:	Aggression, hallucinations
<b>Nervous system disorders</b>	
Common:	Headache
Uncommon:	Dizziness, paraesthesia, somnolence
Rare:	Taste disturbance
<b>Eye disorders</b>	
Rare:	Blurred vision
<b>Ear and labyrinth disorders</b>	
Uncommon:	Vertigo
<b>Respiratory, thoracic and mediastinal disorders</b>	
Rare:	Bronchospasm
<b>Gastrointestinal disorders</b>	
Common:	Abdominal pain, constipation, diarrhoea, flatulence, nausea/vomiting
Rare:	Dry mouth, stomatitis, gastrointestinal candidiasis
Not known	Microscopic colitis

<b>Hepatobiliary disorders</b>	
Uncommon:	Increased liver enzymes
Rare:	Hepatitis with or without jaundice
Very rare:	Hepatic failure, encephalopathy in patients with pre-existing liver disease
<b>Skin and subcutaneous tissue disorders</b>	
Frequency 'not known'	Subacute cutaneous lupus erythematosus (see section 4.4).
Uncommon:	Dermatitis, pruritus, rash, urticaria
Rare:	Alopecia, photosensitivity
Very rare:	Erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis (TEN)
<b>Musculoskeletal and connective tissue disorders</b>	
Uncommon	Fracture of the hip, wrist, or spine
Rare:	Arthralgia, myalgia
Very rare:	Muscular weakness
<b>Renal and urinary disorders</b>	
Rare:	Interstitial nephritis
<b>Reproductive system and breast disorders</b>	
Very rare:	Gynaecomastia
<b>General disorders and administration site conditions</b>	
Uncommon:	Malaise, peripheral oedema
Rare:	Increased sweating

Treatment with proton pump inhibitors may lead to slightly increased risk of gastrointestinal infections such as Salmonella and Campylobacter, and, in hospitalized patients, possibly also Clostridium difficile. . A diagnosis of Clostridium difficile-associated diarrhea (CDAD) should be considered for patients taking PPIs who develop diarrhea that does not improve (see section 5.1)

#### Paediatric population

The safety of omeprazole has been assessed in a total of 310 children aged 0 to 16 years with acid-related disease. There are limited long term safety data from 46 children who received maintenance therapy of omeprazole during a clinical study for severe erosive oesophagitis for up to 749 days. The adverse event profile was generally the same as for adults in short- as well as in long-term treatment. There are no long term data regarding the effects of omeprazole treatment on puberty and growth.

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

(<http://forms.gov.il/globaldata/getsequence/getsequence.aspx?formType=AdversEffectMedic@moh.gov.il>).

## 4.9 Overdose

There is limited information available on the effects of overdoses of omeprazole in humans. In the literature, doses of up to 560 mg have been described, and occasional reports have been received when single oral doses have reached up to 2,400 mg omeprazole (120 times the usual recommended clinical dose). Nausea, vomiting, dizziness, abdominal pain, diarrhoea and headache have been reported. Also apathy, depression and confusion have been described in single cases.

The symptoms described in connection to omeprazole overdose have been transient, and no serious outcome has been reported. The rate of elimination was unchanged (first order kinetics) with increased doses. Treatment, if needed, is symptomatic.

## 5. PHARMACOLOGICAL PROPERTIES

### 5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Proton pump inhibitors, ATC code: A02BC01

#### Mechanism of action

Omeprazole, a racemic mixture of two enantiomers reduces gastric acid secretion through a highly targeted mechanism of action. It is a specific inhibitor of the acid pump in the parietal cell. It is rapidly acting and provides control through reversible inhibition of gastric acid secretion with once daily dosing.

Omeprazole is a weak base and is concentrated and converted to the active form in the highly acidic environment of the intracellular canaliculi within the parietal cell, where it inhibits the enzyme  $H^+ K^+$ -ATPase - the acid pump. This effect on the final step of the gastric acid formation process is dose-dependent and provides for highly effective inhibition of both basal acid secretion and stimulated acid secretion, irrespective of stimulus.

#### Pharmacodynamic effects

All pharmacodynamic effects observed can be explained by the effect of omeprazole on acid secretion.

#### *Effect on gastric acid secretion*

Oral dosing with omeprazole once daily provides for rapid and effective inhibition of daytime and night-time gastric acid secretion with maximum effect being achieved within 4 days of treatment. With omeprazole 20 mg, a mean decrease of at least 80% in 24-hour intragastric acidity is then maintained in duodenal ulcer patients, with the mean decrease in peak acid output after pentagastrin stimulation being about 70% 24 hours after dosing.

Oral dosing with omeprazole 20 mg maintains an intragastric pH of  $\geq 3$  for a mean time of 17 hours of the 24-hour period in duodenal ulcer patients.

As a consequence of reduced acid secretion and intragastric acidity, omeprazole dose-dependently reduces/normalizes acid exposure of the oesophagus in patients with gastro-oesophageal reflux disease.

The inhibition of acid secretion is related to the area under the plasma concentration-time curve (AUC) of omeprazole and not to the actual plasma concentration at a given time.

No tachyphylaxis has been observed during treatment with omeprazole.

#### *Effect on H. pylori*

*H. pylori* is associated with peptic ulcer disease, including duodenal and gastric ulcer disease. *H. pylori* is a major factor in the development of gastritis. *H. pylori* together with gastric acid are major factors in the development of peptic ulcer disease. *H. pylori* is a major factor in the development of atrophic gastritis which is associated with an increased risk of developing gastric cancer.

Eradication of *H. pylori* with omeprazole and antimicrobials is associated with high rates of healing and long-term remission of peptic ulcers

Dual therapies have been tested and found to be less effective than triple therapies. They could, however, be considered in cases where known hypersensitivity precludes use of any triple combination.

#### *Other effects related to acid inhibition*

During long-term treatment gastric glandular cysts have been reported in a somewhat increased frequency. These changes are a physiological consequence of pronounced inhibition of acid secretion, are benign and appear to be reversible.

Decreased gastric acidity due to any means including proton pump inhibitors, increases gastric counts of bacteria normally present in the gastrointestinal tract. Treatment with acid-reducing drugs may lead to slightly increased risk of gastrointestinal infections such as *Salmonella* and *Campylobacter*. and, in hospitalized patients, possibly also *Clostridium difficile*. A diagnosis of *Clostridium difficile*-associated diarrhoea (CDAD) should be considered for patients taking PPIs who develop diarrhoea that does not improve .

During treatment with antisecretory medicinal products serum gastrin increases in response to the decreased acid secretion. Also CgA increases due to decreased gastric acidity. The increased CgA level may interfere with investigations for neuroendocrine tumours. Healthcare providers should temporarily stop omeprazole treatment at least 14 days before assessing CgA levels and consider repeating the test if initial CgA levels are high.

An increased number of ECL cells possibly related to the increased serum gastrin levels, have been observed in some patients (both children and adults) during long term treatment with omeprazole. The findings are considered to be of no clinical significance.

#### **Paediatric use**

In a non-controlled study in children (1 to 16 years of age) with severe reflux oesophagitis, omeprazole at doses of 0.7 to 1.4 mg/kg improved oesophagitis level in 90% of the cases and significantly reduced reflux symptoms. In a single-blind study, children aged 0–24 months with clinically diagnosed gastro-oesophageal reflux disease were treated with 0.5, 1.0 or 1.5 mg omeprazole/kg. The frequency of vomiting/regurgitation episodes decreased by 50% after 8 weeks of treatment irrespective of the dose.

### *Eradication of H. pylori in children*

A randomised, double blind clinical study (Héliot study) concluded that omeprazole, in combination with two antibiotics (amoxicillin and clarithromycin), was safe and effective in the treatment of *H. pylori* infection in children age 4 years old and above with gastritis: *H. pylori* eradication rate: 74.2% (23/31 patients) with omeprazole + amoxicillin + clarithromycin versus 9.4% (3/32 patients) with amoxicillin + clarithromycin. However, there was no evidence of any clinical benefit with respect to dyspeptic symptoms. This study does not support any information for children aged less than 4 years.

## **5.2 Pharmacokinetic properties**

### Absorption

Omeprazole and omeprazole magnesium are acid labile and are therefore administered orally as enteric-coated granules in capsules or tablets. Absorption of omeprazole is rapid, with peak plasma levels occurring approximately 1-2 hours after dose. Absorption of omeprazole takes place in the small intestine and is usually completed within 3-6 hours. Concomitant intake of food has no influence on the bioavailability. The systemic availability (bioavailability) from a single oral dose of omeprazole is approximately 40%. After repeated once-daily administration, the bioavailability increases to about 60%.

### Distribution

The apparent volume of distribution in healthy subjects is approximately 0.3 l/kg body weight. Omeprazole is 97% plasma protein bound.

### Metabolism

Omeprazole is completely metabolised by the cytochrome P450 system (CYP). The major part of its metabolism is dependent on the polymorphically expressed CYP2C19, responsible for the formation of hydroxyomeprazole, the major metabolite in plasma. The remaining part is dependent on another specific isoform, CYP3A4, responsible for the formation of omeprazole sulphone. As a consequence of high affinity of omeprazole to CYP2C19, there is a potential for competitive inhibition and metabolic drug-drug interactions with other substrates for CYP2C19. However, due to low affinity to CYP3A4, omeprazole has no potential to inhibit the metabolism of other CYP3A4 substrates. In addition, omeprazole lacks an inhibitory effect on the main CYP enzymes.

Approximately 3% of the Caucasian population and 15-20% of Asian populations lack a functional CYP2C19 enzyme and are called poor metabolisers. In such individuals the metabolism of omeprazole is probably mainly catalysed by CYP3A4. After repeated once-daily administration of 20 mg omeprazole, the mean AUC was 5 to 10 times higher in poor metabolisers than in subjects having a functional CYP2C19 enzyme (extensive metabolisers). Mean peak plasma concentrations were also higher, by 3 to 5 times. These findings have no implications for the posology of omeprazole.

### Excretion

The plasma elimination half-life of omeprazole is usually shorter than one hour both after single and repeated oral once-daily dosing. Omeprazole is completely eliminated from plasma between doses with no tendency for accumulation during once-daily administration. Almost 80% of an oral dose of omeprazole is excreted as metabolites in the urine, the remainder in the faeces, primarily originating from bile secretion.

The AUC of omeprazole increases with repeated administration. This increase is dose-dependent and results in a non-linear dose-AUC relationship after repeated administration. This time- and dose-dependency is due to a decrease of first pass metabolism and systemic clearance probably caused by an inhibition of the CYP2C19 enzyme by omeprazole and/or its metabolites (e.g. the sulphone).

No metabolite has been found to have any effect on gastric acid secretion.

### Special populations

#### *Impaired hepatic function*

The metabolism of omeprazole in patients with liver dysfunction is impaired, resulting in an increased AUC. Omeprazole has not shown any tendency to accumulate with once-daily dosing.

#### *Impaired renal function*

The pharmacokinetics of omeprazole, including systemic bioavailability and elimination rate, are unchanged in patients with reduced renal function.

#### *Elderly*

The metabolism rate of omeprazole is somewhat reduced in elderly subjects (75-79 years of age).

#### *Paediatric patients*

During treatment with the recommended doses to children from the age of 1 year, similar plasma concentrations were obtained as compared to adults. In children younger than 6 months, clearance of omeprazole is low due to low capacity to metabolise omeprazole.

## **5.3 Preclinical safety data**

Gastric ECL-cell hyperplasia and carcinoids, have been observed in life-long studies in rats treated with omeprazole. These changes are the result of sustained hypergastrinaemia secondary to acid inhibition. Similar findings have been made after treatment with H<sub>2</sub>-receptor antagonists, proton pump inhibitors and after partial fundectomy. Thus, these changes are not from a direct effect of any individual active substance.

## **6. Pharmaceutical Particulars**

### **6.1 List of excipients**

Mannitol, methacrylic acid copolymer, lactose anhydrous, hypromellose, hyprolose, cellulose microcrystalline, macrogol, disodium hydrogen phosphate dihydrate, sodium laurilsulfate, magnesium stearate.

Capsule shell:

Losec 20 mg

Gelatin, red iron oxide, titanium dioxide, water.

***Losec 10 mg***

Gelatin, red iron oxide, titanium dioxide, food grade oil, sodium lauryl sulfate, magnesium stearate, silicone dioxide colloidal anhydrous.

***Lactose content***

*Losec 10 mg: 4 mg per capsule.*

*Losec 20 mg: 8 mg per capsule*

***Sodium content***

*Losec 10 mg: 0.12 mg per capsule.*

*Losec 20 mg: 0.25 mg per capsule.*

**6.2 Incompatibilities**

None known.

**6.3 Special precautions for storage**

Store in a dry place below 25°C.

Keep the container tightly closed. Protect from light.

This medicine may be used for 3 months following first opening of the bottle.

**6.4 Presentation**

Losec Capsules are provided in high density polyethylene bottles with tamper-proof lids containing integral desiccant. Packs of 14 and 30 Capsules

**6.6 Instructions for use and handling**

The cap should be replaced firmly after use.

To be dispensed in original containers.

**7 REGISTRATION NUMBERS**

10 mg Capsules      128 32 28799 00; 128 32 28799 01.

20 mg Capsules      050 66 26256 00.

**8 MANUFACTURER**

Teva Pharmaceutical Industries Ltd

P.O.Box 3190, Petach Tikva 49131, Israel

For

Abic Ltd

P.O.Box 8077, Kiryat Nordau, Netanya, Israel

Losec is a trademark of the AstraZeneca Group of Companies.