

LOSEC® TABLETS

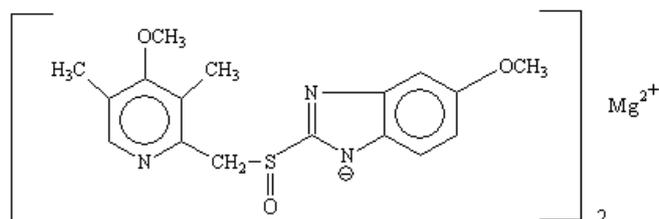
omeprazole magnesium
Multiple Unit Pellet System

PRODUCT INFORMATION

NAME OF THE MEDICINE

LOSEC® is a proton pump inhibitor. The active ingredient in LOSEC Tablets is omeprazole magnesium, a substituted benzimidazole. The chemical name is di-5-methoxy-2-[[[(4-methoxy-3,5-dimethyl-2-pyridinyl)methyl]sulfinyl]-1*H*-benzimidazole magnesium. Omeprazole magnesium is a crystalline substance which is freely soluble in methanol and slightly soluble in water.

The chemical structure of omeprazole magnesium is:



CAS number: 95382-33-5

Molecular formula: C₃₄H₃₆N₆O₆S₂Mg

Molecular weight: 713.1

DESCRIPTION

LOSEC is available in 10 mg, 20 mg and 40 mg tablets containing omeprazole magnesium 10.3 mg, 20.6 mg and 41.3 mg, respectively, as the active ingredient with glyceryl monostearate, hypolose, hypromellose, magnesium stearate, methacrylic acid copolymer, microcrystalline cellulose, synthetic paraffin, macrogol 6000, polysorbate 80, crospovidone, sodium stearyl fumarate, purified talc, titanium dioxide, triethyl citrate, sodium hydroxide and sugar spheres (maize starch and sucrose). The tablet is coloured with iron oxide red CI77491 and/or iron oxide yellow CI77492.

PHARMACOLOGY

Omeprazole reversibly reduces gastric acid secretion by specifically inhibiting the gastric enzyme H⁺, K⁺-ATPase, the proton pump, in the acid environment of the intracellular canaliculi within the parietal cell. This effect of omeprazole on the final

step of the gastric acid formation process is dose-dependent and effectively inhibits both basal acid secretion and stimulated acid secretion, irrespective of the stimulus to acid production.

Omeprazole has no effect on acetylcholine or histamine receptors. No clinically significant pharmacodynamic effects, other than those explained by the effect on acid secretion, have been observed.

Effect on gastric acid secretion

Oral dosing with omeprazole 20 mg once daily provides rapid and effective reduction of gastric acid secretion. After a single dose the onset of antisecretory effect occurs within one hour and is maximal within 2 hours. With repeated once daily dosing the maximum effect is usually achieved within 4 days of commencing treatment.

A mean decrease of approximately 80% in 24-hour intragastric acidity is maintained in duodenal ulcer patients treated with an oral dose of omeprazole 20 mg. Omeprazole produces a mean decrease in peak pentagastrin-stimulated acid output of approximately 70% 24 hours after dosing. When the drug is discontinued, secretory activities return to approximately 50% of maximum after 24 hours and gradually return to normal over 3 to 5 days.

Peptic ulcer disease associated with *Helicobacter pylori*

Helicobacter pylori (*H. pylori*) is associated with duodenal and gastric ulcer disease in about 95% and 70% of patients, respectively. *H. pylori* is the major factor in the development of gastritis and ulcers in such patients. Recent evidence also suggests a causative link between *H. pylori* and gastric carcinoma. An attempt to eradicate *H. pylori* is appropriate therapy in most patients with duodenal and gastric ulcer where the latter is not caused by NSAID ingestion (see **DOSAGE AND ADMINISTRATION**).

In vitro testing has shown that omeprazole has an MIC₉₀ of 25 µg/mL against *H. pylori*. However, *in vivo* it only suppresses the organism without eradicating it. The combination of omeprazole and antimicrobial agent results in eradication of the organism *in vivo*, despite the fact that antimicrobial agents administered singly have also proved ineffective in eradicating *H. pylori*. The mechanism of the synergy between omeprazole and antimicrobial agents in eradicating *H. pylori* is not completely understood. Optimal eradication rates are achieved when omeprazole is combined with two antimicrobial agents.

Eradication of *H. pylori* is associated with reduced peptic ulcer recurrence.

Other effects related to acid inhibition

During long term treatment gastric glandular cysts have been reported in a somewhat increased frequency. These changes are benign and appear to be reversible.

In some patients, fasting serum gastrin levels have been noted to rise two to four-fold during treatment with omeprazole. Up to 3% of patients have values exceeding 400 pg/mL.

Pharmacokinetics

Absorption

Omeprazole magnesium is acid labile and is administered orally as enteric coated granules in tablets. The enteric coating film, protecting the omeprazole magnesium, dissolves at a pH above 5.5. Hence omeprazole magnesium is not released until the pellets are emptied into the duodenum.

Once omeprazole magnesium dissolves in this near neutral environment, the omeprazole ion transforms to its neutral form. The same form of omeprazole is available for absorption regardless of it being administered as the free form, omeprazole, or the salt, omeprazole magnesium.

Absorption is rapid with peak plasma levels of omeprazole occurring within 4 hours and is usually complete within 3-6 hours. The systemic bioavailability of omeprazole from a single oral dose of LOSEC Tablets is approximately 35%. After repeated once daily administration, the bioavailability increases to about 60%. Concomitant intake of food has no influence on oral bioavailability but may reduce the rate of absorption of omeprazole.

Distribution

The plasma protein binding of omeprazole is approximately 95%. The inhibition of acid secretion is related to the area under the plasma concentration-time curve (AUC) but not to the actual plasma concentration at any given time.

Metabolism

Omeprazole is entirely metabolised by the cytochrome P450 system (CYP), mainly in the liver. The major part of its metabolism is dependent on the polymorphic CYP2C19. This CYP is responsible for the formation of hydroxyomeprazole, one of the major metabolites in plasma, and to a lesser extent, for the formation of 5-O-desmethyl omeprazole. The remaining part is mainly dependent on another specific isoform, CYP3A4, responsible for the formation of omeprazole sulphone.

Identified metabolites in plasma are the sulphone, the sulphide and hydroxy-omeprazole. These metabolites have no significant effect on acid secretion. The average half-life of the terminal phase of the plasma concentration-time curve following IV administration of omeprazole is approximately 40 minutes; the total plasma clearance is 0.3 to 0.6 L/min. There is no change in half-life during repeated dosing.

The parameters below reflect mainly the pharmacokinetics in individuals with a functional CYP2C19 enzyme, extensive metabolisers.

Total plasma clearance is about 30-40 L/h after a single dose. The plasma elimination half life of omeprazole is usually shorter than one hour both after single and repeated once-daily dosing. 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). Omeprazole is completely eliminated from plasma between doses with no tendency for accumulation during once-daily administration.

Excretion

About 80% of the metabolites are excreted in urine and the remainder in faeces. The two main urinary metabolites are hydroxy-omeprazole and the corresponding carboxylic acid.

Pharmacokinetics in children

Available data from children (≥1 year) suggest that the pharmacokinetics, within the recommended dosages, is similar to that reported in adults.

CLINICAL TRIALS

Gastro-Oesophageal Reflux Disease (GORD)

1. Symptomatic GORD

Randomised controlled clinical trials (n=1710) were evaluated to assess the efficacy of omeprazole in the complete relief of heartburn in adult patients with symptomatic GORD after four weeks treatment comparing omeprazole 10 mg and 20 mg once daily with control groups of ranitidine 150 mg twice daily or placebo.

The % patients with complete relief of heartburn after 4 weeks is presented below.

Study	Group	N	Relief (% patients)	Group Difference	%	95% CI
Lind	Plac	105	13	Ome 10- Plac	18	9, 27
	Ome 10	199	31	Ome 20 - Plac	33	23, 43
	Ome 20	205	46	Ome 20 - Ome 10	15	6, 25
Venables	Ranit	135	36	Ome 10 - Ranit	0.2	-12, 12
	Ome 10	126	36	Ome 20 - Ranit	3.7	-8, 15
	Ome 20	130	39	Ome 20 - Ome 10	3.5	-8, 15
Bate	Plac	58	22	Ome 20 - Plac	36	17, 55
	Ome 20	48	58			

Plac= placebo; Ome= omeprazole; Ranit = ranitidine

2. Erosive Oesophagitis

At the time of registration, seven randomised controlled clinical trials (n=1674) were evaluated to assess the efficacy of omeprazole in the prevention of relapse in patients with healed reflux oesophagitis. Omeprazole 10 mg and 20 mg once daily maintained endoscopic remission rates which substantially exceeded ranitidine 150 mg bd or placebo at 6 months. The difference in remission rates between omeprazole 10 mg and 20 mg favoured 20 mg. Three studies recorded remission rates over 12 months and an additional study continued for 18 months.

In a meta-analysis of 5 of the clinical trials (n=1154), 72% and 82% of patients remained in remission at 6 months on omeprazole 10 mg and 20 mg once daily, respectively. In a separate large study (n=327), the remission rate following omeprazole 10 mg once daily for 18 months was 60%.

In two of the studies, patients who relapsed in the first three months of maintenance treatment were then healed and treated with a maintenance dose of 20 mg omeprazole. The difference in the total remission rate over 6 or 12 months, while small, suggests that it may be more difficult or take longer to obtain subsequent healing and control if 10 mg rather than 20 mg had been used for initial maintenance therapy.

Gastric safety data are available from 7 controlled clinical trials of up to 2 years duration (irrespective of indication). A full analysis of these trials was undertaken as a consequence of histological changes observed in animals (see **PRECAUTIONS**). This involved a total of 1128 patients with an evaluable series of biopsies; 843 patients treated continuously with omeprazole for 6-12 months, 77 patients completing 18 months, and 208 patients completing 2 years of continuous omeprazole treatment. Additionally, in open studies at least 109 patients were assessed by annual biopsy during continuous treatment for 4 years, and in this continuing study, biopsies are available for at least 14 patients treated for up to 8 years. No instances of dysplasia or carcinoids of the gastric ECL-cells have been reported in these studies. An association between focal hyperplasia and chronic gastritis with atrophy was found during long term therapy. However, this finding is also observed in patients with untreated gastric ulcer disease with normal gastrin levels and is thus not a treatment related effect.

3. Use in Children

In a trial in 65 children aged 0.5–17 years with erosive reflux oesophagitis, an oral omeprazole dose of 2.1 mg/kg/day was required to achieve endoscopic healing in 80% of the 57 patients who completed the study. The duration of treatment was 12-60 weeks. Reasons for discontinuing treatment were difficulty in administering the drug or inappropriate inclusion in the study.

In 13 children aged 1–17 years, oral omeprazole 0.5–0.6 mg/kg/day for 8 weeks achieved endoscopic healing in 2 children with giant gastric ulcer, 6 children with duodenal ulcer and 4 out of 5 children with oesophagitis.

There are no data on the use of omeprazole in children with less severe gastro-oesophageal reflux disease.

INDICATIONS

LOSEC Tablets are indicated for:

Gastro-Oesophageal Reflux Disease (GORD)

1. Symptomatic GORD

The relief of heartburn and other symptoms associated with GORD.

2. Erosive oesophagitis

The treatment and prevention of relapse.

Peptic Ulcers

1. The treatment of duodenal and gastric ulcer.
2. Combination therapy for the treatment of peptic ulcer disease associated with *Helicobacter pylori* infection.
3. The treatment of gastric and duodenal ulcers and erosions associated with non-steroidal anti-inflammatory drugs.
4. The prevention of gastric and duodenal ulcers and erosions associated with non-steroidal anti-inflammatory drugs in patients assessed as being at high risk of gastroduodenal ulcer or complications of gastroduodenal ulcer.
5. Long-term prevention of relapse in gastric and duodenal ulceration, in patients proven to be *Helicobacter pylori* negative, or in whom eradication is inappropriate, e.g. the elderly, or ineffective.

Zollinger-Ellison Syndrome

The treatment of Zollinger-Ellison Syndrome.

CONTRAINDICATIONS

Hypersensitivity to omeprazole magnesium, substituted benzimidazoles or any other ingredients.

Omeprazole, an inhibitor of CYP2C19, is contraindicated in patients taking cilostazol.

PRECAUTIONS

Undiagnosed malignancy

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

Concomitant therapy with clopidogrel

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

these data, concomitant use of omeprazole and clopidogrel should be avoided (see **INTERACTIONS WITH OTHER MEDICINES**).

Acute interstitial nephritis

Acute interstitial nephritis has been observed in patients taking proton pump inhibitors (PPIs) including omeprazole. Acute interstitial nephritis may occur at any point during PPI therapy and is generally attributed to idiopathic hypersensitivity reaction. Discontinue omeprazole if acute interstitial nephritis develops.

Cyanocobalamin (vitamin B-12) deficiency

Daily treatment with acid-suppressing medicines over a long period of time (e.g. longer than 3 years) may lead to malabsorption of cyanocobalamin (vitamin B-12) caused by hypo- or achlorhydria.

Osteoporotic fractures

Some published case controlled and observational studies suggest that proton-pump inhibitor therapy may be associated with an increased risk for osteoporosis-related fractures.

The risk of fracture was increased in patients who received high-dose, defined as multiple daily doses, and long-term PPI therapy (a year or longer). Patients should use the lowest dose and shortest duration of PPI therapy appropriate to the condition being treated.

Patients at risk for developing osteoporosis or osteoporotic fractures are advised to have appropriate clinical monitoring in accordance with current clinical guidelines for these conditions.

Special patient populations

CYP2C19 enzyme

Approximately 3% of the Caucasian population and 15-20% of the Asian population lack a functional CYP2C19 enzyme and are called poor metabolisers. In these individuals the metabolism of omeprazole is most likely 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 3 to 5 times higher. The implications of these findings need to be addressed from clinical perspective.

Hepatic insufficiency

Patients with impaired liver function show a markedly increased bioavailability, a reduced total plasma clearance, and up to a four-fold prolongation of the elimination half-life. However, urinary recovery over 96 hours remains unchanged indicating no accumulation of omeprazole or its metabolites. The normal dose of 20 mg omeprazole daily may be used in patients with severe liver disease (see **DOSAGE AND ADMINISTRATION**).

Antimicrobial resistance

The development of antimicrobial resistance may have an adverse affect on eradication regimens. The clinical impact of this resistance on *H. pylori* has not been comprehensively studied.

Effects of acid inhibition

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 hospitalised patients, possibly also *Clostridium difficile*.

Carcinogenicity, mutagenicity, impairment of fertility

In a two year carcinogenicity study in rats, omeprazole at daily doses of 13.8, 44.0 and 140.8 mg/kg/day produced gastric ECL cell hyperplasia and carcinoid tumours in a dose-related manner in both male and female rats. The incidence of these effects were markedly higher in female rats.

The same effects were seen in an additional 2-year study in female rats at daily doses of 1.7, 3.4 and 13.8 mg/kg/day. A no effect dose was not established in female rats in the dose ranges studied.

In mice, a 78-week carcinogenicity study was performed according to relevant regulatory and scientific standards. No gastric ECL-cell carcinoids were seen. However, longer term studies have not been performed in this species.

Hypergastrinaemia, ECL cell hyperplasia and gastric carcinoids have also been produced in the rat by other treatments or procedures not related to omeprazole. These include:

- a) Exogenous gastrin infusion. Subcutaneous infusion of gastrin-17 has resulted in a significant hyperplasia of ECL-cells following treatment for one month.
- b) H₂-receptor antagonists. In rats administered 2 g/kg/day of ranitidine in their diet over 106 weeks, argyrophilic cell hyperplasia was observed in 37% of the animals and gastric carcinoids were found in 19% of the treated group.
- c) Surgical resection of the acid producing oxyntic mucosa. In rats in whom 75% of the stomach corpus was surgically removed, 26 of 75 animals developed ECL-cell carcinoids during the 124 week study.

These findings show that the development of ECL-cell carcinoids in the rat is directly related to hypergastrinaemia rather than a direct effect of omeprazole on the ECL-cell.

Omeprazole may also affect other cells in the gastrointestinal tract (for example, G cells) either directly or by inducing sustained hypochlorhydria but this possibility has not been extensively studied.

Omeprazole has been subjected to a battery of *in vitro* and *in vivo* genotoxicity tests to examine the mutagenic, clastogenic and DNA damaging potential of the drug. The *in vitro* assays include the Ames test, mouse lymphoma TK locus forward mutation assay and a chromosome aberration test in human lymphocytes. The *in vivo* tests were a chromosome aberration test in mouse bone marrow, an alkaline elution/rat liver DNA damage assay and two mouse micronucleus tests.

No evidence of significant genotoxicity was seen in these tests.

There was no evidence of an adverse effect on fertility following administration of omeprazole to male and female rats at doses up to 320 mg/kg/day orally (16-fold anticipated exposure at the clinical oral dose of 40 mg/day, based on plasma AUC) and 100 mg/kg/day intravenously (14-fold anticipated exposure at the clinical intravenous dose of 40 mg/day, based on plasma AUC). Oral administration to male rats prior to mating and to female rats prior to and throughout gestation at 7-fold clinical exposure was associated with embryofoetal toxicity.

Use in pregnancy – Category B3

Results from three prospective epidemiological studies indicate that whilst there was no increase in the overall malformation rates compared with controls, the data indicated a potentially higher rate of cardiac defects in the omeprazole group.

There was no evidence of teratogenicity following administration of omeprazole to pregnant rats and rabbits during the period of organogenesis. Doses in rats were associated with systemic exposures of up to 16- and 14-fold (oral and intravenous administration, respectively) the anticipated exposure at the clinical dose of 40 mg/day (based on plasma AUC). Studies in rats did not demonstrate embryotoxicity apart from increased locomotor activity in prenatally exposed offspring at systemic exposures approximating clinical exposure, based on plasma AUC. In rabbits, oral doses were associated with systemic exposure less than clinical exposure (plasma AUC) and intravenous doses were up to 13-fold the 40 mg/day clinical dose (on a mg/m² basis). Embryofoetal toxicity and maternotoxicity occurred at doses associated with less than clinical exposures.

Use in lactation

Omeprazole and its metabolites are excreted in milk in rats but it is not known if this occurs in humans. In rats, reduced offspring *postpartum* growth rate was observed following administration of omeprazole during late gestation and throughout lactation at oral doses of 138 mg/kg/day and above (7-fold anticipated exposure at the clinical dose of 40 mg/day, based on plasma AUC) and intravenous doses of 3.2 mg/kg/day and above (less than clinical exposure). It is recommended that omeprazole not be used in nursing mothers.

Effects on ability to drive and operate machinery

No effects have been observed.

INTERACTIONS WITH OTHER MEDICINES

Absorption

Medicinal products with pH dependent absorption

The decreased intragastric acidity during treatment with omeprazole and other PPIs, might increase or decrease the absorption of drugs if the mechanism of absorption is influenced by gastric acidity.

Omeprazole produces a profound and sustained inhibition of gastric acid secretion. The absorption of compounds whose absorption depends on gastric pH (e.g. ketoconazole, itraconazole, erlotinib etc) may decrease and the absorption of drugs such as digoxin can increase during treatment with omeprazole. Concomitant treatment with omeprazole (20 mg daily) and digoxin in healthy subjects increased the bioavailability of digoxin by 10% (up to 30% in two out of ten subjects).

Co-administration of omeprazole in healthy subjects and in transplant patients receiving mycophenolate mofetil has been reported to reduce exposure to the active metabolite, mycophenolic acid. This is possibly due to a decrease in mycophenolate mofetil solubility at an increased gastric pH. The clinical relevance of reduced mycophenolic acid exposure on organ rejection has not been established in transplant patients receiving omeprazole and mycophenolate mofetil. Use omeprazole with caution in transplant patients receiving mycophenolate mofetil.

Metabolism

Cytochrome P-450 effects

Omeprazole is mainly metabolised via the hepatic cytochrome P-450 system (CYP2C19) and may be expected to interact with the metabolism of other drugs metabolised by this enzyme.

Effects of omeprazole on other drugs

Diazepam

Following dosing with omeprazole 40 mg once daily, the clearance of diazepam was decreased by 54% and the mean elimination half-life of diazepam was increased by 130%, with a consequent significant increase in plasma diazepam concentrations. For omeprazole 20 mg, the clearance of diazepam was decreased by approximately 25% in the majority of the population, while no change was detected in poor metabolisers. Consideration should be given to a reduction in diazepam dosage, when LOSEC Tablets are co-prescribed.

Phenytoin

Omeprazole 40 mg daily for 7 days reduced plasma clearance of IV phenytoin by 15-20% and increased the elimination half-life by 27%. Monitoring of patients receiving phenytoin is recommended and a reduction of the phenytoin dose may be necessary. In a study that administered omeprazole 20 mg to epileptic patients, steady state plasma levels of phenytoin were unchanged during omeprazole treatment.

Warfarin

Concomitant administration of omeprazole 20 mg to patients on continuous treatment with warfarin caused a slight though statistically significant increase in the plasma concentration of the R-enantiomer of warfarin. Plasma concentrations of the more potent S-enantiomer were not affected and no change in warfarin's anticoagulant activity was observed.

In patients receiving warfarin or other vitamin K antagonists, monitoring of INR is recommended and a reduction of the warfarin (or other vitamin K antagonist) dose may be necessary.

Cilostazol

Omeprazole 40 mg daily for 7 days increased C_{max} and AUC for cilostazol by 18% and 26% respectively, and one of its active metabolites by 29% and 69% respectively (see **CONTRAINDICATIONS**).

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.

Antiretroviral drugs

Concomitant administration with omeprazole and drugs such as atazanavir and nelfinavir is not recommended.

Omeprazole has been reported to interact with some antiretroviral drugs. The clinical importance and the mechanisms behind these interactions are not always known. Increased gastric pH during omeprazole treatment may change the absorption of the antiretroviral drug. Other possible interaction mechanisms are via CYP2C19. For some antiretroviral drugs, such as atazanavir and nelfinavir, decreased serum levels have been reported when given together with omeprazole. For other antiretroviral drugs, such as saquinavir, elevated serum levels have been reported. There are also some antiretroviral drugs of which unchanged serum levels have been reported when given with omeprazole.

Clopidogrel

Results from studies in healthy subjects have shown a pharmacokinetic/pharmacodynamic (PK/PD) interaction between clopidogrel (300 mg loading dose/75 mg daily maintenance dose) and omeprazole (80 mg p.o. daily, i.e. four times the recommended dose) resulting in decreased exposure to the active metabolite of clopidogrel by an average of 46%, and resulting in decreased maximum inhibition of (ADP induced) platelet aggregation by an average of 16%. Based on these data, concomitant use of omeprazole and clopidogrel should be avoided.

When clopidogrel was given together with a fixed dose combination of esomeprazole 20 mg + ASA 81 mg compared to clopidogrel alone in a study in healthy subjects there was a decreased exposure by almost 40% of the active metabolite of

clopidogrel. However, the maximum levels of inhibition of (ADP induced) platelet aggregation in these subjects were similar in the clopidogrel and the clopidogrel + the combined (esomeprazole + ASA) product groups.

There are both observational and clinical studies on the clinical implications of a PK/PD interaction (with proton pump inhibitors, including omeprazole) investigating the number of major cardiovascular events when clopidogrel and proton pump inhibitors are given concomitantly.

Tacrolimus

Concomitant administration of omeprazole and tacrolimus may increase the serum levels of tacrolimus.

Potential interactions that have been excluded

Results from a range of *in vivo* interaction studies with omeprazole versus other drugs indicate that omeprazole 20-40 mg, given repeatedly, has no influence on any other relevant isoforms of CYP, as shown by the lack of metabolic interaction with substrates for CYP1A2 (caffeine, phenacetin, theophylline), CYP2C9 (S-warfarin, piroxicam, diclofenac, and naproxen), CYP2D6 (metoprolol, propranolol), CYP2E1 (ethanol), and CYP3A (cyclosporin, lignocaine, quinidine and oestradiol).

Effects of other drugs on omeprazole

Drugs 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 the rate of metabolism of omeprazole.

Drugs known to inhibit CYP2C19 or CYP3A4 or both (such as clarithromycin or voriconazole) may lead to increased omeprazole serum levels by decreasing the rate of metabolism of omeprazole.

Clarithromycin

Plasma concentrations of omeprazole are increased during concomitant administration.

Voriconazole

Concomitant administration of omeprazole and CYP2C19 and CYP3A4 inhibitor, voriconazole, resulted in more than doubling of the omeprazole exposure.

Effects on laboratory tests

Chromogranin A (CgA) increases due to decreased gastric acidity. The increased CgA level may interfere with investigations for neuroendocrine tumours. Literature reports indicate that proton pump inhibitor treatment should be stopped 5 to 14 days before CgA measurement. Measurements should be repeated if levels have not normalised by this time.

ADVERSE EFFECTS

LOSEC Tablets are well tolerated. Most adverse reactions have been mild and transient and there has been no consistent relationship with treatment.

Adverse reactions within each body system are listed in descending order of frequency (Very common: $\geq 10\%$; common: $\geq 1\%$ and $< 10\%$; uncommon: $\geq 0.1\%$ and $< 1\%$; rare $\geq 0.01\%$ and $< 0.1\%$; very rare: $< 0.01\%$). These include the following:

Blood and lymphatic disorders

Rare: Leukopenia, thrombocytopenia, agranulocytosis, pancytopenia

Immune system disorders

Rare: Hypersensitivity reactions (e.g. fever, angioedema and anaphylactic reaction/shock)

Metabolism and nutrition disorders

Rare: Hyponatraemia

Very rare: Weight increase, hypomagnesaemia and hypokalaemia (reported in children); severe hypomagnesaemia may result in hypocalcaemia.

Hypomagnesaemia may also result in hypokalaemia

Psychiatric disorders

Uncommon: Insomnia

Rare: Agitation, aggression, reversible mental confusion, depression, hallucinations

Nervous system disorders

Common: Headache

Uncommon: Dizziness, paraesthesia, somnolence

Rare: Taste disturbance

Eye disorders

Rare: Blurred vision

Ear and Labyrinth disorders

Uncommon: Vertigo

Respiratory thoracic and mediastinal disorders

Rare: Bronchospasm

Very rare: Dyspnoea

Gastrointestinal disorders

Common: Abdominal pain, constipation, diarrhoea, flatulence, nausea/vomiting

Rare: Dry mouth, stomatitis, gastrointestinal candidiasis, microscopic colitis

Very rare: Dyspepsia, haemorrhagic necrotic gastritis (reported in children)

Hepatobiliary disorders

Uncommon: Increased liver enzymes

Rare: Hepatitis with or without jaundice, hepatic failure, encephalopathy in patients with pre-existing liver disease

Skin and subcutaneous tissue disorders

Uncommon: Dermatitis, pruritis, rash, urticaria

Rare: Alopecia, photosensitivity, erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis (TEN)

Not known: Subacute cutaneous lupus erythematosus (SCLE)

Musculoskeletal, connective tissue and bone disorders

Rare: Arthralgia, myalgia, muscular weakness

Renal and urinary disorders

Rare: Interstitial nephritis

Very rare: Impaired renal function, including nephrosis

Reproductive system and breast disorders

Rare: Gynaecomastia

Very rare: Impotence (although causality has not been established)

General disorders and administration site conditions

Uncommon: Malaise

Rare: Increased sweating, peripheral oedema

DOSAGE AND ADMINISTRATION

LOSEC Tablets should be swallowed whole (not broken or chewed) with liquid.

If required, the tablets can also be dispersed in half a glass of non-carbonated water (mineral water is not suitable) or non-carbonated fruit juices. Stir until the tablets disintegrate and drink the liquid with the pellets immediately or within 30 minutes. Rinse the glass with half a glass of water and drink. The pellets must not be chewed or crushed.

Symptomatic GORD

Recommended dose for symptom relief: LOSEC Tablets 10 mg to 20 mg once daily for a maximum of 4 weeks.

In most patients symptom relief is rapid. If symptom control has not been achieved after 4 weeks treatment with LOSEC Tablets 20 mg daily, further investigation is recommended.

Erosive oesophagitis

Recommended healing dosage: LOSEC Tablets 20 mg once daily for 4 to 8 weeks.

In most patients, symptomatic relief is rapid and healing is usually complete within 4 weeks. For those patients not fully healed on endoscopic examination during initial treatment, endoscopic healing usually occurs during a further 4 weeks treatment period.

In patients with ulcerative reflux oesophagitis refractory to treatment, LOSEC Tablets 40 mg once daily usually produces healing within 8 weeks.

Maintenance therapy

It is recommended that, after healing, maintenance therapy be commenced, LOSEC Tablets 10 mg once daily. If needed, this dose should be increased to LOSEC Tablets 20 mg once daily.

Peptic ulcer disease associated with *Helicobacter pylori* infection

Patients whose gastric or duodenal ulceration is not associated with ingestion of non-steroidal anti-inflammatory drugs require treatment with antimicrobial agents in addition to antisecretory drugs whether on first presentation or on recurrence. Omeprazole administered at a dose of 40 mg once daily or 20 mg twice daily in association with the following combinations has been found to achieve eradication rates of approximately 90%:

- Amoxicillin 500 mg and metronidazole 400 mg both three times a day, for two weeks; or
- Amoxicillin 1 g and clarithromycin 500 mg both twice a day for one week; or
- Clarithromycin 250 mg and metronidazole 400 mg twice a day for one week.

Patients should be retreated if there is a return of symptoms and *H. pylori* infection. In this situation, possible resistance of the organism to the antimicrobial agents should be considered when deciding on the combination to be used.

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

Duodenal ulcer

Recommended healing dosage: LOSEC Tablets 20 mg orally once daily for 4 to 8 weeks.

In most patients, symptomatic relief is rapid and healing is usually complete within 4 weeks. For those patients not fully healed during initial treatment, healing usually occurs during a further 4 weeks treatment period.

In duodenal ulcer patients refractory to treatment, LOSEC Tablets 40 mg once daily usually produces healing within 4 to 8 weeks.

Maintenance therapy

For the long-term prevention of relapse in patients with duodenal ulcer who are proven to be *Helicobacter pylori* negative and whose ulceration had not been associated with non-steroidal anti-inflammatory drugs (NSAIDs), the recommended dose is LOSEC Tablets 10 mg to 20 mg daily.

For NSAID-associated duodenal ulcers see NSAID-associated gastroduodenal lesions.

Gastric ulcer

Recommended healing dosage: LOSEC Tablets 20 mg once daily for 4 to 8 weeks.

In most patients, symptomatic relief is rapid and healing is usually complete within 4 weeks.

For those patients not fully healed during initial treatment, healing usually occurs during a further 4 weeks treatment period.

In gastric ulcer patients refractory to treatment, LOSEC Tablets 40 mg once daily usually produces healing within 8 weeks.

Maintenance therapy

For the long-term prevention of relapse in patients with gastric ulcer who are proven to be *Helicobacter pylori* negative and whose ulceration had not been associated with non-steroidal anti-inflammatory drugs (NSAIDs), the recommended dose is LOSEC Tablets 20 mg daily.

For NSAID-associated duodenal ulcers see NSAID-associated gastroduodenal lesions.

NSAID-associated gastric or duodenal ulcers or erosions

In patients with or without continued NSAID treatment, the recommended dose is LOSEC Tablets 20 mg to 40 mg daily. Symptom resolution is rapid and healing occurs within 4 weeks in most patients. For those patients not fully healed after the initial course, healing usually occurs during a further 4 weeks treatment period.

For the prevention of NSAID-associated gastric or duodenal ulcers or erosions and dyspeptic symptoms, the recommended dose is LOSEC Tablets 20 mg once daily.

Zollinger-Ellison Syndrome

Recommended initial dose: LOSEC Tablets 60 mg once daily.

The dosage should be adjusted individually and treatment continued for 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. When doses exceed 80 mg orally daily, the dose should be divided and given twice daily.

Use in children

For use in children one year and older the recommended dose is:

<i>Weight</i>	<i>Dose</i>
10-20 kg	LOSEC Tablets 10 mg once daily for 2 to 8 weeks
>20 kg	LOSEC Tablets 20 mg once daily for 2 to 8 weeks

If needed the dose may be increased to 20 mg and 40 mg respectively.

The tablet may be dispersed in yoghurt or orange juice to assist with administration.

Geriatrics

No dosage adjustment of LOSEC Tablets is necessary in the elderly.

Hepatic insufficiency

The rate of plasma elimination of omeprazole and its metabolites is decreased in patients with liver cirrhosis. However, no accumulation has been observed during the use of the recommended dose of 20 mg omeprazole daily and no adjustment to the normal dosage regime is required (see **PRECAUTIONS**).

Renal insufficiency

The systemic bioavailability of omeprazole is not significantly altered in patients with reduced renal function and no dosage adjustment is required.

OVERDOSAGE

Rare reports have been received of overdosage with omeprazole. 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 2400 mg omeprazole (120 times the usual recommended clinical dose). Nausea, vomiting, dizziness, abdominal pain, diarrhoea and headache have been reported from overdosage with omeprazole. Also apathy, depression and confusion have been described in single cases. The symptoms described in connection to omeprazole overdosage have been transient, and no serious clinical outcome due to omeprazole has been reported. The rate of elimination was unchanged (first-order kinetics) with increased doses and no specific treatment has been needed. In suspected cases of overdosage treatment should be supportive and symptomatic.

PRESENTATION AND STORAGE CONDITIONS

LOSEC® Tablets 10 mg are a light pink, oblong, biconvex, film-coated tablet engraved with the LOSEC logo on one side and 10 mg on the other. Each tablet contains omeprazole magnesium 10.3 mg as enteric-coated pellets.

LOSEC Tablets 20 mg are a pink, oblong, biconvex, film-coated tablet engraved with the LOSEC logo on one side and 20 mg on the other. Each tablet contains omeprazole magnesium 20.6 mg as enteric-coated pellets.

LOSEC Tablets 40 mg[#] are a red-brown, oblong, biconvex, film-coated tablet engraved with the LOSEC logo on one side and 40 mg and a score on the other. Each tablet contains omeprazole magnesium 41.3 mg as the enteric-coated pellets.

30 tablets are provided in a blister pack. The tablets should be dispensed and stored in the original container.

LOSEC Tablets 10 mg, 20 mg and 40 mg[#]: stored below 25°C.

#not marketed

POISON SCHEDULE OF THE MEDICINE

S4 (Prescription Only Medicine).

NAME AND ADDRESS OF THE SPONSOR

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DATE OF FIRST INCLUSION IN THE AUSTRALIAN REGISTER OF THERAPEUTIC GOODS (THE ARTG)

14 December 1998

DATE OF MOST RECENT AMENDMENT

18 December 2017

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