

Esomeprazole GXP

Esomeprazole (as magnesium)

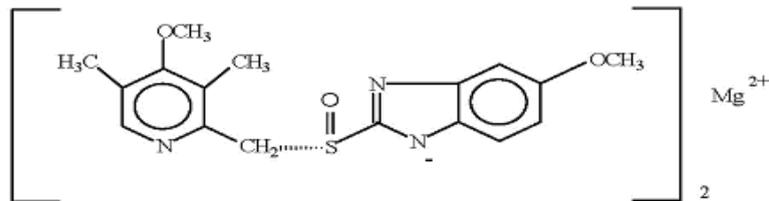
PRODUCT INFORMATION

NAME OF THE MEDICINE

Active ingredient : esomeprazole magnesium

Chemical name : di-(S)-5-methoxy-2-[[[(4-methoxy-3,5-dimethyl-2-pyridinyl)methyl]sulfinyl]-1H-benzimidazole magnesium salt

Structural formula :



Molecular formula : $C_{34}H_{36}N_6O_6S_2Mg$

Molecular weight : 713.12 (anhydrous)

CAS Registry no. : 161973-10-0

DESCRIPTION

Esomeprazole magnesium is an off white to slight coloured powder, soluble in N,N-Dimethyl formamide. Esomeprazole GxP 20mg and 40mg tablets are comprised of enteric coated pellets containing esomeprazole magnesium as the active ingredient as well as the following inactive (excipient) ingredients: Non-pareil seeds 40-50 (ARTG 108808), hypolose, crospovidone, sucrose and maize starch, magnesium oxide light, purified talc, macrogol 6000, methacrylic acid - ethyl acrylate copolymer (1:1), glyceryl monostearate, macrogol 400, polysorbate 80, hypromellose phthalate, acetone, microcrystalline cellulose, iron oxide red, povidone, pregelatinised maize starch, silicon dioxide, lactose monohydrate, OPADRY complete film coating system 03B84893 PINK (ARTG 108603) (20mg), OPADRY complete film coating system 03B54193 PINK (ARTG 108604) (40mg).

PHARMACOLOGY

Esomeprazole magnesium reversibly reduces gastric acid secretion by specifically inhibiting the gastric enzyme H^+ , K^+ -ATPase proton pump in the parietal cell. Both the R- and S-isomer of omeprazole have similar pharmacodynamic activity. In humans, acid control with esomeprazole is dose dependent and is significantly greater, more sustained and less variable compared to that obtained with equal doses of omeprazole.

Esomeprazole is a weak base and is concentrated and converted to the active form in the highly acidic environment of the secretory canaliculi of the parietal cell, where it inhibits the enzyme H^+ , K^+ -ATPase (the acid pump) and inhibits both basal and stimulated acid secretion.

EFFECT ON GASTRIC ACID SECRETION

After oral dosing with esomeprazole 20 mg and 40 mg the onset of effect occurs within one hour. After repeated administration with 20 mg esomeprazole once daily for five days, mean peak acid output after pentagastrin stimulation is decreased 90% when measured 6-7 hours after dosing on day five.

After five days of oral dosing with 20 mg and 40 mg of esomeprazole, intragastric pH above 4 was maintained for a mean time of 13 hours and 17 hours, respectively over 24 hours in symptomatic GORD patients. The corresponding time for omeprazole 20 mg of 10 hours was significantly shorter. In this study plus another, the percentage of GORD patients maintaining an intragastric pH above 4 for at least 8, 12 and 16 hours are tabulated below.

Table 1. % GORD patients with intragastric pH >4 for at least 8, 12 and 16 hours

		% GORD patients with intragastric pH >4 for at least:		
Population	Study drug	8 hours	12 hours	16 hours
GORD (n=36)	Omeprazole 20 mg	67%	45%	14%
	Esomeprazole 20 mg	76%	54%	24%
	Esomeprazole 40 mg	97%	92%	56%
GORD (n=115)	Omeprazole 40 mg	96%	77%	45%
	Esomeprazole 40 mg	99%	88%	56%

In vivo results demonstrate that acid control with esomeprazole is dose dependent and that it is significantly greater, more sustained and less variable compared to an equal dose of the racemate.

Using AUC as a surrogate parameter for plasma concentration, a relationship between inhibition of acid secretion and exposure has been shown.

In separate comparative studies (Table 2) the time and % patients with an intragastric pH above 4 after five days of oral dosing was compared for esomeprazole 40 mg, pantoprazole 40 mg, and lansoprazole 30 mg and rabeprazole 20 mg. The results from these pharmacodynamic studies are tabulated below.

Table 2. Time and % patients with intragastric pH >4 for different treatment regimens

Population	Study drug	Time Intragastric pH > 4	% patients with intragastric pH >4 for at least:		
			8 hours	12 hours	16 hours
Symptomatic GORD (n=31)	Esomeprazole 40 mg	16.1 hours*	100%	90%	50%
	Pantoprazole 40 mg	10.8 hours	80%	30%	10%
Healthy (n=30)	Esomeprazole 40 mg	15.7 hours*	95%	90%	38%
	Lansoprazole 30 mg	12.7 hours	95%	57%	5%
Healthy (n=22)	Esomeprazole 40 mg	14.6 hours	-	77%	32%
	Rabeprazole 20 mg	10.8 hours	-	36%	5%

* p
<0.001

In a five-way crossover study, the 24 hour intragastric pH profile of oral esomeprazole 40 mg, lansoprazole 30 mg, omeprazole 20 mg, pantoprazole 40 mg and rabeprazole 20 mg once daily was evaluated in 34 symptomatic GORD patients. The results are tabulated below in Table 3.

Table 3.

Population	Study Drug	Mean Time Intra-gastric pH >4	% Patients with Intra-gastric pH >4 for at least 12 hours
Symptomatic GORD (n=34)	Esomeprazole 40 mg	14 hours	65%
	Lansoprazole 30 mg	11.5 hours	41%
	Omeprazole 20 mg	12 hours	44%
	Pantoprazole 40 mg	10 hours	32%
	Rabeprazole 20 mg	12 hours	38%

A 6-way crossover study was conducted to investigate the dose response relationship assessed by intra-gastric pH monitoring after repeated once daily oral doses of 20, 40 and 80 mg of esomeprazole and 20, 40 and 80 mg of pantoprazole in symptomatic GORD patients. Results are provided in Table 4.

Table 4. Means and mean differences in percentage of time with intra-gastric pH > 4 on Day 5 following repeated once daily administration of 20, 40 and 80 mg esomeprazole and pantoprazole in symptomatic GORD patients.

	n	% time intra-gastric pH > 4	p-value
Esomeprazole 20 mg	35	46.97	<0.0001
Pantoprazole 20 mg	35	28.75	
Esomeprazole 20 mg - Pantoprazole 20 mg		18.23	
Esomeprazole 20 mg	35	47.41	0.0003
Pantoprazole 40 mg	35	37.59	
Esomeprazole 20 mg - Pantoprazole 40 mg		9.83	
Esomeprazole 40 mg	35	59.01	<0.0001
Pantoprazole 40 mg	35	37.73	
Esomeprazole 40 mg - Pantoprazole 40 mg		21.27	
Esomeprazole 40 mg	36	58.35	<0.0001
Pantoprazole 80 mg	36	44.22	
Esomeprazole 40 mg - Pantoprazole 80 mg		14.13	
Esomeprazole 80 mg	36	65.69	<0.0001
Pantoprazole 80 mg	36	43.58	
Esomeprazole 80 mg - Pantoprazole 80 mg		22.12	

Therapeutic effects of acid inhibition

Healing of reflux oesophagitis with esomeprazole 40 mg occurs in approximately 78% of patients after four weeks, and in 93% after eight weeks (see CLINICAL TRIALS).

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 and there appears to be a causative link between *H. pylori* and gastric carcinoma. An attempt to eradicate *H. pylori* is appropriate therapy in most patients with active or healed peptic ulcer (see CLINICAL TRIALS and DOSAGE AND ADMINISTRATION).

After eradication treatment for one week there is no need for subsequent monotherapy with antisecretory drugs for effective ulcer healing and symptom resolution in uncomplicated duodenal ulcers. Eradication of *H. pylori* is also associated with long-term remission of peptic ulcer disease, thus reducing complications such as gastrointestinal bleeding, as well as the need for prolonged anti-secretory treatment.

Other effects related to acid inhibition

During treatment with antisecretory agents serum gastrin increases in response to decreased acid secretion.

An increased number of ECL cells possibly related to the increased serum gastrin levels, have been observed in some patients during long term treatment with esomeprazole.

During long-term treatment with antisecretory drugs gastric glandular cysts have been reported to occur. These changes are a physiological consequence of pronounced inhibition of acid secretion, are benign and appear reversible.

Pharmacokinetics

Absorption

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

Once esomeprazole magnesium dissolves in this near neutral environment, the esomeprazole ion transforms to its neutral form and is absorbed as such. *In vivo* conversion to the R-isomer is negligible. Absorption is rapid with peak plasma levels of esomeprazole occurring approximately 1 to 2 hours after the dose. The absolute bioavailability is 64% after a single dose of 40 mg and increases to 89% after repeated once-daily administration. For 20 mg esomeprazole the corresponding values are 50% and 68% respectively.

Food intake both delays and decreases the absorption of esomeprazole although this has no significant influence on the effect of esomeprazole on intragastric acidity.

Distribution

The apparent volume of distribution at steady state in healthy subjects is approximately 0.22 L/kg body weight. Esomeprazole is 97% protein bound.

Metabolism

Esomeprazole is completely metabolised by the cytochrome P450 system (CYP450). The intrinsic clearance of esomeprazole (S-isomer) is one third of that of the R-isomer, resulting in a higher AUC with less inter-individual variation compared to the racemate. The major part of the metabolism of esomeprazole is dependent on the polymorphic CYP2C19, responsible for the formation of the hydroxy- and desmethyl metabolites of esomeprazole. The remaining part is dependent on another specific isoform, CYP3A4, responsible for the formation of esomeprazole sulphone, the main metabolite in plasma.

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

Total plasma clearance is about 17 L/h after a single dose and about 9 L/h after repeated administration. The plasma elimination half-life is about 1.3 hours after repeated once-daily dosing. The area under the plasma concentration-time curve increases with repeated administration of esomeprazole. 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 esomeprazole and/or its sulphone metabolite. Esomeprazole is completely eliminated from plasma between doses with no tendency for accumulation during once-daily administration.

Excretion

The major metabolites of esomeprazole have no effect on gastric acid secretion. Almost 80% of an oral dose of esomeprazole is excreted as metabolites in the urine, the remainder in the faeces. Less than 1% of the parent drug is found in urine.

CLINICAL TRIALS

Healing of erosive reflux oesophagitis

Randomised double-blind clinical trials (n=15,120) were evaluated to assess the comparative efficacy of esomeprazole in the healing of erosive reflux oesophagitis (grades A to D, according to the Los Angeles endoscopic classification system¹¹) after four and eight weeks treatment. A secondary outcome measure was gastro- oesophageal symptom resolution. These trials compared esomeprazole 40 mg and/or 20 mg with the standard dose of omeprazole 20 mg, lansoprazole 30 mg or pantoprazole 40 mg.

Esomeprazole 40 mg vs esomeprazole 20 mg vs omeprazole 20 mg

In study B1, the endoscopic healing rates at 4 and 8 weeks and the proportion of patients reporting resolution of symptoms (complete resolution of heartburn and acid regurgitation) were statistically higher for esomeprazole 40 mg compared to omeprazole 20 mg (see Table 5).

Esomeprazole 20 mg vs omeprazole 20 mg

In study B3, the healing rates were comparable for esomeprazole 20 mg and omeprazole 20 mg (see Table 5).

Table 5. Erosive reflux oesophagitis healing rates at week 4 and 8

Study	Esomeprazole 40 mg od	Esomeprazole 20 mg od	Omeprazole 20 mg od
B1	4 wks 71.1% (n=654)	4 wks 66.5% (n=656)	4 wks 61.4% (n=650)
	8 wks 87.6% (n=654)	8 wks 83.8% (n=656)	8 wks 81.4% (n=650)
B3	-	4 wks 66.4% (n=587)	4 wks 65.6% (n=588)
	-	8 wks 86.5% (n=587)	8 wks 82.3% (n=588)

Based on pooled data from all clinical trials in patients with baseline endoscopy grades B to D, healing rates at 4 and 8 weeks were statistically significantly better for esomeprazole 40 mg, compared with omeprazole 20 mg.

Esomeprazole 40 mg vs lansoprazole 30 mg

In a randomised, double blind, parallel group trial (n=5,241), the endoscopic healing rates at 4 and 8 weeks were statistically significantly higher for esomeprazole 40 mg compared to lansoprazole 30 mg. Sustained resolution of heartburn occurred faster and in more patients treated with esomeprazole.

Esomeprazole 40 mg vs pantoprazole 40 mg (EXPO Study)

In the healing phase of the EXPO study, a randomised, double-blind, multi-centre study (n=3,170), esomeprazole 40 mg had significantly more patients healed on endoscopic assessment at 4 and 8 weeks compared to pantoprazole 40 mg. The proportions of patients with complete healing of reflux oesophagitis by week 8 as per Kaplan-Meier life table estimates were 95.5% (95% CI, 94.43-96.58%) and 92.0% (95% CI, 90.65-93.41%) respectively for esomeprazole 40mg dose and pantoprazole 40 mg dose (p=0.0006) (Primary Efficacy). When adjusted for severity of initial oesophagitis using the LA classification system, the proportions of patients healed at 8 weeks were 91.6% (95% CI, 90.1-92.9%) and 88.9% (95% CI,

¹ The LA Endoscopic Classification system for reflux oesophagitis

Grade A. One (or more) mucosal break no longer than 5mm, that does not extend between the tops of two mucosal folds.

Grade B. One (or more) mucosal break more than 5 mm long, that does not extend between the tops of two mucosal folds.

Grade C. One (or more) mucosal break that is continuous between the tops of two or more mucosal folds, but which involves less than 75% of the circumference.

Grade D. One (or more) mucosal break, which involves at least 75% of the oesophageal circumference.

87.3-90.4%) respectively for esomeprazole 40mg dose and pantoprazole 40 mg dose (p=0.018) (Secondary Efficacy). The crude healing rates after 4 and 8 weeks are given together with the percentages of healed patients for each baseline LA grade in Table 6. Sustained heartburn resolution was achieved significantly faster in patients treated with esomeprazole. The proportion of heartburn-free days was also significantly greater in esomeprazole patients. Endoscopically healed patients free of moderate/severe heartburn and acid regurgitation at 4 or 8 weeks entered the 6 month maintenance phase of the study (see CLINICAL TRIALS - Maintenance treatment of erosive reflux oesophagitis).

Table 6. The Healing of reflux oesophagitis by baseline LA classification grade

Time Point	LA grade at baseline	Esomeprazole 40mg n=1,562	Pantoprazole 40mg n=1,589	p-value
Week 4	Grade A	83.9%	83.1%	0.0002
	Grade B	80.2%	75.4%	
	Grade C	71.1%	60.1%	
	Grade D	61.4%	40.2%	
	All	78.8%	72.8%	
Week 8	Grade A	93.7%	92.5%	0.018
	Grade B	92.3%	90.4%	
	Grade C	87.8%	84.8%	
	Grade D	85.7%	72.8%	
	All	91.6%	88.9%	

Maintenance treatment of erosive reflux oesophagitis

Two randomised double-blind placebo controlled clinical trials (n=750) were evaluated to assess the comparative efficacy of esomeprazole in patients with healed erosive reflux oesophagitis at 1, 2 and 6 months treatment comparing esomeprazole 40 mg or esomeprazole 20 mg or esomeprazole 10 mg with placebo.

Across both studies, maintenance of healing of erosive reflux oesophagitis at 6 months was achieved in a dose-dependent pattern and these results were significantly different from placebo. There were no differences between the esomeprazole 20 mg and 40 mg group of patients.

In the maintenance phase of the EXPO study, endoscopic and symptomatic remission rates in patients with endoscopically healed erosive oesophagitis (n=2,766) were compared in treatment groups receiving either esomeprazole 20 mg or pantoprazole 20 mg once daily for 6 months. Patients were randomised to receive maintenance treatment independent of the treatment used in the healing phase. A significantly higher proportion of patients were in endoscopic and symptomatic remission during 6 months of treatment with esomeprazole 20 mg daily (87.0% [95% CI, 85.1-88.9%] at six months) compared to pantoprazole 20 mg daily (74.9% [95% CI, 72.5-77.3%] at six months) (p-value <0.0001) as per cumulative life table estimates (Primary Efficacy). The proportion of patients in remission at 6 months, when adjusted for severity of initial oesophagitis using the LA classification system, receiving esomeprazole for the healing and maintenance phase was 70.9% compared to 59.6% of patients receiving pantoprazole for the healing and maintenance phases (p-value <0.0001) as per Table 7 below.

Table 7. Proportion and number of patients who were in remission at 6 months.

LA grade at baseline	Esomeprazole n=772	Pantoprazole n=797	p-value
Grade A	76.4%	68.1%	<0.0001
Grade B	72.8%	58.2%	
Grade C	61.6%	53.7%	
Grade D	52.6%	44.0%	
All	70.9%	59.6%	

Symptomatic treatment of GORD in patients with normal endoscopy

At the time of registration, five randomised, double-blind controlled clinical trials (n=3,362) were evaluated to assess the efficacy of esomeprazole in the complete resolution of heartburn at 4 weeks comparing esomeprazole 20 mg or 40 mg with omeprazole 20 mg or placebo. Study B7 was a dose- finding study, two studies compared esomeprazole 40 mg and omeprazole 20 mg (B8 and B9), and two compared esomeprazole 20 mg, 40 mg and placebo (B16 and B17).

There were no apparent differences in any of the studies between population subsets based on gender, age, race or *H. pylori* status in the proportion of patients with complete resolution of heartburn by treatment. The proportion of patients with complete resolution of heartburn at 4 weeks in studies B7, B8 and B9 (n=2,645), independent of treatment, was approximately 60%. There was no statistically significant difference between any of the treatment groups with regard to complete resolution of heartburn at 2 weeks or 4 weeks.

In studies B16 and B17 the proportion of patients (n=717) with complete resolution of heartburn at 4 weeks was significantly higher for esomeprazole 20 mg and 40 mg compared to placebo.

Treatment of GORD in Paediatric and Adolescent Patients (1-18 years)

A randomised, double-blind multi-centre study was conducted to determine the safety and efficacy in patients with clinically diagnosed GORD aged 12 to 17 years, inclusive (n=149) treated with esomeprazole 20 mg or 40 mg daily. This study was primarily designed as a safety study with a secondary objective to evaluate the clinical outcome. Both doses of esomeprazole were safe and well tolerated with the adverse event profile of this population being consistent with the adverse event profile seen in adults. No clinically important findings or trends in haematology, clinical chemistry, vital signs or physical examination were observed. GORD symptoms were statistically significantly reduced after treatment with esomeprazole. Symptoms (heartburn, acid regurgitation, epigastric pain, vomiting) were reduced or resolved in both the 20 mg (72.4%) and 40 mg (75.3%) treatment arms over the 8 week study period.

A multi-centre, parallel-group study was conducted in 109 paediatric patients aged 1 to 11 years with endoscopically proven GORD to evaluate safety and tolerability of esomeprazole once daily for up to eight weeks. Dosing of patients was based on weight with patients weighing <20 kg receiving esomeprazole 5 mg or 10 mg once daily and patients weighing \geq 20 kg receiving esomeprazole 10 mg or 20 mg once daily. Fifty-three patients had erosive esophagitis at baseline. Of the 45 patients who had follow-up endoscopy, 40 (88.9%) of these patients had their erosive oesophagitis healed through eight weeks. A statistically significant reduction in overall GORD symptom scores from baseline to the final visit, as assessed by the physician/investigators, was observed in all treatment groups. In addition a statistically significant reduction in symptoms from baseline was observed at each study visit (Week 2, Week 4, Week 6, and final visit) for all treatment groups (p <0.0036). Adverse reactions recorded during the study did not identify any new safety concerns.

On demand treatment

Three large randomised long-term placebo controlled double-blind clinical trials in patients with non-erosive GORD were evaluated to assess the efficacy of on-demand treatment with esomeprazole 20 mg and/or 40 mg or placebo over a 6 month period following initial complete resolution of heartburn.

Based on the primary variable of “time to study discontinuation due to unwillingness to continue” there was no difference between esomeprazole 20 mg and 40 mg. Following initial treatment, effective symptom control is maintained in approximately 90% of patients taking on demand therapy with either esomeprazole 20 mg or 40 mg once daily, when needed. On average, patients only took one dose of esomeprazole approximately every 3 days to effectively control their symptoms, and most patients took esomeprazole for 3 consecutive days or less.

Short-term treatment of NSAID associated upper gastrointestinal (GI) symptoms

Two large randomised multicentre placebo controlled double-blind trials (NEN-0001; n=402 and NEN-0003; n=376) were evaluated to assess the efficacy of esomeprazole 20 mg orally versus placebo through 4 weeks of treatment of upper GI symptoms associated with NSAID use in patients receiving daily NSAID (non- selective and COX-2 selective) therapy.

The primary endpoint for both trials was change in severity of upper GI symptoms associated with NSAID use (pain, discomfort, or burning in the upper abdomen) referred to as upper GI symptoms. Patients completed a diary card once daily during the study period and were instructed to fill in the diary card at the same time each day throughout the study, close to intake of study drug. The patient was asked to rate the intensity of his/her upper GI symptoms by the following question:

“How severe has your most intense episode of pain, discomfort or burning in the upper abdomen been during the last 24 hours?”

The question was answered using a 7-graded scale as follows: 0=None (No symptoms);

1=Minimal (Can be easily ignored without effort); 2=Mild (Can be ignored with effort);

3=Moderate (Cannot be ignored but does not influence my daily activities);

4=Moderately Severe (Cannot be ignored and occasionally limits my daily activities); 5=Severe (Cannot be ignored and often limits my daily activities);

6=Very Severe (Cannot be ignored and markedly limits my daily activities and often requires rest).

Additional symptoms (heartburn, acid regurgitation, and abdominal bloating, and nausea) were captured by investigator-recorded assessments and were considered to be supportive of the primary study endpoint. A further analysis was performed for; age; gender; race; *H. pylori* status; NSAID compliance and baseline NSAID type. Validated patient-reported outcome (PRO) measures (including a disease-specific health related quality-of-life questionnaire Gastrointestinal Symptom Rating Scale (GSRS) and the Quality of Life in Reflux and Dyspepsia (QOLRAD)) were also selected as secondary endpoints.

In both trials, esomeprazole was significantly better than placebo in the treatment of upper GI symptoms (pain, discomfort and burning in the upper abdomen) in patients using non-selective or COX- 2-selective NSAIDs (see Table 8). These differences were evident at 2 weeks and were sustained or further improved after 4 weeks of treatment. The median time for patients to achieve relief of upper GI symptoms for esomeprazole 20 mg was 10 to 11 days compared to 17 to 21 days for placebo, across both trials. The esomeprazole 20 mg group gained a significantly higher percentage of symptom-free days (range 29.0% to 30.6% of days) compared to placebo (range 13.9 % to 21.0 % of days) and gained significantly better resolution of investigator-recorded symptoms of heartburn and acid regurgitation compared to placebo.

Table 8. Difference between esomeprazole and placebo in mean change in the upper GI symptom score from the last 7 days in the run-in-period to the last 7 days.

Statistic	NEN-0001 E20 vs placebo	NEN-0003 E20 vs placebo
Estimated mean difference*	-0.59	-0.61
95% CI	-0.86, -0.32	-0.86, -0.36
p-value	<0.0001	<0.0001

*a difference of 0.4 units on a 7-graded scale is considered clinically important

Based on the Quality of Life in Reflux and Dyspepsia questionnaire, patients on esomeprazole 20 mg gained significantly improved well-being (emotional distress dimension), sleep quality (sleep problem dimension) and improved ability to eat and drink (food/drink problems dimension) compared to placebo. The GSRS questionnaire indicated significantly less reflux symptoms in both studies and significantly less abdominal pain and indigestion in one of the two studies.

No dosage adjustment is required based on age category, gender, race, or type of NSAID. Efficacy parameters were not affected by *H. pylori* status.

Gastric Ulcer Healing

Two large randomised, multicentre, active-controlled, comparative, double-blind, parallel-group trials were conducted to assess the efficacy of esomeprazole 40 mg and 20 mg once daily versus ranitidine 150 mg twice daily through 8 weeks of treatment for healing of gastric ulcers in patients receiving daily NSAID (non-selective and COX-2 selective) therapy. Patients had at least one gastric ulcer of ≥ 5 mm but not >25 mm at greatest diameter. The primary variable was the gastric healing status (healed or unhealed) as observed endoscopically through 8 weeks.

A total of 846 patients were randomised (SH-NEN-0005 n=406; SH-NEN-0006 n=440); 765 patients completed the studies.

In SH-NEN-0005, the efficacy evaluation based on the ITT population (n=399) demonstrated that esomeprazole 40 mg and esomeprazole 20 mg treatment resulted in statistically significant higher observed gastric ulcer healing rates at both Week 4 (E40 p=0.036, E20 p=0.023) and Week 8 (E40 p=<0.001, E20 p=0.003) compared to the ranitidine 150 mg twice daily treatment. The Week 8 results in the PP population (n=301) were similar to those in the ITT population. In addition, esomeprazole treatment resulted in a statistically significant greater beneficial effect on some patient-reported and investigator-assessed NSAID-associated upper GI symptoms compared to ranitidine following 8 weeks of treatment.

In SH-NEN-0006, the efficacy evaluation based on the ITT population (n=410) demonstrated that esomeprazole 40 mg and esomeprazole 20 mg treatment resulted in statistically significant higher observed gastric ulcer healing rates at Week 4 compared to the ranitidine 150 mg twice daily treatment (E40 p=0.009, E20 p=0.003). At week 8, although not statistically different, the healing rates were numerically higher with esomeprazole 40 mg and esomeprazole 20 mg compared to ranitidine 150 mg twice daily. The Week 4 and Week 8 results in the PP population were similar to those in the ITT population.

Ulcer Prevention

Two large randomised, multicentre, placebo-controlled, double-blind, parallel-group studies were conducted to assess the efficacy of up to 6 months of treatment with esomeprazole 40 mg and 20 mg once daily versus placebo in preventing gastric ulcers and/or duodenal ulcers in patients receiving continuous NSAID (non-selective and COX-2 selective) therapy, who were at risk of developing NSAID related ulcers.

A total of 1429 patients were randomised (SH-NEN-0013 n=585; SH-NEN-0014 n=844); 1067 patients completed the studies.

Patients enrolled in the studies were ulcer free (as determined by endoscopy at baseline; erosions were permitted) but at risk of developing NSAID-associated gastric ulcers and/or duodenal ulcers because of a documented gastric and duodenal ulcer within the past 5 years and/or age ≥ 60 years.

The cumulative proportion of patients without gastric ulcer and/or duodenal ulcer throughout the 6 month treatment period was higher in patients treated with esomeprazole 40 mg or esomeprazole 20 mg than in patients treated with placebo. The reduction of gastric ulcer and/or duodenal ulcer development relative to placebo was statistically significant in the 2 studies, both in the ITT and PP population.

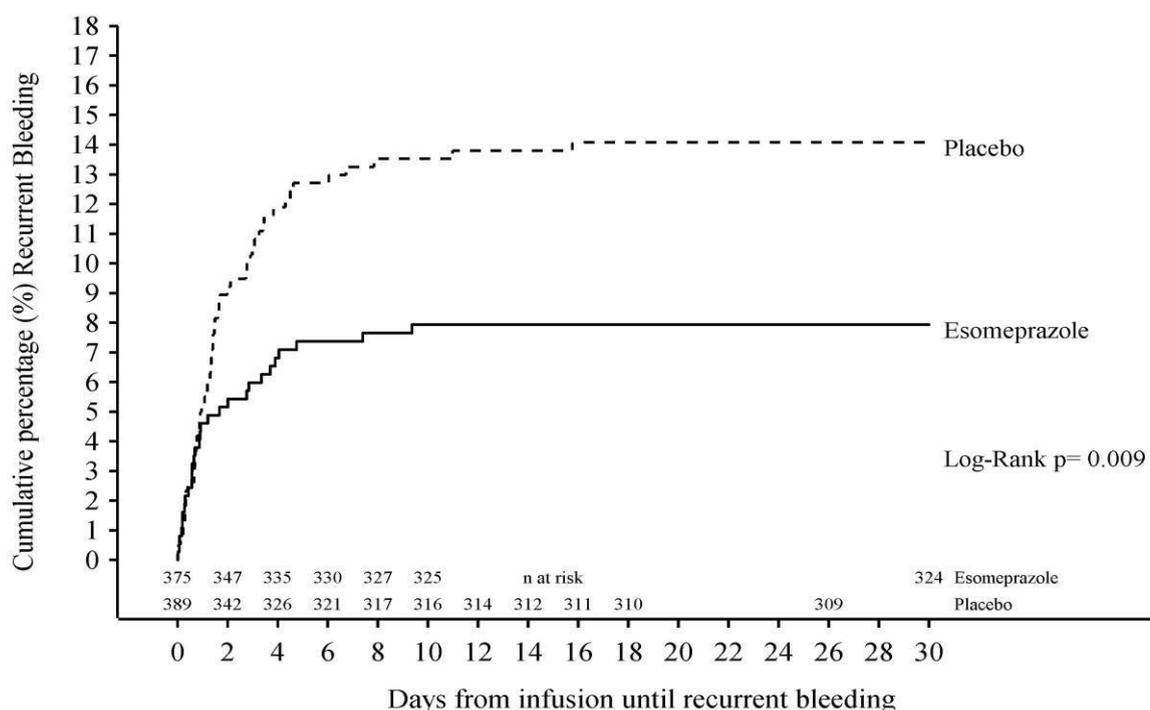
A 26-week randomised double-blind, placebo-controlled trial (n=992) was conducted to evaluate the efficacy of esomeprazole 20 mg daily for the prevention of gastric and/or duodenal ulcers in patients taking low-dose aspirin (75-325 mg daily) at moderate to high risk of developing gastroduodenal ulcers.

In patients receiving esomeprazole 20 mg the estimated cumulative proportion of patients with a gastric and/or duodenal ulcer at 6 months was significantly lower compared to the placebo group (1.8% vs 6.2%, $p=0.0007$, life-table analysis). Esomeprazole 20 mg daily was also significantly more effective at reducing the risk of lesions in the oesophagus compared to placebo in patients using low dose aspirin.

Prevention of rebleeding of gastric or duodenal ulcers

In a randomised, double blind, placebo-controlled clinical study, 764 patients with bleeding gastric or duodenal ulcers were randomised to receive esomeprazole IV for Injection (n=375) or placebo (n=389). Following endoscopic haemostasis, patients received either 80 mg esomeprazole IV administered as a bolus infusion over 30 minutes followed by a continuous infusion of 8 mg per hour or placebo for 72 hrs. After the initial 72 hour period, all patients received oral esomeprazole 40 mg for 27 days for acid suppression. The occurrence of rebleeding within 3 days was 5.9% in the esomeprazole IV treated group compared to 10.3% for the placebo group. At 7 and 30 days post-treatment, the occurrence of rebleeding in the esomeprazole treated group versus the placebo treated group was 7.2% vs 12.9% and 7.7% vs 13.6% respectively. The Kaplan-Meier curve in Fig 1 shows the cumulative percentage of patients rebleeding within 30 days of commencing treatment.

Figure 1 Kaplan-Meier estimate of the cumulative percentage of patients with rebleeding within 30 days (iv+oral treatment)



Esomeprazole IV treatment followed by the oral treatment regimen reduced the total number of days patients were hospitalised due to rebleeding during the 30 day treatment by 43% compared to placebo. Hospitalisations exceeding 5 days were observed in 4.8% of patients treated with esomeprazole compared to 10.5% for placebo.

Control of Gastric Acid Secretion in Patients with Hypersecretory States

A 12 month study in 21 patients diagnosed with pathological hypersecretory conditions including Zollinger-Ellison syndrome and idiopathic hypersecretion was conducted to determine if appropriately titrated doses of esomeprazole controlled gastric acid secretion (pharmacodynamic assessment) during the study and to evaluate the safety and tolerability of esomeprazole in patients with hypersecretory states. Basal acid output was controlled with high-dose esomeprazole (doses from 40 mg bid up to 240 mg daily) in 95% (20) of patients at 6 months and 90% (19) at 12 months. Most patients achieved

control on 40 mg bid. High-dose esomeprazole was found to be generally safe and well tolerated throughout the study.

Helicobacter pylori eradication

Two large randomised double-blind clinical trials were evaluated to assess the efficacy of esomeprazole in combination with specified antibiotics for the eradication of *H. pylori*. In the first trial, study B13, the seven day regimen consisted of esomeprazole 20 mg bid in combination with amoxicillin, 1000 mg bid and clarithromycin 250 mg x 2 bid (EAC) and was compared with standard seven day therapy of omeprazole 20 mg bid, amoxicillin 1000 mg bid and clarithromycin 250 mg x 2 bid (OAC). In the second trial, study B14, the above seven day treatment regimen was combined with three additional weeks of treatment with placebo (EAC + placebo) or omeprazole (OAC + omeprazole). This study looked at the healing rate of duodenal ulcer and eradication rate of *H. pylori* following treatment with omeprazole or placebo.

The estimated intention to treat (ITT) eradication rates in study B13 for the EAC and OAC treatment groups were 90% and 88% respectively. In study B14 the estimated ITT cumulative healing rates were 97% and 96% in the EAC + placebo and OAC + omeprazole groups, respectively, whilst the estimated ITT eradication rates were 86% and 88% respectively.

INDICATIONS

Gastro-Oesophageal Reflux Disease (GORD).

- treatment of erosive reflux oesophagitis
- long-term management of patients with healed oesophagitis to prevent relapse
- symptomatic treatment of gastro-oesophageal reflux disease (GORD)

Patients requiring NSAID therapy.

- short-term treatment of upper gastrointestinal symptoms associated with non-steroidal anti-inflammatory drug NSAID (non-selective and COX-2 selective) therapy.
- healing of gastric ulcers associated with non-steroidal anti-inflammatory drug NSAID (non-selective and COX-2 selective) therapy
- prevention of gastric and duodenal ulcers associated with non-steroidal anti-inflammatory drug NSAID (non-selective and COX-2 selective) therapy in patients at risk.

Prevention of rebleeding of gastric or duodenal ulcers following treatment with esomeprazole IV solution by intravenous infusion.

Pathological hypersecretory conditions including Zollinger-Ellison syndrome and idiopathic hypersecretion.

In combination with appropriate antibiotics for:

- healing of duodenal ulcer associated with *Helicobacter pylori*
- eradication of *Helicobacter pylori* in patients with active or healed peptic ulcer

CONTRAINDICATIONS

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

Esomeprazole like other proton pump inhibitors should not be administered with atazanavir (refer Effects of esomeprazole on other drugs)

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

PRECAUTIONS

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 esomeprazole may alleviate symptoms and delay diagnosis.

Patients on long-term treatment (particularly those treated for more than a year) should be kept under regular surveillance.

Patients on on-demand treatment should be instructed to contact their physician if their symptoms change in character. When prescribing esomeprazole for on demand therapy, the implications for interactions with other pharmaceuticals, due to fluctuating plasma concentrations of esomeprazole should be considered (see Interactions with other medicines).

When prescribing esomeprazole for eradication of *Helicobacter pylori* possible drug interactions for all components in the triple therapy should be considered. Clarithromycin is a potent inhibitor of CYP3A4 and hence contraindications and interactions for clarithromycin should be considered when the triple therapy is used in patients concurrently taking other drugs metabolised via CYP3A4 such as cisapride.

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 proton pump inhibitors may lead to slightly increased risk of gastrointestinal infections such as *Salmonella* and *Campylobacter* and, in hospitalised patients, possibly also *Clostridium difficile*.

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 esomeprazole (40 mg p.o. daily) resulting in decreased exposure to the active metabolite of clopidogrel by an average of 40%, and resulting in decreased maximum inhibition of (ADP induced) platelet aggregation by an average of 14%. Based on these data, concomitant use of esomeprazole 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 esomeprazole. Acute interstitial nephritis may occur at any point during PPI therapy and is generally attributed to idiopathic hypersensitivity reaction. Discontinue esomeprazole if acute interstitial nephritis develops. 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.

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 populationsCYP2C19 enzyme

Approximately 3% of the population lack a functional CYP2C19 enzyme and are called poor metabolisers. In these individuals the metabolism of esomeprazole is most likely catalysed by CYP3A4. After repeated once-daily administration of 40 mg esomeprazole, the mean area under the plasma concentration-time curve was approximately 100% higher in poor metabolisers than in subjects having a functional CYP2C19 enzyme (extensive metabolisers). Mean plasma concentrations were increased by about 60%. These findings have no implications for the dosage of esomeprazole.

Elderly

The metabolism of esomeprazole is not significantly changed in elderly subjects (71-80 years).

Children 12-18 years

The pharmacokinetics of esomeprazole were studied in 28 adolescent patients with GORD aged 12 to 18 years, in a single centre study. Patients were randomised to receive esomeprazole 20 mg or 40 mg once daily for 8 days. Mean C_{max} and AUC values of esomeprazole were not affected by body weight or age; and more than dose proportional increases in mean C_{max} and AUC values were observed between the two dose groups in the study. Overall, esomeprazole pharmacokinetics in adolescent patients aged 12 to 18 years were similar to those observed in adult patients with symptomatic GORD (Table 9)

Table 9. Comparison of PK Parameters in 12 to 18 Year Olds with GORD and Adults with Symptomatic GORD Following the Repeated Daily Oral Dose Administration of Esomeprazole*

	12-18 Year Olds (n=28)		Adults (n=36)	
	20 mg	40 mg	20 mg	40 mg
AUC (µmol.h/L)	3.65	13.86	4.2	12.6
C _{max} (µmol/L)	1.45	5.13	2.1	4.7
t _{max} (h)	2.00	1.75	1.6	1.6
t _½ (h)	0.82	1.22	1.2	1.5

*Duration of treatment for 12 to 18 year olds and adults were 8 days and 5 days, respectively. Data were obtained from two independent studies.

Data presented are geometric means for AUC, C_{max} and t_½, and median value for t_{max}

Children 1-11 years

Following repeated dose administration of 10 mg and 20 mg esomeprazole, the total exposure (AUC) and the time to reach maximum plasma drug concentration (t_{max}) for the 10 mg dose was similar across the 1 to 11 year-olds and similar to the total exposure seen with the 20 mg dose in 12 to 18 year-olds and adults. The 20 mg dose resulted in higher exposure in 6 to 11 year-olds compared to 12 to 18 year-olds and adults.

Table 10. Summary of Pharmacokinetic Parameters in 1-11 year olds with GORD following 5 days of once-daily oral esomeprazole treatment

	1 to 5 year olds		6 – 11 year olds	
	5 mg (n=6)	10 mg (n=8)	10 mg (n=7)	20 mg (n=6)
AUC (µmol.h/L)	0.74	4.83	3.70	6.28
C _{max} (µmol/L)	0.62	2.98	1.77	3.73
t _{max} (h)	1.33	1.44	1.79	1.75
t _½ (h)	0.42	0.74	0.88	0.73
Cl/F (L/h)	19.44	5.99	7.84	9.22

Values represent geometric mean except t_{max} which is the arithmetic mean

Repeated dose administration of 5 mg esomeprazole resulted in insufficient exposure in 1 to 5 year-olds.

A single-centre, randomised, single-blind, two-arm parallel, repeated dose study examined the pharmacokinetics of esomeprazole and its efficacy in controlling intragastric pH in infants aged 1-24 months. Patients were randomised to either esomeprazole 0.25 mg/kg or 1.0 mg/kg orally once daily for 7 or 8 days. Fifty patients were randomised of which 43 were ≤12 months of age and 7 were >12 months of age. Forty-five patients completed the study of whom 39 were ≤12 months of age and 6 were >12 months of age. The median time to reach maximum plasma concentration (t_{max}) of esomeprazole was approximately 2 hours for the 0.25 mg/kg dose and 3 hours for the 1.0 mg/kg dose group. Mean AUC_τ was 3.51 µmol.h/L for the 1.0 mg/kg dose and 0.65 µmol.h/L for the 0.25 mg/kg dose. Mean C_{max} values of 0.85 µmol/L and 0.17 µmol/L were obtained for the 1.0 mg/kg and 0.25 mg/kg doses respectively. Large inter-individual variability in AUC_τ, AUC_τ, and C_{SSmax} of esomeprazole was observed for both 0.25 mg/kg and 1.0 mg/kg doses and the variability seemed larger in the younger children. No conclusions regarding dose proportionality could be drawn. The mean percentage of time with intragastric pH>4

increased from 30.5% at baseline to 47.9% in the 0.25 mg/kg dose group and from 28.6% to 69.3% in the 1.0 mg/kg dose group.

Statistically, the increase was significantly higher with esomeprazole 1.0 mg/kg dose compared with the 0.25 mg/kg dose. Both doses of esomeprazole were well tolerated. Esomeprazole is not approved for use in children <1 year of age.

Gender

Following a single dose of 40 mg esomeprazole the mean area under the plasma- concentration-time curve is approximately 30% higher in females than in males. No gender difference is seen after repeated once-daily administration. These findings have no implications for the dosage of esomeprazole.

Hepatic insufficiency

The metabolism of esomeprazole in patients with mild to moderate liver dysfunction (Child Pugh A or B) may be impaired, however no dose adjustment is required. The metabolic rate is decreased in patients with severe liver dysfunction (Child Pugh C) resulting in a doubling of the area under the plasma concentration- time curve for esomeprazole. Therefore, a maximum of 20 mg should not be exceeded in patients with severe dysfunction. Esomeprazole or its major metabolites do not show any tendency to accumulate with once daily dosing (see DOSAGE AND ADMINISTRATION).

Renal impairment

No studies have been performed in patients with decreased renal function. Since the kidney is responsible for the excretion of the metabolites of esomeprazole but not for the elimination of the parent compound, the metabolism of esomeprazole is not expected to be changed in patients with impaired renal function.

Carcinogenicity

Preclinical bridging studies between the enantiomer esomeprazole and the racemate (omeprazole) showed that these compounds are pharmacologically and toxicologically similar at equivalent systemic exposure. Thus, the extensive preclinical database for omeprazole is also relevant for the safety assessment of esomeprazole.

No carcinogenicity studies have been conducted on esomeprazole. However, omeprazole (the racemate) produced enterochromaffin-like (ECL) cell hyperplasia and gastric carcinoids in rats. In a 104- week study in rats, carcinoids were observed at doses (on a mg/m^2 basis) which ranged from 0.4 to 30- fold the maximum clinical dose for adults. However, a no-effect dose level was not determined in female rats. A similar effect was not observed in a 78-week mouse carcinogenicity study with omeprazole. These gastric effects in the rat are believed to be the result of sustained, pronounced hypergastrinaemia secondary to reduced production of gastric acid. Similar effects are elicited by other proton pump inhibitors, H₂-receptor antagonists and by partial fundectomy.

Genotoxicity

Esomeprazole was negative in a bacterial gene mutation assay. In clastogenicity tests, esomeprazole was positive (as was omeprazole) in an *in vitro* chromosome aberration test in human lymphocytes. However, two *in vivo* tests (a mouse micronucleus test and an *in vivo* chromosome aberration test in rat bone marrow) in the presence of long and high systemic exposure to esomeprazole, showed that esomeprazole was not clastogenic under *in vivo* conditions. Exposure levels in man are well below those at which clastogenic effects occurred *in vitro*.

Effects on fertility

A fertility study has not been conducted on esomeprazole. However, there was no evidence that omeprazole impaired fertility in the rat at an estimated exposure (plasma AUC) of 1-2.5 times the maximum clinical exposure for adults.

Use in pregnancy – Category B3²

For esomeprazole limited clinical data on exposed pregnancies are available. Esomeprazole should only be given to pregnant women if its use is considered essential.

Esomeprazole was not teratogenic in rats or rabbits at oral doses up to 800 and 250 µmol/kg.day, respectively [corresponding to respective exposures (plasma AUC) of about 6-10 times and 0.04 times the anticipated clinical value in adults]. However, in rabbits, esomeprazole was associated with reduced fetal weights and an increased incidence of minor skeletal anomalies, although these effects were most probably related to the maternal toxicity of esomeprazole in this species. No effects on the fetuses were observed in the rat teratology study, in which an adequate systemic exposure to esomeprazole was achieved.

Use in lactation

It is not known if esomeprazole or its metabolites appear in human breast milk. No studies in lactating women have been performed. Therefore esomeprazole should not be used during breast feeding.

Effects on ability to drive and operate machinery

Esomeprazole is not likely to affect the ability to drive or use machines.

INTERACTIONS WITH OTHER MEDICINES

Esomeprazole is metabolised via the CYP2C19 and CYP3A4 isoforms of the hepatic cytochrome P-450 system and may be expected to interact with the pharmacokinetics of other drugs metabolised by this system.

Esomeprazole inhibits CYP2C19, the major esomeprazole metabolising enzyme. Thus, when esomeprazole is combined with drugs metabolised by CYP2C19 (see Effects of esomeprazole on other drugs), the plasma concentrations of these drugs may be increased and a dose reduction could be needed. This should be considered especially when prescribing esomeprazole for on demand therapy.

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 esomeprazole (40 mg p.o. daily) resulting in decreased exposure to the active metabolite of clopidogrel by an average of 40%, and resulting in decreased maximum inhibition of (ADP induced) platelet aggregation by an average of 14%. Based on these data, concomitant use of esomeprazole 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.

Other drugs that effect esomeprazole

Clarithromycin

Concomitant administration of esomeprazole and a CYP3A4 inhibitor, clarithromycin (500 mg bid), resulted in a doubling of the exposure (AUC) to esomeprazole. Dose adjustment of esomeprazole is not required.

² Drugs which have been taken only by a limited number of pregnant women of childbearing age, without an increase in frequency of malformation or other direct or indirect harmful effects on the human fetus having been observed. Studies in animals have shown evidence of an increased occurrence of fetal damage, the significance of which is considered uncertain in humans

Concomitant administration of esomeprazole and a combined inhibitor of CYP2C19 and CYP3A4, such as voriconazole, may result in more than doubling of the esomeprazole exposure. However, dose adjustment of esomeprazole, with normal dosage, is not required.

CYP3A4 is a less important pathway than CYP2C19. However, inhibitors of CYP3A4 other than clarithromycin (e.g. ketoconazole, itraconazole, erythromycin etc) may also reduce esomeprazole clearance, although this is unlikely to be of any clinical significance.

Drugs known to induce CYP2C19 or CYP3A4 or both (such as rifampicin and St. John's wort) may lead to decreased esomeprazole serum levels by increasing the esomeprazole metabolism.

Effects of esomeprazole on other drugs

Cisapride

In healthy volunteers, concomitant administration of esomeprazole 40 mg resulted in a 32% increase in area under the plasma concentration-time curve (AUC) and a 31% prolongation of elimination half-life ($t_{1/2}$) but no significant increase in peak plasma levels of cisapride. The slightly prolonged QTc interval observed after administration of cisapride alone, was not further prolonged when cisapride was given in combination with esomeprazole (see PRECAUTIONS).

Cilostazol

Omeprazole as well as esomeprazole act as inhibitors of CYP2C19. 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. (See CONTRAINDICATIONS).

Citalopram, clomipramine and imipramine

Because the plasma concentrations of these drugs may be increased by the concomitant administration of esomeprazole a dose reduction could be needed.

Diazepam

Concomitant administration of 30 mg esomeprazole to healthy volunteers resulted in 45% decrease in clearance of the CYP2C19 substrate diazepam. This interaction is unlikely to be of clinical relevance.

NSAID drugs

Studies evaluating concomitant administration of esomeprazole and either naproxen (non-selective NSAID) or rofecoxib (COX-2 selective NSAID) did not identify any clinically relevant interactions in young healthy Caucasian volunteers.

Phenytoin

Concomitant administration of 40 mg esomeprazole resulted in a 13% increase in trough plasma levels of phenytoin in epileptic patients. Dose adjustment was not required in this study. It is recommended to monitor the plasma concentrations of phenytoin when treatment with esomeprazole is introduced or withdrawn.

Warfarin

Concomitant administration of 40 mg esomeprazole to warfarin-treated patients showed that, despite a slight elevation in the trough plasma concentration of the less potent R-isomer of warfarin, the coagulation times were within the accepted range. However, from post-marketing use cases of elevated INR of clinical significance have been reported during concomitant treatment with warfarin. Close monitoring is recommended when initiating and ending treatment with warfarin or other coumarin derivatives.

Tacrolimus

Concomitant administration of esomeprazole has been reported to increase the serum levels of tacrolimus.

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 esomeprazole may need to be considered.

Antiretroviral drugs

Concomitant administration with esomeprazole and atazanavir is contraindicated.

Omeprazole has been reported to interact with some antiretroviral drugs. The clinical importance and the mechanisms behind these reported 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 CYP 2C19. For some antiretroviral drugs, such as atazanavir and nelfinavir, decreased serum levels have been reported when given together with omeprazole and concomitant administration is not recommended. For other antiretroviral drugs, such as saquinavir, increased serum levels have been reported. There are also some antiretroviral drugs for which unchanged serum levels have been reported when given with omeprazole. Due to the similar pharmacodynamic effects and pharmacokinetic properties of omeprazole and esomeprazole, concomitant administration with esomeprazole and antiretroviral drugs such as nelfinavir is not recommended.

Medicinal products with pH dependent absorption

The decreased intragastric acidity during treatment with esomeprazole and other PPIs, might increase or decrease the absorption of drugs if the mechanism of absorption is influenced by gastric acidity. In common with the use of other inhibitors of acid secretion or antacids, the absorption of drugs such as ketoconazole, itraconazole and erlotinib can decrease and the absorption of drugs such as digoxin can increase during treatment with esomeprazole. 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).

Esomeprazole can reduce the absorption of drugs where gastric pH is an important determinant of their bioavailability. Esomeprazole is an enantiomer of omeprazole. Co-administration of omeprazole and mycophenolate mofetil in healthy and transplant patients 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 proton pump inhibitors and mycophenolate mofetil. Use esomeprazole with caution in transplant patients receiving mycophenolate mofetil.

Potential interactions that have been excluded

Amoxicillin or quinidine

Esomeprazole has been shown to have no clinically relevant effects on the pharmacokinetics of amoxicillin or quinidine.

Effect on laboratory tests

Chromogranin A (CgA) increases due to decreased gastric acidity. The increased CgA level may interfere with investigations for neuroendocrine tumours. To avoid this interference the esomeprazole treatment should be temporarily stopped five days before CgA measurements.

ADVERSE EFFECTS

Esomeprazole is well tolerated.

Clinical trials and post-marketing data

The following adverse reactions have been identified or suspected in the clinical trials programme and/or from post-marketing experience for esomeprazole. None was found to be dose-related.

Adverse reactions within each body system are listed in descending order of frequency (Very common:

≥10%; common: ≥1% and <10%; uncommon: ≥0.1% and <1%; rare ≥0.01% and <0.1%; very rare:

<0.01%). These include the following:

Blood and lymphatic system disorders

Rare: leukopenia, thrombocytopenia

Very rare: agranulocytosis, pancytopenia

Immune system disorders

Rare: hypersensitivity reactions e.g. angioedema and anaphylactic reaction/shock

Metabolism and nutrition disorders

Uncommon: peripheral oedema

Rare: hyponatraemia

Very rare: hypomagnesaemia; severe hypomagnesaemia may result in hypocalcaemia. Hypomagnesaemia may also result in hypokalaemia

Psychiatric disorders

Uncommon: insomnia

Rare: agitation, confusion, depression

Very rare: aggression, hallucination

Nervous system disorders

Common: headache

Uncommon: dizziness, paraesthesia, somnolence

Rare: taste disturbance

Eye disturbances

Rare: blurred vision

Ear and labyrinth disorders

Uncommon: vertigo

Respiratory, thoracic mediastinal disorders

Rare: bronchospasm

Gastrointestinal

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

Uncommon: dry mouth

Rare: stomatitis, gastrointestinal candidiasis

Very rare: microscopic colitis

Hepatobiliary disorders

Uncommon: increased liver enzymes

Rare: Hepatitis with or without jaundice

Very rare: hepatic failure, hepatic encephalopathy

Skin and subcutaneous tissue disorders

Uncommon: dermatitis, pruritus, urticaria, rash

Rare: alopecia, photosensitivity

Very rare: erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis (TEN)

Not known: subacute cutaneous lupus erythematosus (SCLE)

Muskuloskeletal, connective tissue and bone disorders

Rare: arthralgia, myalgia

Very rare: muscular weakness

Renal and urinary disorders

Very rare: Interstitial nephritis

Reproductive system and breast disorders

Very rare: gynaecomastia

General disorders and administration site conditions

Rare: malaise, hyperhidrosis

Table 11. Number (%) of patients by the most common adverse events and dose, for long-term maintenance studies (B4 and B5)

	E total n=519	E 40 n=173	E 20 n=179	E 10 n=167	Placebo n=169
Mean exposure time (days):	136	147	144	115	58
Respiratory infection	44 (8.5)	16 (9.2)	17 (9.5)	11 (6.6)	5 (3.0)
Diarrhoea	35 (6.7)	13 (7.5)	9 (5.0)	13 (7.8)	5 (3.0)
Headache	34 (6.6)	11 (6.4)	14 (7.8)	9 (5.4)	7 (4.1)

Gastritis/gastritis (aggravated)	32 (6.2)	11 (6.4)	13 (7.3)	8 (4.8)	9 (5.3)
Flatulence	26 (5.0)	13 (7.5)	7 (3.9)	6 (3.6)	3 (1.8)
Nausea/nausea (aggravated)	25 (4.8)	11 (6.4)	8 (4.5)	6 (3.6)	4 (2.4)
Sinusitis	22 (4.2)	8 (4.6)	10 (5.6)	4 (2.4)	3 (1.8)
Abdominal pain	19 (3.7)	4 (2.3)	9 (5.0)	6 (3.6)	4 (2.4)
Accident and/or injury	19 (3.7)	3 (1.7)	6 (3.4)	10 (6.0)	3 (1.8)
Infection viral	19 (3.7)	7 (4.0)	7 (3.9)	5 (3.0)	3 (1.8)
Vomiting/vomiting (aggravated)	17 (3.3)	6 (3.5)	3 (1.7)	8 (4.8)	2 (1.2)
Hypertension/hypertension (aggravated)	14 (2.7)	2 (1.2)	6 (3.4)	6 (3.6)	0
Gastrin serum increased	13 (2.5)	6 (3.5)	6 (3.4)	1 (0.6)	0
Tooth disorder	13 (2.5)	4 (2.3)	6 (3.4)	3 (1.8)	1 (0.6)
Back pain	10 (1.9)	3 (1.7)	2 (1.1)	5 (3.0)	4 (2.4)
Epigastric pain/epigastric pain (aggravated)	9 (1.7)	2 (1.2)	2 (1.1)	5 (3.0)	3 (1.8)

DOSAGE AND ADMINISTRATION

ESOMEPRAZOLE GXP tablets should be swallowed whole with liquid. The tablets should not be chewed or crushed.

If required, the tablets can also be dispersed in half a glass of non-carbonated water (mineral water is not suitable). No other liquids should be used. 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.

For patients who cannot swallow, the tablets can be dispersed in non-carbonated water and administered via a large syringe through a gastric tube. To ensure appropriate dosing and to avoid clogging, the gastric tube should be flushed with non-carbonated water following administration.

Adults

Gastro-Oesophageal Reflux Disease (GORD)

Treatment of erosive reflux oesophagitis

40 mg once daily for four weeks.

An additional 4 weeks treatment is recommended for patients in whom oesophagitis has not healed or who have persistent symptoms

Long-term management (maintenance) of patients with healed oesophagitis to prevent relapse

20 mg once daily.

Symptomatic treatment of gastro-oesophageal reflux disease (GORD)

In patients with normal endoscopy 20 mg once daily for four weeks. If symptom control has not been achieved after four weeks, the patient should be further investigated. For patients with symptom resolution after 4 weeks initial therapy, subsequent symptom control can be achieved using an on-demand regimen taking 20 mg once daily, when needed.

Patients requiring NSAID (non-selective and COX-2 selective) therapy

Short-term treatment of upper gastrointestinal symptoms associated with NSAID therapy

20 mg once daily in patients requiring NSAID therapy. If symptom control has not been achieved after 4 weeks, the patient should be further investigated. Controlled studies did not extend beyond 4 weeks.

Healing of gastric ulcers associated with NSAID (non-selective and COX-2 selective) therapy

The usual dose is 20 mg once daily for 4 to 8 weeks.

Prevention of gastric and duodenal ulcers associated with NSAID (non-selective and COX-2 selective) therapy in patients at risk

20 mg once daily. Controlled studies did not extend beyond 6 months.

Prevention of rebleeding of gastric or duodenal ulcers

40 mg once daily for a duration determined by the treating physician. Oral esomeprazole should be preceded by esomeprazole administered intravenously.

Pathological hypersecretory conditions including Zollinger-Ellison syndrome and idiopathic hypersecretion

The recommended initial dosage is esomeprazole 40 mg twice daily. The dosage should then be individually adjusted and treatment continued as long as clinically indicated. Doses up to 120 mg twice daily have been administered.

In combination with appropriate antibiotics for:

- Healing of duodenal ulcer associated with *Helicobacter pylori*
- Eradication of *Helicobacter pylori* with active or healed peptic ulceration

20 mg esomeprazole twice daily for 7 days. In the Clinical Trials section, esomeprazole was used in combination with 1000 mg amoxicillin and 500 mg clarithromycin, both twice daily for 7 days.

Children and Adolescents 12-18 years

Treatment of erosive reflux oesophagitis

40 mg once daily for four weeks.

An additional 4 weeks treatment is recommended for patients in whom oesophagitis has not healed or who have persistent symptoms.

Long-term management (maintenance) of patients with healed oesophagitis to prevent relapse

20 mg once daily

Symptomatic treatment of gastro-oesophageal reflux disease (GORD)

In patients with normal endoscopy 20 mg once daily for four weeks. If symptom control has not been achieved after four weeks, the patient should be further investigated. Once symptoms have resolved, subsequent symptom control can be achieved using 20 mg once daily under medical supervision.

Children 1-11 years

Gastro-Oesophageal Reflux Disease (GORD)

Treatment of erosive reflux oesophagitis

Weight <20 kg: 10 mg once daily for 8 weeks.

Weight ≥20 kg: 10 mg or 20 mg once daily for 8 weeks.

Long-term management (maintenance) of patients with healed oesophagitis to prevent relapse

10 mg once daily

Symptomatic treatment of gastro-oesophageal reflux disease (GORD)

10 mg once daily for up to 8 weeks.

Doses over 1 mg/kg have not been studied.

Children below the age of 1 year

Esomeprazole is not approved for use in children younger than 1 year.

Geriatrics

Dose adjustment is not required in the elderly.

Hepatic insufficiency

Dose adjustment is not required in patients with mild to moderate liver impairment (Child Pugh A and B). For patients with severe liver impairment (Child Pugh C), a maximum dose of 20 mg esomeprazole should not be exceeded (see PRECAUTIONS).

Renal insufficiency

Dosage adjustment is not required in patients with impaired renal function. Due to limited experience in patients with severe renal insufficiency such patients should be treated with caution.

OVERDOSAGE

The symptoms described in connection with deliberate esomeprazole overdose are transient. The symptoms described in connection with 280 mg were gastrointestinal symptoms and weakness. Single doses of 80 mg esomeprazole were uneventful. No specific antidote is known. Esomeprazole is extensively protein bound and is therefore not readily dialyzable. As in any case of overdose, treatment should be symptomatic and general supportive measures should be utilised.

Contact the Poisons Information Centre (telephone 13 11 26) for advice on overdose management.

PRESENTATION AND STORAGE CONDITIONS

Esomeprazole GxP 20 mg Light pink, oblong, biconvex, film coated tablets debossed with '20' on one side and 'CE' on the other side. Each tablet contains 20 mg esomeprazole (as esomeprazole magnesium) as enteric-coated pellets.

Esomeprazole GxP 40 mg Pink, oblong, biconvex, film coated tablets debossed with '40' on one side and 'CE' on the other side. Each tablet contains 40 mg esomeprazole (as esomeprazole magnesium) as enteric-coated pellets.

Available in Al/Al blister packs of 30 tablets (non-marketed pack sizes 7, 15, 56, 100 tablets). Store below 25°C.

NAME AND ADDRESS OF SPONSOR

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POISON SCHEDULE OF THE MEDICINE

S4 (Prescription Only Medicine)

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

03 February 2014

DATE OF MOST RECENT AMENDMENT

18/08/2016

Esomeprazole GXP_pi\Jun16/01