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RESEARCH**

APPLICATION NUMBER:

21-689

LABELING

NEXIUM® I.V.
(esomeprazole sodium)

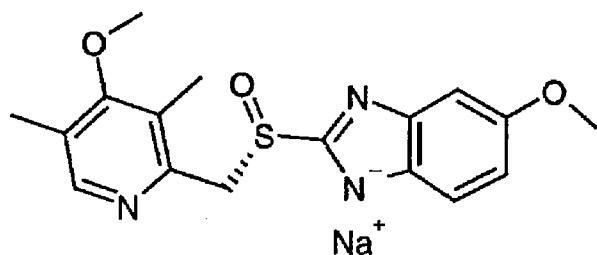
NDA 21-689

March 25, 2005

for Injection

Rx only**DESCRIPTION**

The active ingredient in NEXIUM® I.V. (esomeprazole sodium) for Injection is (*S*)-5-methoxy-2-[[[(4-methoxy-3,5-dimethyl-2-pyridinyl)-methyl]sulfinyl]-1 *H*-benzimidazole sodium a compound that inhibits gastric acid secretion. Esomeprazole is the *S*-isomer of omeprazole, which is a mixture of the *S*- and *R*- isomers. Its empirical formula is C₁₇H₁₈N₃O₃Na with molecular weight of 367.4 g/mol (sodium salt) and 345.4 g/mol (parent compound). Esomeprazole sodium is very soluble in water and freely soluble in ethanol (95%). The structural formula is:



NEXIUM I.V. for Injection is supplied as a sterile, freeze-dried, white to off-white, porous cake or powder in a 5 mL vial, intended for intravenous administration after reconstitution with 0.9% Sodium Chloride Injection, USP; Lactated Ringer's Injection, USP or 5% Dextrose Injection, USP. NEXIUM I.V. for Injection contains esomeprazole sodium 21.3 mg or 42.5 mg equivalent to esomeprazole 20 mg or 40 mg, edetate disodium 1.5 mg and sodium hydroxide q.s. for pH adjustment. The pH of reconstituted solution of NEXIUM I.V. for Injection depends on the reconstitution volume and is in the pH range of 9 to 11. The stability of esomeprazole sodium in aqueous solution is strongly pH dependent. The rate of degradation increases with decreasing pH.

CLINICAL PHARMACOLOGY**Pharmacokinetics***Absorption*

The pharmacokinetic profile of NEXIUM I.V. for Injection 20 mg and 40 mg was determined in 24 healthy volunteers for the 20 mg dose and 38 healthy volunteers for the 40 mg dose following once daily administration of 20 mg and 40 mg of NEXIUM I.V. for Injection by constant rate over 30 minutes for five days. The results are shown in the following table:

Pharmacokinetic Parameters of NEXIUM Following I.V. Dosing for 5 days

Parameter	NEXIUM	NEXIUM
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	I.V. 20 mg	I.V. 40 mg
AUC ($\mu\text{mol}\cdot\text{h/L}$)	5.11 (3.96:6.61)	16.21 (14.46:18.16)
C_{max} ($\mu\text{mol/L}$)	3.86 (3.16:4.72)	7.51 (6.93:8.13)
$t_{1/2}$ (h)	1.05 (0.90:1.22)	1.41 (1.30:1.52)

Values represent the geometric mean (95% CI)

Distribution

Esomeprazole is 97% bound to plasma proteins. Plasma protein binding is constant over the concentration range of 2-20 $\mu\text{mol/L}$. The apparent volume of distribution at steady state in healthy volunteers is approximately 16 L.

Metabolism

Esomeprazole is extensively metabolized in the liver by the cytochrome P450 (CYP) enzyme system. The metabolites of esomeprazole lack antisecretory activity. The major part of esomeprazole's metabolism is dependent upon the CYP2C19 isoenzyme, which forms the hydroxy and desmethyl metabolites. The remaining amount is dependent on CYP3A4 which forms the sulphone metabolite. CYP2C19 isoenzyme exhibits polymorphism in the metabolism of esomeprazole, since some 3% of Caucasians and 15-20% of Asians lack CYP2C19 and are termed Poor Metabolizers. At steady state, the ratio of AUC in Poor Metabolizers to AUC in the rest of the population (Extensive metabolizers) is approximately 2.

Following administration of equimolar doses, the S- and R-isomers are metabolized differently by the liver, resulting in higher plasma levels of the S- than of the R-isomer.

Excretion

Esomeprazole is excreted as metabolites primarily in urine but also in feces. Less than 1% of parent drug is excreted in the urine. Esomeprazole is completely eliminated from plasma and there is no accumulation during once daily administration. The plasma elimination half-life of intravenous esomeprazole is approximately 1.1 to 1.4 hours and is prolonged with increasing dose of intravenous esomeprazole.

Special Populations

Investigation of age, gender, race, renal, and hepatic impairment and metabolizer status have been made previously with oral esomeprazole. The pharmacokinetics of esomeprazole is not expected to be affected differently by intrinsic or extrinsic factors after intravenous administration compared to oral administration. The same recommendations for dose adjustment in special populations are suggested for intravenous esomeprazole as for oral esomeprazole.

Geriatric

In oral studies, the AUC and C_{max} values were slightly higher (25% and 18%, respectively) in the elderly as compared to younger subjects at steady state. Dosage adjustment based on age is not necessary.

Pediatric

The pharmacokinetics of esomeprazole have not been studied in patients < 18 years of age.

Gender

In oral studies, the AUC and C_{max} values were slightly higher (13%) in females than in males at steady state. Similar differences have been seen for intravenous administration of esomeprazole. Dosage adjustment based on gender is not necessary.

Hepatic Insufficiency

In oral studies, the steady state pharmacokinetics of esomeprazole obtained after administration of 40 mg once daily to 4 patients each with mild (Child Pugh A), moderate (Child Pugh Class B), and severe (Child Pugh Class C) liver insufficiency were compared to those obtained in 36 male and female GERD patients with normal liver function. In patients with mild and moderate hepatic insufficiency, the AUCs were within the range that could be expected in patients with normal liver function. In patients with severe hepatic insufficiency the AUCs were 2 to 3 times higher than in the patients with normal liver function. No dosage adjustment is recommended for patients with mild to moderate hepatic insufficiency (Child Pugh Classes A and B). However, in patients with severe hepatic insufficiency (Child Pugh Class C) a dose of 20 mg once daily should not be exceeded (See **DOSAGE AND ADMINISTRATION**).

Renal Insufficiency

The pharmacokinetics of esomeprazole in patients with renal impairment are not expected to be altered relative to healthy volunteers as less than 1% of esomeprazole is excreted unchanged in urine.

Pharmacodynamics*Mechanism of Action*

Esomeprazole is a proton pump inhibitor that suppresses gastric acid secretion by specific inhibition of the H⁺/K⁺-ATPase in the gastric parietal cell. The S- and R-isomers of omeprazole are protonated and converted in the acidic compartment of the parietal cell forming the active inhibitor, the achiral sulphenamide. By acting specifically on the proton pump, esomeprazole blocks the final step in acid production, thus reducing gastric acidity. This effect is dose-related up to a daily dose of 20 to 40 mg and leads to inhibition of gastric acid secretion.

Antisecretory Activity

The effect of intravenous esomeprazole on intragastric pH was determined in two separate studies. In the first study, 20 mg of NEXIUM I.V. for Injection was administered intravenously once daily at constant rate over 30 minutes for 5 days. Twenty-two healthy subjects were included in the study. In the second study, 40 mg of NEXIUM I.V. for Injection was administered intravenously once daily at constant rate over 30 minutes for 5 days. Thirty-eight healthy were included in the study.

Effect of NEXIUM I.V. for Injection on Intragastric pH on Day 5

	Esomeprazole 20 mg (n=22)	Esomeprazole 40 mg (n=38)
% Time Gastric pH>4 (95% CI)	49.5 41.9-57.2	66.2 62.4-70.0

Gastric pH was measured over a 24-hour period

Serum Gastrin Effects

In oral studies, the effect of NEXIUM on serum gastrin concentrations was evaluated in approximately 2,700 patients in clinical trials up to 8 weeks and in over 1,300 patients for up to 6-12 months. The mean fasting gastrin level increased in a dose-related manner. This increase reached a plateau within two to three months of therapy and returned to baseline levels within four weeks after discontinuation of therapy.

Enterochromaffin-like (ECL) Cell Effects

There are no data available on the effects of intravenous esomeprazole on ECL cells.

In 24-month carcinogenicity studies of oral omeprazole in rats, a dose-related significant occurrence of gastric ECL cell carcinoid tumors and ECL cell hyperplasia was observed in both male and female animals (see **PRECAUTIONS**, Carcinogenesis, Mutagenesis, Impairment of Fertility). Carcinoid tumors have also been observed in rats subjected to fundectomy or long-term treatment with other proton pump inhibitors or high doses of H₂-receptor antagonists.

Human gastric biopsy specimens have been obtained from more than 3,000 patients treated orally with omeprazole in long-term clinical trials. The incidence of ECL cell hyperplasia in these studies increased with time; however, no case of ECL cell carcinoids, dysplasia, or neoplasia has been found in these patients.

In over 1,000 patients treated with NEXIUM (10, 20 or 40 mg/day) up to 6-12 months, the prevalence of ECL cell hyperplasia increased with time and dose. No patient developed ECL cell carcinoids, dysplasia, or neoplasia in the gastric mucosa.

Endocrine Effects

NEXIUM had no effect on thyroid function when given in oral doses of 20 or 40 mg for 4 weeks. Other effects of NEXIUM on the endocrine system were assessed using omeprazole studies. Omeprazole given in oral doses of 30 or 40 mg for 2 to 4 weeks had no effect on carbohydrate metabolism, circulating levels of parathyroid hormone, cortisol, estradiol, testosterone, prolactin, cholecystokinin or secretin.

Clinical Studies

Acid Suppression in Gastroesophageal Reflux Disease (GERD)

Four multicenter, open-label, two-period crossover studies were conducted to compare the pharmacodynamic efficacy of the intravenous formulation of esomeprazole (20 mg and 40 mg) to that of NEXIUM delayed-release capsules at corresponding doses in patients with symptoms of GERD, with or without erosive esophagitis. The patients (n=206, 18 to 72 years old; 112 female; 110 Caucasian, 50 Black, 10 Oriental, and 36 Other Race) were randomized to receive either 20 or 40 mg of intravenous or oral esomeprazole once daily for 10 days (Period 1), and then were switched in Period 2 to the other formulation for 10 days, matching their respective dose level from Period 1. The intravenous formulation was administered as a 3-minute injection in two of the studies, and as a 15-minute infusion in the other two studies. Basal acid output (BAO) and maximal acid output (MAO) were determined 22-24 hours post-dose on Period 1, Day 11; on Period 2, Day 3; and on Period 2, Day 11. BAO and MAO were estimated from 1-hour continuous collections of gastric contents prior to and following (respectively) subcutaneous injection of 6.0 µg/kg of pentagastrin.

In these studies, after 10 days of once daily administration, the intravenous dosage forms of NEXIUM 20 mg and 40 mg were similar to the corresponding oral dosage forms in their ability to suppress BAO and MAO in these GERD patients (see table below).

There were no major changes in acid suppression when switching between intravenous and oral dosage forms.

Mean (SD) BAO and MAO measured 22-24 hours post-dose following once daily oral and intravenous administration of esomeprazole for 10 days in GERD patients with or without a history of erosive esophagitis

Study	Dose in mg	INTRAVENOUS ADMINISTRATION METHOD	BAO IN MMOL H ⁺ /H		MAO IN MMOL H ⁺ /H	
			INTRAVENOUS	ORAL	INTRAVENOUS	ORAL
1 (N=42)	20	3-minute injection	0.71 (1.24)	0.69 (1.24)	5.96 (5.41)	5.27 (5.39)
2 (N=44)	20	15-minute infusion	0.78 (1.38)	0.82 (1.34)	5.95 (4.00)	5.26 (4.12)
3 (N=50)	40	3-minute injection	0.36 (0.61)	0.31 (0.55)	5.06 (3.90)	4.41 (3.11)
4 (N=47)	40	15-minute infusion	0.36 (0.79)	0.22 (0.39)	4.74 (3.65)	3.52 (2.86)

INDICATIONS AND USAGE

NEXIUM I.V. for Injection is indicated for the short-term treatment (up to 10 days) of GERD patients with a history of erosive esophagitis as an alternative to oral therapy in patients when therapy with NEXIUM Delayed-Release Capsules is not possible or appropriate.

When oral therapy is possible or appropriate, intravenous therapy with NEXIUM I.V. for Injection should be discontinued and the therapy should be continued orally.

CONTRAINDICATIONS

NEXIUM is contraindicated in patients with known hypersensitivity to any component of the formulation or to substituted benzimidazoles.

PRECAUTIONS

General

Symptomatic response to therapy with NEXIUM does not preclude the presence of gastric malignancy.

Atrophic gastritis has been noted occasionally in gastric corpus biopsies from patients treated long-term with omeprazole, of which NEXIUM is an enantiomer.

Treatment with NEXIUM I.V. for Injection should be discontinued as soon as the patient is able to resume treatment with NEXIUM Delayed-Release Capsules.

Drug Interactions

Esomeprazole is extensively metabolized in the liver by CYP2C19 and CYP3A4.

In vitro and *in vivo* studies have shown that esomeprazole is not likely to inhibit CYPs 1A2, 2A6, 2C9, 2D6, 2E1 and 3A4. No clinically relevant interactions with drugs metabolized by these CYP enzymes would be expected. Drug interaction studies have shown that esomeprazole does not have any clinically significant interactions with phenytoin, warfarin, quinidine, clarithromycin or amoxicillin. Post-marketing reports of changes in prothrombin measures have been received among patients on concomitant warfarin and esomeprazole therapy. Increases in INR and prothrombin time may lead to abnormal bleeding and even death. Patients treated with proton pump inhibitors and warfarin concomitantly may need to be monitored for increases in INR and prothrombin time.

Esomeprazole may potentially interfere with CYP2C19, the major esomeprazole metabolizing enzyme. Coadministration of esomeprazole 30 mg and diazepam, a CYP2C19 substrate, resulted in a 45% decrease in clearance of diazepam. Increased plasma levels of diazepam were observed 12 hours after dosing and onwards. However, at that time, the plasma levels of diazepam were below the therapeutic interval, and thus this interaction is unlikely to be of clinical relevance.

Coadministration of oral contraceptives, diazepam, phenytoin, or quinidine did not seem to change the pharmacokinetic profile of esomeprazole.

Studies evaluating concomitant administration of esomeprazole and either naproxen (non-selective NSAID) or rofecoxib (COX-2 selective NSAID) did not identify any clinically relevant changes in the pharmacokinetic profiles of esomeprazole or these NSAIDs.

Esomeprazole inhibits gastric acid secretion. Therefore, esomeprazole may interfere with the absorption of drugs where gastric pH is an important determinant of bioavailability (eg, ketoconazole, iron salts and digoxin).

Carcinogenesis, Mutagenesis, Impairment of Fertility

The carcinogenic potential of esomeprazole was assessed using omeprazole studies. In two 24-month oral carcinogenicity studies in rats, omeprazole at daily doses of 1.7, 3.4, 13.8, 44.0 and 140.8 mg/kg/day (about 0.7 to 57 times the human dose of 20 mg/day expressed on a body surface area basis) produced gastric ECL cell carcinoids in a dose-related manner in both male and female rats; the incidence of this effect was markedly higher in female rats, which had higher blood levels of omeprazole. Gastric carcinoids seldom occur in the untreated rat. In addition, ECL cell hyperplasia was present in all treated groups of both sexes. In one of these studies, female rats were treated with 13.8 mg omeprazole/kg/day (about 5.6 times the human dose on a body surface area basis) for 1 year, then followed for an additional year without the drug. No carcinoids were seen in these rats. An increased incidence of treatment-related ECL cell hyperplasia was observed at the end of 1 year (94% treated vs 10% controls). By the second year the difference between treated and control rats was much smaller (46% vs 26%) but still showed more hyperplasia in the treated group. Gastric adenocarcinoma was seen in one rat (2%). No similar tumor was seen in male or female rats treated for 2 years. For this

strain of rat no similar tumor has been noted historically, but a finding involving only one tumor is difficult to interpret. A 78-week oral mouse carcinogenicity study of omeprazole did not show increased tumor occurrence, but the study was not conclusive.

Esomeprazole was negative in the Ames mutation test, in the *in vivo* rat bone marrow cell chromosome aberration test, and the *in vivo* mouse micronucleus test. Esomeprazole, however, was positive in the *in vitro* human lymphocyte chromosome aberration test. Omeprazole was positive in the *in vitro* human lymphocyte chromosome aberration test, the *in vivo* mouse bone marrow cell chromosome aberration test, and the *in vivo* mouse micronucleus test.

The potential effects of esomeprazole on fertility and reproductive performance were assessed using omeprazole studies. Omeprazole at oral doses up to 138 mg/kg/day in rats (about 56 times the human dose on a body surface area basis) was found to have no effect on reproductive performance of parental animals.

Pregnancy

Teratogenic Effects. Pregnancy Category B

Teratology studies have been performed in rats at oral doses up to 280 mg/kg/day (about 57 times the human dose on a body surface area basis) and in rabbits at oral doses up to 86 mg/kg/day (about 35 times the human dose on a body surface area basis) and have revealed no evidence of impaired fertility or harm to the fetus due to esomeprazole. There are, however, no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed.

Teratology studies conducted with omeprazole in rats at oral doses up to 138 mg/kg/day (about 56 times the human dose on a body surface area basis) and in rabbits at doses up to 69 mg/kg/day (about 56 times the human dose on a body surface area basis) did not disclose any evidence for a teratogenic potential of omeprazole. In rabbits, omeprazole in a dose range of 6.9 to 69.1 mg/kg/day (about 5.5 to 56 times the human dose on a body surface area basis) produced dose-related increases in embryo-lethality, fetal resorptions, and pregnancy disruptions. In rats, dose-related embryo/fetal toxicity and postnatal developmental toxicity were observed in offspring resulting from parents treated with omeprazole at 13.8 to 138.0 mg/kg/day (about 5.6 to 56 times the human doses on a body surface area basis). There are no adequate and well-controlled studies in pregnant women. Sporadic reports have been received of congenital abnormalities occurring in infants born to women who have received omeprazole during pregnancy.

Nursing Mothers

The excretion of esomeprazole in milk has not been studied. However, omeprazole concentrations have been measured in breast milk of a woman following oral administration of 20 mg. Because esomeprazole is likely to be excreted in human milk, because of the potential for serious adverse reactions in nursing infants from esomeprazole, and because of the potential for tumorigenicity shown for omeprazole in rat carcinogenicity studies, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother.

Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

Geriatric Use

Of the total number of patients who received oral NEXIUM in clinical trials, 1,459 were 65 to 74 years of age and 354 patients were ≥ 75 years of age.

No overall differences in safety and efficacy were observed between the elderly and younger individuals, and other reported clinical experience has not identified differences in responses between the elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out.

ADVERSE REACTIONS

Safety Experience with Intravenous NEXIUM

The safety of intravenous esomeprazole is based on results from clinical trials conducted in three different populations including patients having symptomatic GERD with or without a history of erosive esophagitis (n=206), patients with erosive esophagitis (n=246) and healthy subjects (n=204). Adverse experiences occurring in $>1\%$ of patients treated with intravenous esomeprazole (n=359) in trials irrespective of the relationship to NEXIUM are listed below by body system:

Skin and appendages disorders: pruritus (1.1%); **Central and peripheral nervous system disorders:** dizziness (2.5%), headache (10.9%); **Gastrointestinal system disorders:** abdominal pain (5.8%), constipation (2.5%), diarrhea (3.9%), dyspepsia (6.4%), flatulence (10.3%), mouth dry (3.9%), nausea (6.4%); **Respiratory system disorders:** respiratory infection (1.1%), sinusitis (1.7%); **Body as a whole – general disorders:** AE associated with test procedure (23.1%); and **Application site disorders:** application site reaction (1.7%) (including mild focal erythema and pruritus at IV insertion site).

Intravenous treatment with esomeprazole 20 and 40 mg administered as an injection or as an infusion was found to have a safety profile similar to that of oral administration of esomeprazole 20 and 40 mg.

Safety Experience with Oral NEXIUM

The safety of oral NEXIUM was evaluated in over 15,000 patients (aged 18-84 years) in clinical trials worldwide including over 8,500 patients in the United States and over 2,600 patients in Europe and Canada. Over 6,500 patients were treated in long-term studies for up to 6-12 months.

The safety in the treatment of healing of erosive esophagitis was assessed in four randomized comparative clinical trials, which included 1,240 patients on NEXIUM 20 mg, 2,434 patients on NEXIUM 40 mg, and 3,008 patients on omeprazole 20 mg daily. The most frequently occurring adverse events ($\geq 1\%$) in all three groups was headache (5.5, 5.0, and 3.8, respectively) and diarrhea (no difference among the three groups). Nausea, flatulence, abdominal pain, constipation, and dry mouth occurred at similar rates among patients taking NEXIUM or omeprazole.

Additional adverse events that were reported as possibly or probably related to NEXIUM with an incidence $< 1\%$ are listed below by body system:

Body as a Whole: abdomen enlarged, allergic reaction, asthenia, back pain, chest pain, chest pain substernal, facial edema, peripheral edema, hot flushes, fatigue, fever, flu-like disorder, generalized edema, leg edema, malaise, pain, rigors; **Cardiovascular:** flushing, hypertension, tachycardia; **Endocrine:** goiter; **Gastrointestinal:** bowel irregularity, constipation aggravated, dyspepsia, dysphagia, dysplasia GI, epigastric pain, eructation, esophageal disorder, frequent stools, gastroenteritis, GI hemorrhage, GI symptoms not otherwise specified, hiccup, melena, mouth disorder, pharynx disorder, rectal disorder, serum gastrin increased, tongue disorder, tongue edema, ulcerative

stomatitis, vomiting; **Hearing:** earache, tinnitus; **Hematologic:** anemia, anemia hypochromic, cervical lymphadenopathy, epistaxis, leukocytosis, leukopenia, thrombocytopenia; **Hepatic:** bilirubinemia, hepatic function abnormal, SGOT increased, SGPT increased; **Metabolic/Nutritional:** glycosuria, hyperuricemia, hyponatremia, increased alkaline phosphatase, thirst, vitamin B12 deficiency, weight increase, weight decrease; **Musculoskeletal:** arthralgia, arthritis aggravated, arthropathy, cramps, fibromyalgia syndrome, hernia, polymyalgia rheumatica; **Nervous System/Psychiatric:** anorexia, apathy, appetite increased, confusion, depression aggravated, dizziness, hypertonia, nervousness, hypoesthesia, impotence, insomnia, migraine, migraine aggravated, paresthesia, sleep disorder, somnolence, tremor, vertigo, visual field defect; **Reproductive:** dysmenorrhea, menstrual disorder, vaginitis; **Respiratory:** asthma aggravated, coughing, dyspnea, larynx edema, pharyngitis, rhinitis, sinusitis; **Skin and Appendages:** acne, angioedema, dermatitis, pruritus, pruritus ani, rash, rash erythematous, rash maculo-papular, skin inflammation, sweating increased, urticaria; **Special Senses:** otitis media, parosmia, taste loss, taste perversion; **Urogenital:** abnormal urine, albuminuria, cystitis, dysuria, fungal infection, hematuria, micturition frequency, moniliasis, genital moniliasis, polyuria; **Visual:** conjunctivitis, vision abnormal.

Endoscopic findings that were reported as adverse events include: duodenitis, esophagitis, esophageal stricture, esophageal ulceration, esophageal varices, gastric ulcer, gastritis, hernia, benign polyps or nodules, Barrett's esophagus, and mucosal discoloration.

The incidence of treatment-related adverse events during 6-month maintenance treatment was similar to placebo. There were no differences in types of related adverse events seen during maintenance treatment up to 12 months compared to short-term treatment.

Two placebo-controlled studies were conducted in 710 patients for the treatment of symptomatic gastroesophageal reflux disease. The most common adverse events that were reported as possibly or probably related to NEXIUM were diarrhea (4.3%), headache (3.8%), and abdominal pain (3.8%).

Postmarketing Reports – There have been spontaneous reports of adverse events with postmarketing use of esomeprazole. These reports have included rare cases of anaphylactic reaction and severe dermatologic reactions, including toxic epidermal necrolysis (TEN, some fatal), Stevens-Johnson syndrome, and erythema multiforme, and pancreatitis.

Other adverse events not observed with NEXIUM, but occurring with omeprazole can be found in the omeprazole package insert, **ADVERSE REACTIONS** section.

Laboratory Events

The following potentially clinically significant laboratory changes in clinical trials, irrespective of relationship to NEXIUM, were reported in $\leq 1\%$ of patients: increased creatinine, uric acid, total bilirubin, alkaline phosphatase, ALT, AST, hemoglobin, white blood cell count, platelets, serum gastrin, potassium, sodium, thyroxine and thyroid stimulating hormone (see **CLINICAL PHARMACOLOGY**, *Endocrine Effects* for further information on thyroid effects). Decreases were seen in hemoglobin, white blood cell count, platelets, potassium, sodium, and thyroxine.

OVERDOSAGE

The minimum lethal dose of esomeprazole sodium in rats after bolus administration was 310 mg/kg (about 62 times the human dose on a body surface area basis). The major signs of acute toxicity were

reduced motor activity, changes in respiratory frequency, tremor, ataxia and intermittent clonic convulsions.

There have been some reports of overdosage with oral esomeprazole. Reports have been received of overdosage with oral omeprazole in humans. Doses ranged up to 2,400 mg (120 times the usual recommended clinical dose). Manifestations were variable, but included confusion, drowsiness, blurred vision, tachycardia, nausea, diaphoresis, flushing, headache, dry mouth, and other adverse reactions similar to those seen in normal clinical experience (see omeprazole package insert - **ADVERSE REACTIONS**). No specific antidote for esomeprazole is known. Since esomeprazole is extensively protein bound, it is not expected to be removed by dialysis. In the event of overdosage, treatment should be symptomatic and supportive.

As with the management of any overdose, the possibility of multiple drug ingestion should be considered. For current information on treatment of any drug overdose, a certified Regional Poison Control Center should be contacted. Telephone numbers are listed in the Physicians' Desk Reference (PDR) or local telephone book.

DOSAGE AND ADMINISTRATION

GERD with a history of Erosive Esophagitis

The recommended adult dose is either 20 or 40 mg esomeprazole given once daily by intravenous injection (no less than 3 minutes) or intravenous infusion (10 to 30 minutes).

NEXIUM I.V. for Injection should not be administered concomitantly with any other medications through the same intravenous site and or tubing. The intravenous line should always be flushed with either 0.9% Sodium Chloride Injection, USP, Lactated Ringer's Injection, USP or 5% Dextrose Injection, USP both prior to and after administration of NEXIUM I.V. for Injection.

Treatment with NEXIUM I.V. for Injection should be discontinued as soon as the patient is able to resume treatment with NEXIUM Delayed-Release Capsules.

Safety and efficacy of NEXIUM I.V. for Injection as a treatment of GERD patients with a history of erosive esophagitis for more than 10 days have not been demonstrated (see **INDICATIONS AND USAGE**).

Special Populations

Geriatric: No dosage adjustment is necessary. (See **CLINICAL PHARMACOLOGY, Pharmacokinetics.**)

Renal Insufficiency: No dosage adjustment is necessary. (See **CLINICAL PHARMACOLOGY, Pharmacokinetics.**)

Hepatic Insufficiency: No dosage adjustment is necessary in patients with mild to moderate liver impairment (Child Pugh Classes A and B). For patients with severe liver impairment (Child Pugh Class C), a dose of 20 mg of NEXIUM should not be exceeded (See **CLINICAL PHARMACOLOGY, Pharmacokinetics.**)

Gender: No dosage adjustment is necessary. (See **CLINICAL PHARMACOLOGY, Pharmacokinetics.**)

Preparations for use:

Intravenous Injection (20 or 40 mg) over no less than 3 minutes

The freeze-dried powder should be reconstituted with 5 mL of 0.9% Sodium Chloride Injection, USP. Withdraw 5 mL of the reconstituted solution and administer as an intravenous injection over no less than 3 minutes.

The reconstituted solution should be stored at room temperature up to 30°C (86°F) and administered within 12 hours after reconstitution. No refrigeration is required.

Intravenous Infusion (20 or 40 mg) over 10 to 30 minutes

A solution for intravenous infusion is prepared by first reconstituting the contents of one vial with 5 mL of 0.9% Sodium Chloride Injection, USP, Lactated Ringer's Injection, USP or 5% Dextrose Injection, USP and further diluting the resulting solution to a final volume of 50 mL. The solution (admixture) should be administered as an intravenous infusion over a period of 10 to 30 minutes.

The admixture should be stored at room temperature up to 30°C (86°F) and should be administered within the designated time period as listed in the Table below. No refrigeration is required.

Diluent	Administer within:
0.9% Sodium Chloride Injection, USP	12 hours
Lactated Ringer's Injection, USP	12 hours
5% Dextrose Injection, USP	6 hours

NEXIUM I.V. for Injection should not be administered concomitantly with any other medications through the same intravenous site and or tubing. The intravenous line should always be flushed with either 0.9% Sodium Chloride Injection, USP, Lactated Ringer's Injection, USP or 5% Dextrose Injection, USP both prior to and after administration of NEXIUM I.V. for Injection.

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whenever solution and container permit.

HOW SUPPLIED

NEXIUM I.V. for Injection is supplied as a freeze-dried powder containing 20 mg or 40 mg of esomeprazole per single-use vial.

NDC 0186-6020-01 one carton containing 10 vials of NEXIUM I.V. for Injection (each vial contains 20 mg of esomeprazole).

NDC 0186-6040-01 one carton containing 10 vials of NEXIUM I.V. for Injection (each vial contains 40 mg of esomeprazole).

Storage

Store at 25°C (77°F); excursions permitted to 15°-30°C (59°-86°F). [See USP Controlled Room Temperature]. Protect from light. Store in carton until time of use.

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Rev. 03/05

AstraZeneca 

