

LANSOPRAZOLE - lansoprazole capsule, delayed release
Physicians Total Care, Inc.

HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use lansoprazole delayed-release capsules USP safely and effectively. See full prescribing information for lansoprazole delayed-release capsules USP.

LANSOPRAZOLE delayed-release capsules USP for oral use

Initial U.S. Approval: 1995

----- **RECENT MAJOR CHANGES** -----

WARNINGS AND PRECAUTIONS

- Bone Fracture (5.2) 9/2010
- Hypomagnesemia (5.3) 5/2011

----- **INDICATIONS AND USAGE** -----

Lansoprazole is a proton pump inhibitor (PPI). Refer to **DOSAGE AND ADMINISTRATION** table (below) for indications and usage. (1)

----- **DOSAGE AND ADMINISTRATION** -----

Indication	Dose	Frequency
Duodenal Ulcers (1.1, 1.3)		
Short-Term Treatment	15 mg	Once daily for 4 wks
Maintenance of Healed	15 mg	Once daily
H. pylori Eradication to Reduce Recurrence of Duodenal Ulcer (1.2)		
Triple Therapy: Lansoprazole Delayed-Release Capsules USP Amoxicillin	30 mg	Twice daily for 10 or 14 days
Clarithromycin	1 gram 500 mg	
Dual Therapy: Lansoprazole Delayed-Release Capsules USP Amoxicillin	30 mg	Three times daily for 14 days
	1 gram	
Benign Gastric Ulcer (1.4)		
Short-Term Treatment	30 mg	Once daily up to 8 wks
NSAID-associated Gastric Ulcer (1.6)		
Healing	30 mg	Once daily for 8 wks
Risk Reduction	15 mg	Once daily up to 12 wks
GERD (1.7)		
Short-Term Treatment of Symptomatic GERD	15 mg	Once daily up to 8 wks
Short-Term Treatment of EE	30 mg	Once daily up to 8 wks
Pediatric (8.4)		
(1 to 11 years of age) Short-Term Treatment of Symptomatic GERD and Short-Term Treatment of EE		
≤ 30 kg	15 mg	Once daily up to 12 wks
> 30 kg	30 mg	Once daily up to 12 wks
(12 to 17 years of age) Short-Term Treatment of Symptomatic GERD		
Nonerosive GERD	15 mg	Once daily up to 8 wks
EE	30 mg	Once daily up to 8 wks
Maintenance of Healing of EE (1.8)	15 mg	Once daily
Pathological Hypersecretory Conditions (i.e., ZES) (1.9)	60 mg	Once daily

----- **DOSAGE FORMS AND STRENGTHS** -----

Capsules: 15 mg and 30 mg. (3)

----- **CONTRAINDICATIONS** -----

Contraindicated in patients with known severe hypersensitivity to any component of the lansoprazole delayed-release capsule formulation. (4)

----- **WARNINGS AND PRECAUTIONS** -----

- Symptomatic response with lansoprazole does not preclude the presence of gastric malignancy. (5.1)
- Bone Fracture: Long-term and multiple daily dose PPI therapy may be associated with an increased risk for osteoporosis-related fractures of the hip, wrist or spine. (5.2)
- Hypomagnesemia has been reported rarely with prolonged treatment with PPIs. (5.3)

----- **ADVERSE REACTIONS** -----

Most commonly reported adverse reactions ($\geq 1\%$): diarrhea, abdominal pain, nausea and constipation. (6)

To report SUSPECTED ADVERSE REACTIONS, contact TEVA USA, PHARMACOVIGILANCE at 1-888-838-2872, X6351 or drug.safety@tevapharm.com; or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

----- **DRUG INTERACTIONS** -----

- Do not coadminister with atazanavir. (7)
- May interfere with the absorption of drugs where gastric pH is important for bioavailability. (7)
- Concomitant warfarin use may require monitoring for increases in INR and prothrombin time. (7)
- Concomitant tacrolimus use may increase tacrolimus whole blood concentrations. (7)
- Titration of theophylline dosage may be required when concomitant lansoprazole use is started or stopped. (7)

----- **USE IN SPECIFIC POPULATIONS** -----

- Consider dose adjustment in patients with severe liver impairment. (8.7)

See 17 for **PATIENT COUNSELING INFORMATION** and **FDA-approved patient labeling**.

Revised: 1/2012

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* Sections or subsections omitted from the full prescribing information are not listed.

FULL PRESCRIBING INFORMATION

1 INDICATIONS AND USAGE

1.1 Short-Term Treatment of Active Duodenal Ulcer

Lansoprazole delayed-release capsules are indicated for short-term treatment (for 4 weeks) for healing and symptom relief of active duodenal ulcer [see *Clinical Studies (14)*].

1.2 *H. pylori* Eradication to Reduce the Risk of Duodenal Ulcer Recurrence

Triple Therapy: Lansoprazole delayed-release capsules/amoxicillin/clarithromycin

Lansoprazole delayed-release capsules in combination with amoxicillin plus clarithromycin as triple therapy is indicated for the treatment of patients with *H. pylori* infection and duodenal ulcer disease (active or one-year history of a duodenal ulcer) to eradicate *H. pylori*. Eradication of *H. pylori* has been shown to reduce the risk of duodenal ulcer recurrence [see *Clinical Studies (14)*].

Please refer to the full prescribing information for amoxicillin and clarithromycin.

Dual Therapy: Lansoprazole delayed-release capsules/amoxicillin

Lansoprazole delayed-release capsules in combination with amoxicillin as dual therapy is indicated for the treatment of patients with *H. pylori* infection and duodenal ulcer disease (active or one-year history of a duodenal ulcer) **who are either allergic or intolerant to clarithromycin or in whom resistance to clarithromycin is known or suspected** (see the clarithromycin package insert, MICROBIOLOGY section). Eradication of *H. pylori* has been shown to reduce the risk of duodenal ulcer recurrence [see *Clinical Studies (14)*].

Please refer to the full prescribing information for amoxicillin.

1.3 Maintenance of Healed Duodenal Ulcers

Lansoprazole delayed-release capsules are indicated to maintain healing of duodenal ulcers. Controlled studies do not extend beyond 12 months [see *Clinical Studies (14)*].

1.4 Short-Term Treatment of Active Benign Gastric Ulcer

Lansoprazole delayed-release capsules are indicated for short-term treatment (up to 8 weeks) for healing and symptom relief of active benign gastric ulcer [see *Clinical Studies (14)*].

1.5 Healing of NSAID-Associated Gastric Ulcer

Lansoprazole delayed-release capsules are indicated for the treatment of NSAID-associated gastric ulcer in patients who continue NSAID use. Controlled studies did not extend beyond 8 weeks [see *Clinical Studies (14)*].

1.6 Risk Reduction of NSAID-Associated Gastric Ulcer

Lansoprazole delayed-release capsules are indicated for reducing the risk of NSAID-associated gastric ulcers in patients with a history of a documented gastric ulcer who require the use of an NSAID. Controlled studies did not extend beyond 12 weeks [see *Clinical Studies (14)*].

1.7 Gastroesophageal Reflux Disease (GERD)

Short-Term Treatment of Symptomatic GERD

Lansoprazole delayed-release capsules are indicated for the treatment of heartburn and other symptoms associated with GERD [see *Clinical Studies (14)*].

Short-Term Treatment of Erosive Esophagitis

Lansoprazole delayed-release capsules are indicated for short-term treatment (up to 8 weeks) for healing and symptom relief of all grades of erosive esophagitis. For patients who do not heal with lansoprazole delayed-release capsules for 8 weeks (5 to 10%), it may be helpful to give an additional 8 weeks of treatment. If there is a recurrence of erosive esophagitis an additional 8 week course of lansoprazole delayed-release capsules may be considered [see *Clinical Studies (14)*].

1.8 Maintenance of Healing of Erosive Esophagitis (EE)

Lansoprazole delayed-release capsules are indicated to maintain healing of erosive esophagitis. Controlled studies did not extend beyond 12 months [see *Clinical Studies (14)*].

1.9 Pathological Hypersecretory Conditions Including Zollinger-Ellison Syndrome (ZES)

Lansoprazole delayed-release capsules are indicated for the long-term treatment of pathological hypersecretory conditions, including Zollinger-Ellison syndrome [see *Clinical Studies (14)*].

2 DOSAGE AND ADMINISTRATION

Lansoprazole delayed-release capsules USP are available in 15 mg and 30 mg strengths. Directions for use specific to the route and available methods of administration for this dosage form is presented below. Lansoprazole delayed-release capsules USP should be taken before eating. Lansoprazole delayed-release capsules USP SHOULD NOT BE CRUSHED OR CHEWED. In the clinical trials, antacids were used concomitantly with lansoprazole.

2.1 Recommended Dose

Indication	Recommended Dose	Frequency
Duodenal Ulcers		
Short-Term Treatment	15 mg	Once daily for 4 weeks
Maintenance of Healed	15 mg	Once daily
<i>H. pylori</i> Eradication to Reduce the Risk of Duodenal Ulcer Recurrence		
Triple Therapy:		
Lansoprazole Delayed-Release Capsules USP	30 mg	Twice daily (q12h) for 10 or 14 days
Amoxicillin	1 gram	Twice daily (q12h) for 10 or 14 days
Clarithromycin	500 mg	Twice daily (q12h) for 10 or 14 days
Dual Therapy:		
Lansoprazole Delayed-Release Capsules USP	30 mg	Three times daily (q8h) for 14 days
Amoxicillin	1 gram	Three times daily (q8h) for 14 days
Benign Gastric Ulcer		
Short-Term Treatment	30 mg	Once daily for up to 8 weeks
NSAID-associated Gastric Ulcer		
Healing	30 mg	Once daily for 8 weeks*

Risk Reduction	15 mg	Once daily for up to 12 weeks*
Gastroesophageal Reflux Disease (GERD)		
Short-Term Treatment of Symptomatic GERD	15 mg	Once daily for up to 8 weeks
Short-Term Treatment of Erosive Esophagitis	30 mg	Once daily for up to 8 weeks
Pediatric		
(1 to 11 years of age)		
Short-Term Treatment of Symptomatic GERD and Short-Term Treatment of Erosive Esophagitis		
≤ 30 kg	15 mg	Once daily for up to 12 weeks†
> 30 kg	30 mg	Once daily for up to 12 weeks†
(12 to 17 years of age)		
Short-Term Treatment of Symptomatic GERD		
Nonerosive GERD	15 mg	Once daily for up to 8 weeks
Erosive Esophagitis	30 mg	Once daily for up to 8 weeks
Maintenance of Healing of Erosive Esophagitis	15 mg	Once daily
Pathological Hypersecretory Conditions Including Zollinger-Ellison syndrome	60 mg	Once daily
* Controlled studies did not extend beyond indicated duration.		
† The lansoprazole dose was increased (up to 30 mg twice daily) in some pediatric patients after 2 or more weeks of treatment if they remained symptomatic. For pediatric patients unable to swallow an intact capsule please see Administration Options.		

Patients should be instructed that if a dose is missed, it should be taken as soon as possible. However, if the next scheduled dose is due, the patient should not take the missed dose, and should be instructed to take the next dose on time. Patients should be instructed not to take 2 doses at one time to make up for a missed dose.

2.2 Special Populations

Renal impairment patients and geriatric patients do not require dosage adjustment. However, consider dose adjustment in patients with severe liver impairment [see *Use in Specific Populations (8.5, 8.6 and 8.7)*].

2.3 Important Administration Information

Administration Options

Lansoprazole Delayed-Release Capsules USP - Oral Administration

- Lansoprazole delayed-release capsules USP should be swallowed whole.
- Alternatively, for patients who have difficulty swallowing capsules, lansoprazole delayed-release capsules USP can be opened and administered as follows:
 - Open capsule.
 - Sprinkle intact granules on one tablespoon of either applesauce, ENSURE[®] pudding, cottage cheese, yogurt or strained pears.
 - Swallow immediately.
- Lansoprazole delayed-release capsules USP may also be emptied into a small volume of either apple juice, orange juice or tomato juice and administered as follows:
 - Open capsule.
 - Sprinkle intact granules into a small volume of either apple juice, orange juice or tomato juice (60 mL — approximately 2 ounces).
 - Mix briefly.
 - Swallow immediately.
 - To ensure complete delivery of the dose, the glass should be rinsed with two or more volumes of juice and the contents swallowed immediately.

Lansoprazole Delayed-Release Capsules USP - Nasogastric Tube (≥ 16 French) Administration

- For patients who have a nasogastric tube in place, lansoprazole delayed-release capsules USP can be administered as follows:
 - Open capsule.
 - Mix intact granules into 40 mL of apple juice. DO NOT USE OTHER LIQUIDS.
 - Inject through the nasogastric tube into the stomach.
 - Flush with additional apple juice to clear the tube.

USE IN OTHER FOODS AND LIQUIDS HAS NOT BEEN STUDIED CLINICALLY AND IS THEREFORE NOT RECOMMENDED.

3 DOSAGE FORMS AND STRENGTHS

-
- 15 mg are hard gelatin capsules, with a light-blue opaque cap and flesh-colored opaque body, imprinted with “93” and “7350” on the other side.
- 30 mg are hard gelatin capsules, with a light-gray opaque cap and flesh-colored opaque body, imprinted with “93” and “7351” on the other side.

4 CONTRAINDICATIONS

Lansoprazole delayed-release capsules are contraindicated in patients with known severe hypersensitivity to any component of the formulation of lansoprazole delayed-release capsules. For information on contraindications for amoxicillin or clarithromycin, refer to their full prescribing information, CONTRAINDICATIONS sections.

5 WARNINGS AND PRECAUTIONS

5.1 Gastric Malignancy

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

5.2 Bone Fracture

Several published observational studies suggest that proton pump inhibitor (PPI) therapy may be associated with an increased risk for osteoporosis-related fractures of the hip, wrist or spine. 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 osteoporosis-related fractures should be managed according to established treatment guidelines [see *Dosage and Administration (2) and Adverse Reactions (6.2)*].

For information on warnings and precautions for amoxicillin or clarithromycin, refer to their full prescribing information, WARNINGS and PRECAUTIONS sections.

5.3 Hypomagnesemia

Hypomagnesemia, symptomatic and asymptomatic, has been reported rarely in patients treated with PPIs for at least three months, in most cases after a year of therapy. Serious adverse events include tetany, arrhythmias, and seizures. In most patients, treatment of hypomagnesemia required magnesium replacement and discontinuation of the PPI.

For patients expected to be on prolonged treatment or who take PPIs with medications such as digoxin or drugs that may cause hypomagnesemia (e.g., diuretics), health care professionals may consider monitoring magnesium levels prior to initiation of PPI treatment and periodically [see *Adverse Reactions (6.2)*].

6 ADVERSE REACTIONS

6.1 Clinical

Worldwide, over 10,000 patients have been treated with lansoprazole in Phase 2 or Phase 3 clinical trials involving various dosages and durations of treatment. In general, lansoprazole treatment has been well-tolerated in both short-term and long-term trials.

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in clinical practice.

The following adverse reactions were reported by the treating physician to have a possible or probable relationship to drug in 1% or more of lansoprazole-treated patients and occurred at a greater rate in lansoprazole-treated patients than placebo-treated patients in **Table 1**.

Table 1: Incidence of Possibly or Probably Treatment-Related Adverse Reactions in Short-Term, Placebo-Controlled Lansoprazole Studies

Body System/Adverse Event	Lansoprazole (N = 2768) %	Placebo (N = 1023) %
Body as a Whole		
Abdominal Pain	2.1	1.2
Digestive System		
Constipation	1.0	0.4
Diarrhea	3.8	2.3
Nausea	1.3	1.2

Headache was also seen at greater than 1% incidence but was more common on placebo. The incidence of diarrhea was similar between patients who received placebo and patients who received 15 mg and 30 mg of lansoprazole, but higher in the patients who received 60 mg of lansoprazole (2.9%, 1.4%, 4.2%, and 7.4%, respectively).

The most commonly reported possibly or probably treatment-related adverse event during maintenance therapy was diarrhea.

In the risk reduction study of lansoprazole for NSAID-associated gastric ulcers, the incidence of diarrhea for patients treated with lansoprazole, misoprostol, and placebo was 5%, 22%, and 3%, respectively.

Another study for the same indication, where patients took either a COX-2 inhibitor or lansoprazole and naproxen, demonstrated that the safety profile was similar to the prior study. Additional reactions from this study not previously observed in other clinical trials with lansoprazole included contusion, duodenitis, epigastric discomfort, esophageal disorder, fatigue, hunger, hiatal hernia, hoarseness, impaired gastric emptying, metaplasia, and renal impairment.

Additional adverse experiences occurring in less than 1% of patients or subjects who received lansoprazole in domestic trials are shown below:

Body as a Whole - abdomen enlarged, allergic reaction, asthenia, back pain, candidiasis, carcinoma, chest pain (not otherwise specified), chills, edema, fever, flu syndrome, halitosis, infection (not otherwise specified), malaise, neck pain, neck rigidity, pain, pelvic pain

Cardiovascular System - angina, arrhythmia, bradycardia, cerebrovascular accident/cerebral infarction, hypertension/hypotension, migraine, myocardial infarction, palpitations, shock (circulatory failure), syncope, tachycardia, vasodilation

Digestive System - abnormal stools, anorexia, bezoar, cardiospasm, cholelithiasis, colitis, dry mouth, dyspepsia, dysphagia, enteritis, eructation, esophageal stenosis, esophageal ulcer, esophagitis, fecal discoloration, flatulence, gastric nodules/fundic gland polyps, gastritis, gastroenteritis, gastrointestinal anomaly, gastrointestinal disorder, gastrointestinal hemorrhage, glossitis, gum hemorrhage, hematemesis, increased appetite, increased salivation, melena, mouth ulceration, nausea and vomiting, nausea and vomiting and diarrhea, gastrointestinal moniliasis, rectal disorder, rectal hemorrhage, stomatitis, tenesmus, thirst, tongue disorder, ulcerative colitis, ulcerative stomatitis

Endocrine System - diabetes mellitus, goiter, hypothyroidism

Hemic and Lymphatic System - anemia, hemolysis, lymphadenopathy

Metabolism and Nutritional Disorders - avitaminosis, gout, dehydration, hyperglycemia/hypoglycemia, peripheral edema, weight gain/loss

Musculoskeletal System - arthralgia, arthritis, bone disorder, joint disorder, leg cramps, musculoskeletal pain, myalgia, myasthenia, ptosis, synovitis

Nervous System - abnormal dreams, agitation, amnesia, anxiety, apathy, confusion, convulsion, dementia, depersonalization, depression, diplopia, dizziness, emotional lability, hallucinations, hemiplegia, hostility aggravated, hyperkinesia, hypertonia, hypesthesia, insomnia, libido decreased/increased, nervousness, neurosis, paresthesia, sleep disorder, somnolence, thinking abnormality, tremor, vertigo

Respiratory System - asthma, bronchitis, cough increased, dyspnea, epistaxis, hemoptysis, hiccup, laryngeal neoplasia, lung fibrosis, pharyngitis, pleural disorder, pneumonia, respiratory disorder, upper respiratory inflammation/infection, rhinitis, sinusitis, stridor

Skin and Appendages - acne, alopecia, contact dermatitis, dry skin, fixed eruption, hair disorder, maculopapular rash, nail disorder, pruritus, rash, skin carcinoma, skin disorder, sweating, urticaria

Special Senses - abnormal vision, amblyopia, blepharitis, blurred vision, cataract, conjunctivitis, deafness, dry eyes, ear/eye disorder, eye pain, glaucoma, otitis media, parosmia, photophobia, retinal

degeneration/disorder, taste loss, taste perversion, tinnitus, visual field defect

Urogenital System - abnormal menses, breast enlargement, breast pain, breast tenderness, dysmenorrhea, dysuria, gynecomastia, impotence, kidney calculus, kidney pain, leukorrhea, menorrhagia, menstrual disorder, penis disorder, polyuria, testis disorder, urethral pain, urinary frequency, urinary retention, urinary tract infection, urinary urgency, urination impaired, vaginitis.

6.2 Postmarketing Experience

Additional adverse experiences have been reported since lansoprazole has been marketed. The majority of these cases are foreign-sourced and a relationship to lansoprazole has not been established. Because these reactions were reported voluntarily from a population of unknown size, estimates of frequency cannot be made. These events are listed below by COSTART body system.

Body as a Whole - anaphylactic/anaphylactoid reactions; *Digestive System* - hepatotoxicity, pancreatitis, vomiting; *Hemic and Lymphatic System* - agranulocytosis, aplastic anemia, hemolytic anemia, leukopenia, neutropenia, pancytopenia, thrombocytopenia, and thrombotic thrombocytopenic purpura; *Metabolism and Nutritional Disorders* – hypomagnesemia; *Musculoskeletal System*- bone fracture, myositis; *Skin and Appendages* - severe dermatologic reactions including erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis (some fatal); *Special Senses* - speech disorder; *Urogenital System* - interstitial nephritis, urinary retention.

6.3 Combination Therapy With Amoxicillin and Clarithromycin

In clinical trials using combination therapy with lansoprazole plus amoxicillin and clarithromycin, and lansoprazole plus amoxicillin, no adverse reactions peculiar to these drug combinations were observed. Adverse reactions that have occurred have been limited to those that had been previously reported with lansoprazole, amoxicillin, or clarithromycin.

Triple Therapy: Lansoprazole/amoxicillin/clarithromycin

The most frequently reported adverse reactions for patients who received triple therapy for 14 days were diarrhea (7%), headache (6%), and taste perversion (5%). There were no statistically significant differences in the frequency of reported adverse reactions between the 10 and 14 day triple therapy regimens. No treatment-emergent adverse reactions were observed at significantly higher rates with triple therapy than with any dual therapy regimen.

Dual Therapy: Lansoprazole/amoxicillin

The most frequently reported adverse reactions for patients who received lansoprazole three times daily plus amoxicillin three times daily dual therapy were diarrhea (8%) and headache (7%). No treatment-emergent adverse reactions were observed at significantly higher rates with lansoprazole three times daily plus amoxicillin three times daily dual therapy than with lansoprazole alone.

For information on adverse reactions with amoxicillin or clarithromycin, refer to their full prescribing information, ADVERSE REACTIONS sections.

6.4 Laboratory Values

The following changes in laboratory parameters in patients who received lansoprazole were reported as adverse reactions:

Abnormal liver function tests, increased SGOT (AST), increased SGPT (ALT), increased creatinine, increased alkaline phosphatase, increased globulins, increased GGTP, increased/decreased/abnormal WBC, abnormal AG ratio, abnormal RBC, bilirubinemia, blood potassium increased, blood urea increased, crystal urine present, eosinophilia, hemoglobin decreased, hyperlipemia, increased/decreased electrolytes, increased/decreased cholesterol, increased glucocorticoids, increased LDH, increased/decreased/abnormal platelets, increased gastrin levels and positive fecal occult blood. Urine abnormalities such as albuminuria, glycosuria, and hematuria were also reported.

Additional isolated laboratory abnormalities were reported.

In the placebo controlled studies, when SGOT (AST) and SGPT (ALT) were evaluated, 0.4% (4/978) and 0.4% (11/2677) patients, who received placebo and lansoprazole, respectively, had enzyme elevations greater than three times the upper limit of normal range at the final treatment visit. None of these patients who received lansoprazole reported jaundice at any time during the study.

In clinical trials using combination therapy with lansoprazole plus amoxicillin and clarithromycin, and lansoprazole plus amoxicillin, no increased laboratory abnormalities particular to these drug combinations were observed.

For information on laboratory value changes with amoxicillin or clarithromycin, refer to their full prescribing information, ADVERSE REACTIONS sections.

7 DRUG INTERACTIONS

7.1 Drugs With pH-Dependent Absorption Kinetics

Lansoprazole causes long-lasting inhibition of gastric acid secretion. Lansoprazole and other PPIs are likely to substantially decrease the systemic concentrations of the HIV protease inhibitor atazanavir, which is dependent upon the presence of gastric acid for absorption, and may result in a loss of therapeutic effect of atazanavir and the development of HIV resistance. Therefore, lansoprazole and other PPIs should not be coadministered with atazanavir [see *Clinical Pharmacology (12.3)*].

Lansoprazole and other PPIs may interfere with the absorption of other drugs where gastric pH is an important determinant of oral bioavailability (e.g., ampicillin esters, digoxin, iron salts, ketoconazole) [see *Clinical Pharmacology (12.3)*].

7.2 Warfarin

In a study of healthy subjects, coadministration of single or multiple 60 mg doses of lansoprazole and warfarin did not affect the pharmacokinetics of warfarin nor prothrombin time [see *Clinical Pharmacology (12.3)*]. However, there have been reports of increased INR and prothrombin time in patients receiving PPIs and warfarin concomitantly. Increases in INR and prothrombin time may lead to abnormal bleeding and even death. Patients treated with PPIs and warfarin concomitantly may need to be monitored for increases in INR and prothrombin time [see *Clinical Pharmacology (12.3)*].

7.3 Tacrolimus

Concomitant administration of lansoprazole and tacrolimus may increase whole blood levels of tacrolimus, especially in transplant patients who are intermediate or poor metabolizers of CYP2C19.

7.4 Theophylline

A minor increase (10%) in the clearance of theophylline was observed following the administration of lansoprazole concomitantly with theophylline. Although the magnitude of the effect on theophylline clearance is small, individual patients may require additional titration of their theophylline dosage when lansoprazole is started or stopped to ensure clinically effective blood levels [see *Clinical Pharmacology (12.3)*].

For information on drug interactions for amoxicillin or clarithromycin, refer to their full prescribing information, DRUG INTERACTIONS sections.

7.5 Clopidogrel

Concomitant administration of lansoprazole and clopidogrel in healthy subjects had no clinically important effect on exposure to the active metabolite of clopidogrel or clopidogrel-induced platelet inhibition [see *Clinical Pharmacology (12.3)*]. No dose adjustment of clopidogrel is necessary when administered with an approved dose of lansoprazole.

For information on drug interactions for amoxicillin or clarithromycin, refer to their full prescribing information, DRUG INTERACTIONS sections.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Teratogenic Effects

Pregnancy category B

Reproduction studies have been performed in pregnant rats at oral doses up to 40 times the recommended human dose and in pregnant rabbits at oral doses up to 16 times the recommended human dose and have revealed no evidence of impaired fertility or harm to the fetus due to lansoprazole. There are, however, no adequate or 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 [see *Nonclinical Toxicology (13.2)*].

See full prescribing information for clarithromycin before using in pregnant women.

8.3 Nursing Mothers

Lansoprazole or its metabolites are excreted in the milk of rats. It is not known whether lansoprazole is excreted in human milk. Because many drugs are excreted in human milk, because of the potential for serious adverse reactions in nursing infants from lansoprazole, and because of the potential for tumorigenicity shown for lansoprazole in rat carcinogenicity studies, a decision should be made whether to discontinue nursing or to discontinue lansoprazole, taking into account the importance of lansoprazole to the mother.

8.4 Pediatric Use

The safety and effectiveness of lansoprazole have been established in pediatric patients 1 to 17 years of age for short-term treatment of symptomatic GERD and erosive esophagitis.

One to 11 years of age

In an uncontrolled, open-label, U.S. multicenter study, 66 pediatric patients (1 to 11 years of age) with GERD were assigned, based on body weight, to receive an initial dose of either lansoprazole 15 mg daily if ≤ 30 kg or lansoprazole 30 mg daily if greater than 30 kg administered for 8 to 12 weeks. The lansoprazole dose was increased (up to 30 mg twice daily) in 24 of 66 pediatric patients after 2 or more weeks of treatment if they remained symptomatic. At baseline 85% of patients had mild to moderate overall GERD symptoms (assessed by investigator interview), 58% had non-erosive GERD and 42% had erosive esophagitis (assessed by endoscopy).

After 8 to 12 weeks of lansoprazole treatment, the intent-to-treat analysis demonstrated an approximate 50% reduction in frequency and severity of GERD symptoms.

Twenty-one of 27 erosive esophagitis patients were healed at 8 weeks and 100% of patients were healed at 12 weeks by endoscopy (**Table 2**).

Table 2: GERD Symptom Improvement and Erosive Esophagitis Healing Rates in Pediatric Patients Age 1 to 11

GERD	Final Visit % (n/N)
Symptomatic GERD	
Improvement in Overall GERD Symptoms*	76% (47/62)
Erosive Esophagitis	

Improvement in Overall GERD Symptoms*	81% (22/27)
Healing Rate	100% (27/27)
* Symptoms assessed by patients diary kept by caregiver.	

In a study of 66 pediatric patients in the age group 1 year to 11 years old after treatment with lansoprazole given orally in doses of 15 mg daily to 30 mg twice daily, increases in serum gastrin levels were similar to those observed in adult studies. Median fasting serum gastrin levels increased 89% from 51 pg/mL at baseline to 97 pg/mL [interquartile range (25th to 75th percentile) of 71 to 130 pg/mL] at the final visit.

The pediatric safety of lansoprazole delayed-release capsules has been assessed in 66 pediatric patients aged 1 to 11 years of age. Of the 66 patients with GERD 85% (56/66) took lansoprazole for 8 weeks and 15% (10/66) took it for 12 weeks.

The most frequently reported (2 or more patients) treatment-related adverse reactions in patients 1 to 11 years of age (N = 66) were constipation (5%) and headache (3%).

Twelve to 17 years of age

In an uncontrolled, open-label, U.S. multicenter study, 87 adolescent patients (12 to 17 years of age) with symptomatic GERD were treated with lansoprazole for 8 to 12 weeks. Baseline upper endoscopies classified these patients into two groups: 64 (74%) nonerosive GERD and 23 (26%) erosive esophagitis (EE). The nonerosive GERD patients received lansoprazole 15 mg daily for 8 weeks and the EE patients received lansoprazole 30 mg daily for 8 to 12 weeks. At baseline, 89% of these patients had mild to moderate overall GERD symptoms (assessed by investigator interviews). During 8 weeks of lansoprazole treatment, adolescent patients experienced a 63% reduction in frequency and a 69% reduction in severity of GERD symptoms based on diary results.

Twenty-one of 22 (95.5%) adolescent erosive esophagitis patients were healed after 8 weeks of lansoprazole treatment. One patient remained unhealed after 12 weeks of treatment (**Table 3**).

Table 3: GERD Symptom Improvement and Erosive Esophagitis Healing Rates in Pediatric Patients Age 12 to 17

GERD	Final Visit % (n/N)
Symptomatic GERD (All Patients)	
Improvement in Overall GERD Symptoms*	73.2% (60/82) [†]
Nonerosive GERD	
Improvement in Overall GERD Symptoms*	71.2% (42/59) [†]
Erosive Esophagitis	
Improvement in Overall GERD Symptoms*	78.3% (18/23)
Healing Rate [‡]	95.5% (21/22) [‡]
* Symptoms assessed by patient diary (parents/caregivers as necessary).	
[†] No data available for 5 patients.	
[‡] Data from one healed patient was excluded from this analysis due to timing of final endoscopy.	

In these 87 adolescent patients, increases in serum gastrin levels were similar to those observed in adult

studies, median fasting serum gastrin levels increased 42% from 45 pg/mL at baseline to 64 pg/mL [interquartile range (25th to 75th percentile) of 44 to 88 pg/mL] at the final visit. (Normal serum gastrin levels are 25 to 111 pg/mL.)

The safety of lansoprazole delayed-release capsules has been assessed in these 87 adolescent patients. Of the 87 adolescent patients with GERD, 6% (5/87) took lansoprazole delayed-release capsules for less than 6 weeks, 93% (81/87) for 6 to 10 weeks, and 1% (1/87) for greater than 10 weeks.

The most frequently reported (at least 3%) treatment-related adverse reactions in these patients were headache (7%), abdominal pain (5%), nausea (3%) and dizziness (3%). Treatment-related dizziness, reported in this package insert as occurring in less than 1% of adult patients, was reported in this study by 3 adolescent patients with nonerosive GERD, who had dizziness concurrently with other reactions (such as migraine, dyspnea, and vomiting).

8.5 Geriatric Use

No dosage adjustment of lansoprazole is necessary in geriatric patients. The incidence rates of lansoprazole-associated adverse reactions and laboratory test abnormalities are similar to those seen in younger patients [see *Clinical Pharmacology* (12.3)].

8.6 Renal Impairment

No dosage adjustment of lansoprazole is necessary in patients with renal impairment. The pharmacokinetics of lansoprazole in patients with various degrees of renal impairment were not substantially different compared to those in subjects with normal renal function [see *Clinical Pharmacology* (12.3)].

8.7 Hepatic Impairment

In patients with various degrees of chronic hepatic impairment, an increase in the mean AUC of up to 500% was observed at steady state compared to healthy subjects. Consider dose reduction in patients with severe hepatic impairment [see *Clinical Pharmacology* (12.3)].

8.8 Gender

Over 4,000 women were treated with lansoprazole. Ulcer healing rates in females were similar to those in males. The incidence rates of adverse reactions in females were similar to those seen in males [see *Clinical Pharmacology* (12.3)].

8.9 Race

The pooled mean pharmacokinetic parameters of lansoprazole from twelve U.S. Phase 1 studies (N = 513) were compared to the mean pharmacokinetic parameters from two Asian studies (N = 20). The mean AUCs of lansoprazole in Asian subjects were approximately twice those seen in pooled U.S. data; however, the inter-individual variability was high. The C_{max} values were comparable.

10 OVERDOSAGE

Lansoprazole is not removed from the circulation by hemodialysis. In one reported overdose, a patient consumed 600 mg of lansoprazole with no adverse reaction. Oral lansoprazole doses up to 5000 mg/kg in rats [approximately 1300 times the 30 mg human dose based on body surface area (BSA)] and in mice (about 675.7 times the 30 mg human dose based on BSA) did not produce deaths or any clinical signs.

11 DESCRIPTION

The active ingredient in lansoprazole delayed-release capsules USP is lansoprazole, a substituted benzimidazole, 2-[[[3-methyl-4-(2,2,2-trifluoroethoxy)-2-pyridyl]methyl]sulfinyl] benzimidazole, a compound that inhibits gastric acid secretion. Lansoprazole has the following structure:

C₁₆H₁₄F₃N₃O₂S M.W. 369.36

Lansoprazole is a white to brownish-white odorless crystalline powder which melts with decomposition at approximately 166°C. Lansoprazole is freely soluble in dimethylformamide; soluble in methanol; sparingly soluble in ethanol; slightly soluble in ethyl acetate, dichloromethane and acetonitrile; very slightly soluble in ether; and practically insoluble in hexane and water.

Lansoprazole is stable when exposed to light for up to two months. The rate of degradation of the compound in aqueous solution increases with decreasing pH. The degradation half-life of the drug substance in aqueous solution at 25°C is approximately 0.5 hour at pH 5.0 and approximately 18 hours at pH 7.0.

The lansoprazole delayed-release capsules USP for oral administration are available in two dosage strengths: 15 mg and 30 mg of lansoprazole per capsule. Each delayed-release capsule contains enteric-coated granules consisting of 15 mg or 30 mg of lansoprazole (active ingredient) and the following inactive ingredients: black iron oxide, gelatin, hypromellose, magnesium carbonate, methacrylic acid copolymer dispersion, propylene glycol, red iron oxide, shellac, sugar spheres (which contain sucrose and corn starch), talc, titanium dioxide, and triethyl citrate. Additionally, 15 mg capsule contains brilliant blue FCF - FD&C blue 1. The imprinting ink may contain potassium hydroxide.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

Lansoprazole belongs to a class of antisecretory compounds, the substituted benzimidazoles, that suppress gastric acid secretion by specific inhibition of the (H⁺, K⁺)-ATPase enzyme system at the secretory surface of the gastric parietal cell. Because this enzyme system is regarded as the acid (proton) pump within the parietal cell, lansoprazole has been characterized as a gastric acid-pump inhibitor, in that it blocks the final step of acid production. This effect is dose-related and leads to inhibition of both basal and stimulated gastric acid secretion irrespective of the stimulus. Lansoprazole does not exhibit anticholinergic or histamine type-2 antagonist activity.

12.2 Pharmacodynamics

Antisecretory Activity: After oral administration, lansoprazole was shown to significantly decrease the basal acid output and significantly increase the mean gastric pH and percent of time the gastric pH was greater than 3 and greater than 4. Lansoprazole also significantly reduced meal-stimulated gastric acid output and secretion volume, as well as pentagastrin-stimulated acid output. In patients with hypersecretion of acid, lansoprazole significantly reduced basal and pentagastrin-stimulated gastric acid secretion. Lansoprazole inhibited the normal increases in secretion volume, acidity and acid output induced by insulin.

The intragastric pH results of a five-day, pharmacodynamic, crossover study of 15 mg and 30 mg of once daily lansoprazole are presented in **Table 4**:

Table 4: Mean Antisecretory Effects After Single and Multiple Daily Lansoprazole Dosing

Parameter	Baseline Value	Lansoprazole			
		15 mg		30 mg	
		Day 1	Day 5	Day 1	Day 5
Mean 24 Hour pH	2.1	2.7*	4.0*	3.6 [†]	4.9 [†]
Mean Nighttime pH	1.9	2.4	3.0*	2.6	3.8 [†]
% Time Gastric pH > 3	18	33*	59*	51 [†]	72 [†]
% Time Gastric pH > 4	12	22*	49*	41 [†]	66 [†]
NOTE: An intragastric pH of greater than 4 reflects a reduction in gastric acid by 99%.					
* (p < 0.05) versus baseline only.					
[†] (p < 0.05) versus baseline and lansoprazole 15 mg.					

After the initial dose in this study, increased gastric pH was seen within 1 to 2 hours with 30 mg of lansoprazole and 2 to 3 hours with 15 mg of lansoprazole. After multiple daily dosing, increased gastric pH was seen within the first hour post-dosing with 30 mg of lansoprazole and within 1 to 2 hours post-dosing with 15 mg of lansoprazole.

Acid suppression may enhance the effect of antimicrobials in eradicating *Helicobacter pylori* (*H. pylori*). The percentage of time gastric pH was elevated above 5 and 6 was evaluated in a crossover study of lansoprazole given daily, twice daily and three times daily (**Table 5**).

Table 5: Mean Antisecretory Effects After 5 Days of Twice Daily and Three Times Daily Dosing

Parameter	Lansoprazole			
	30 mg daily	15 mg twice daily	30 mg twice daily	30 mg three times daily
% Time Gastric pH > 5	43	47	59	77*
% Time Gastric pH > 6	20	23	28	45*
* (p < 0.05) versus lansoprazole 30 mg daily, 15 mg twice daily and 30 mg twice daily.				

The inhibition of gastric acid secretion as measured by intragastric pH gradually returned to normal over two to four days after multiple doses. There was no indication of rebound gastric acidity.

Enterochromaffin-like (ECL) Cell Effects

During lifetime exposure of rats with up to 150 mg/kg/day of lansoprazole dosed seven days per week, marked hypergastrinemia was observed followed by ECL cell proliferation and formation of carcinoid tumors, especially in female rats. Gastric biopsy specimens from the body of the stomach from approximately 150 patients treated continuously with lansoprazole for at least one year did not show

evidence of ECL cell effects similar to those seen in rat studies. Longer term data are needed to rule out the possibility of an increased risk of the development of gastric tumors in patients receiving long-term therapy with lansoprazole [see *Nonclinical Toxicology (13.1)*].

Other Gastric Effects in Humans

Lansoprazole did not significantly affect mucosal blood flow in the fundus of the stomach. Due to the normal physiologic effect caused by the inhibition of gastric acid secretion, a decrease of about 17% in blood flow in the antrum, pylorus, and duodenal bulb was seen. Lansoprazole significantly slowed the gastric emptying of digestible solids. Lansoprazole increased serum pepsinogen levels and decreased pepsin activity under basal conditions and in response to meal stimulation or insulin injection. As with other agents that elevate intragastric pH, increases in gastric pH were associated with increases in nitrate-reducing bacteria and elevation of nitrite concentration in gastric juice in patients with gastric ulcer. No significant increase in nitrosamine concentrations was observed.

Serum Gastrin Effects

In over 2100 patients, median fasting serum gastrin levels increased 50% to 100% from baseline but remained within normal range after treatment with 15 to 60 mg of oral lansoprazole. These elevations reached a plateau within two months of therapy and returned to pretreatment levels within four weeks after discontinuation of therapy.

Endocrine Effects

Human studies for up to one year have not detected any clinically significant effects on the endocrine system. Hormones studied include testosterone, luteinizing hormone (LH), follicle stimulating hormone (FSH), sex hormone binding globulin (SHBG), dehydroepiandrosterone sulfate (DHEA-S), prolactin, cortisol, estradiol, insulin, aldosterone, parathormone, glucagon, thyroid stimulating hormone (TSH), triiodothyronine (T₃), thyroxine (T₄), and somatotrophic hormone (STH). Lansoprazole in oral doses of 15 to 60 mg for up to one year had no clinically significant effect on sexual function. In addition, lansoprazole in oral doses of 15 to 60 mg for two to eight weeks had no clinically significant effect on thyroid function. In 24 month carcinogenicity studies in Sprague-Dawley rats with daily lansoprazole dosages up to 150 mg/kg, proliferative changes in the Leydig cells of the testes, including benign neoplasm, were increased compared to control rats.

Other Effects

No systemic effects of lansoprazole on the central nervous system, lymphoid, hematopoietic, renal, hepatic, cardiovascular, or respiratory systems have been found in humans. Among 56 patients who had extensive baseline eye evaluations, no visual toxicity was observed after lansoprazole treatment (up to 180 mg/day) for up to 58 months. After lifetime lansoprazole exposure in rats, focal pancreatic atrophy, diffuse lymphoid hyperplasia in the thymus, and spontaneous retinal atrophy were seen.

Microbiology

Lansoprazole, clarithromycin and/or amoxicillin have been shown to be active against most strains of *Helicobacter pylori* *in vitro* and in clinical infections as described in the INDICATIONS AND USAGE section [see *Indications and Usage (1.2)*].

Helicobacter pylori Pretreatment Resistance

Clarithromycin pretreatment resistance (≥ 2.0 mcg/mL) was 9.5% (91/960) by E-test and 11.3% (12/106) by agar dilution in the dual and triple therapy clinical trials (M93-125, M93-130, M93-131, M95-392, and M95-399).

Amoxicillin pretreatment susceptible isolates (≤ 0.25 mcg/mL) occurred in 97.8% (936/957) and 98.0% (98/100) of the patients in the dual and triple therapy clinical trials by E-test and agar dilution, respectively. Twenty-one of 957 patients (2.2%) by E-test, and 2 of 100 patients (2.0%) by agar dilution,

had amoxicillin pretreatment MICs of greater than 0.25 mcg/mL. One patient on the 14 day triple therapy regimen had an unconfirmed pretreatment amoxicillin minimum inhibitory concentration (MIC) of greater than 256 mcg/mL by E-test and the patient was eradicated of *H. pylori* (Table 6).

Table 6: Clarithromycin Susceptibility Test Results and Clinical/Bacteriological Outcomes

Clarithromycin Pretreatment Results		Clarithromycin Post-treatment Results				
		<i>H. pylori</i> negative - eradicated	<i>H. pylori</i> positive – not eradicated Post-treatment susceptibility results			
			S*	I*	R*	No MIC
Triple Therapy 14 Day (lansoprazole 30 mg twice daily/amoxicillin 1 g twice daily/clarithromycin 500 mg twice daily) (M95-399, M93-131, M95-392)						
Susceptible*	112	105				7
Intermediate*	3	3				
Resistant*	17	6			7	4
Triple Therapy 10 Day (lansoprazole 30 mg twice daily/amoxicillin 1 g twice daily/clarithromycin 500 mg twice daily) (M95-399)						
Susceptible*	42	40	1		1	
Intermediate*						
Resistant*	4	1			3	

* Susceptible (S) MIC ≤ 0.25 mcg/mL, Intermediate (I) MIC 0.5 to 1.0 mcg/mL, Resistant (R) MIC ≥ 2 mcg/mL

Patients not eradicated of *H. pylori* following lansoprazole/amoxicillin/clarithromycin triple therapy will likely have clarithromycin resistant *H. pylori*. Therefore, for those patients who fail therapy, clarithromycin susceptibility testing should be done when possible. Patients with clarithromycin resistant *H. pylori* should not be treated with lansoprazole/amoxicillin/clarithromycin triple therapy or with regimens which include clarithromycin as the sole antimicrobial agent.

Amoxicillin Susceptibility Test Results and Clinical/Bacteriological Outcomes: In the dual and triple therapy clinical trials, 82.6% (195/236) of the patients that had pretreatment amoxicillin susceptible MICs (≤ 0.25 mcg/mL) were eradicated of *H. pylori*. Of those with pretreatment amoxicillin MICs of greater than 0.25 mcg/mL, three of six had the *H. pylori* eradicated. A total of 30% (21/70) of the patients failed lansoprazole 30 mg three times daily/amoxicillin 1 g three times daily dual therapy and a total of 12.8% (22/172) of the patients failed the 10 and 14 day triple therapy regimens. Post-treatment susceptibility results were not obtained on 11 of the patients who failed therapy. Nine of the 11 patients with amoxicillin post-treatment MICs that failed the triple therapy regimen also had clarithromycin resistant *H. pylori* isolates.

Susceptibility Test for Helicobacter pylori: The reference methodology for susceptibility testing of *H. pylori* is agar dilution MICs.¹ One to three microliters of an inoculum equivalent to a No. 2 McFarland standard (1 x 10⁷ to 1 x 10⁸ CFU/mL for *H. pylori*) are inoculated directly onto freshly prepared antimicrobial-containing Mueller-Hinton agar plates with 5% aged defibrinated sheep blood (≥ 2 weeks old). The agar dilution plates are incubated at 35°C in a microaerobic environment produced by a gas generating system suitable for campylobacters.

After 3 days of incubation, the MICs are recorded as the lowest concentration of antimicrobial agent required to inhibit growth of the organism. The clarithromycin and amoxicillin MIC values should be

interpreted according to the following criteria (**Table 7**):

Table 7

Clarithromycin MIC (mcg/mL)*	Interpretation
≤ 0.25	Susceptible (S)
0.5 to 1.0	Intermediate (I)
≥ 2.0	Resistant (R)
Amoxicillin MIC (mcg/mL)*,	Interpretation
≤ 0.25	Susceptible (S)

* These are tentative breakpoints for the agar dilution methodology and they should not be used to interpret results obtained using alternative methods.

Standardized susceptibility test procedures require the use of laboratory control microorganisms to control the technical aspects of the laboratory procedures. Standard clarithromycin and amoxicillin powders should provide the following MIC values (**Table 8**):

Table 8

Microorganism	Antimicrobial Agent	MIC (mcg/mL)
<i>H. pylori</i> ATCC 43504	Clarithromycin	0.015 to 0.12
<i>H. pylori</i> ATCC 43504	Amoxicillin	0.015 to 0.12

12.3 Pharmacokinetics

Lansoprazole delayed-release capsules contain an enteric-coated granule formulation of lansoprazole. Absorption of lansoprazole begins only after the granules leave the stomach. Absorption is rapid, with mean peak plasma levels of lansoprazole occurring after approximately 1.7 hours. After a single-dose administration of 15 mg to 60 mg of oral lansoprazole, the peak plasma concentrations (C_{max}) of lansoprazole and the area under the plasma concentration curves (AUCs) of lansoprazole were approximately proportional to the administered dose. Lansoprazole does not accumulate and its pharmacokinetics are unaltered by multiple dosing.

Absorption: The absorption of lansoprazole is rapid, with the mean C_{max} occurring approximately 1.7 hours after oral dosing, and the absolute bioavailability is over 80%. In healthy subjects, the mean (\pm SD) plasma half-life was 1.5 (\pm 1.0) hours. Both the C_{max} and AUC are diminished by about 50% to 70% if lansoprazole is given 30 minutes after food, compared to the fasting condition. There is no significant food effect if lansoprazole is given before meals.

Distribution: Lansoprazole is 97% bound to plasma proteins. Plasma protein binding is constant over the concentration range of 0.05 to 5.0 mcg/mL.

Metabolism: Lansoprazole is extensively metabolized in the liver. Two metabolites have been identified in measurable quantities in plasma (the hydroxylated sulfinyl and sulfone derivatives of lansoprazole). These metabolites have very little or no antisecretory activity. Lansoprazole is thought to be transformed into two active species which inhibit acid secretion by blocking the proton pump [(H⁺, K⁺)-ATPase enzyme system] at the secretory surface of the gastric parietal cell. The two active species are

not present in the systemic circulation. The plasma elimination half-life of lansoprazole is less than 2 hours while the acid inhibitory effect lasts more than 24 hours. Therefore, the plasma elimination half-life of lansoprazole does not reflect its duration of suppression of gastric acid secretion.

Elimination: Following single-dose oral administration of lansoprazole, virtually no unchanged lansoprazole was excreted in the urine. In one study, after a single oral dose of ^{14}C -lansoprazole, approximately one-third of the administered radiation was excreted in the urine and two-thirds was recovered in the feces. This implies a significant biliary excretion of the lansoprazole metabolites.

Specific Populations

Pediatric Use:

One to 17 years of age

The pharmacokinetics of lansoprazole were studied in pediatric patients with GERD aged 1 to 11 years and 12 to 17 years in two separate clinical studies. In children aged 1 to 11 years, lansoprazole was dosed 15 mg daily for subjects weighing ≤ 30 kg and 30 mg daily for subjects weighing greater than 30 kg. Mean C_{max} and AUC values observed on Day 5 of dosing were similar between the two dose groups and were not affected by weight or age within each weight-adjusted dose group used in the study. In adolescent subjects aged 12 to 17 years, subjects were randomized to receive lansoprazole at 15 mg or 30 mg daily. Mean C_{max} and AUC values of lansoprazole were not affected by body weight or age; and nearly dose-proportional increases in mean C_{max} and AUC values were observed between the two dose groups in the study. Overall, lansoprazole pharmacokinetics in pediatric patients aged 1 to 17 years were similar to those observed in healthy adult subjects.

Geriatric Use: The clearance of lansoprazole is decreased in the elderly, with elimination half-life increased approximately 50% to 100%. Because the mean half-life in the elderly remains between 1.9 to 2.9 hours, repeated once daily dosing does not result in accumulation of lansoprazole. Peak plasma levels were not increased in the elderly. No dosage adjustment is necessary in the elderly [see *Use in Specific Populations* (8.5)].

Renal Impairment: In patients with severe renal impairment, plasma protein binding decreased by 1.0% to 1.5% after administration of 60 mg of lansoprazole. Patients with renal impairment had a shortened elimination half-life and decreased total AUC (free and bound). The AUC for free lansoprazole in plasma, however, was not related to the degree of renal impairment; and the C_{max} and T_{max} (time to reach the maximum concentration) were not different than the C_{max} and T_{max} from subjects with normal renal function. No dosage adjustment is necessary in patients with renal impairment [see *Use in Specific Populations* (8.6)].

Hepatic Impairment: In patients with various degrees of chronic hepatic impairment, the mean plasma half-life of lansoprazole was prolonged from 1.5 hours to 3.2 to 7.2 hours. An increase in the mean AUC of up to 500% was observed at steady state in hepatically-impaired patients compared to healthy subjects. Consider dose reduction in patients with severe hepatic impairment [see *Use in Specific Populations* (8.7)].

Gender: In a study comparing 12 male and 6 female human subjects who received lansoprazole, no gender differences were found in pharmacokinetics and intragastric pH results [see *Use in Specific Populations* (8.8)].

Drug-Drug Interactions

Lansoprazole may interfere with the absorption of other drugs where gastric pH is an important determinant of bioavailability (e.g., ketoconazole, ampicillin esters, iron salts, digoxin).

Lansoprazole is metabolized through the cytochrome P₄₅₀ system, specifically through the CYP3A and CYP2C19 isozymes. Studies have shown that lansoprazole does not have clinically significant interactions with other drugs metabolized by the cytochrome P₄₅₀ system, such as warfarin, antipyrine,

indomethacin, ibuprofen, phenytoin, propranolol, prednisone, diazepam, or clarithromycin in healthy subjects. These compounds are metabolized through various cytochrome P₄₅₀ isozymes including CYP1A2, CYP2C9, CYP2C19, CYP2D6, and CYP3A.

Atazanavir: Lansoprazole causes long-lasting inhibition of gastric acid secretion. Lansoprazole substantially decreases the systemic concentrations of the HIV protease inhibitor atazanavir, which is dependent upon the presence of gastric acid for absorption, and may result in a loss of therapeutic effect of atazanavir and the development of HIV resistance. Therefore, lansoprazole, or other proton pump inhibitors, should not be coadministered with atazanavir.

Theophylline: When lansoprazole was administered concomitantly with theophylline (CYP1A2, CYP3A), a minor increase (10%) in the clearance of theophylline was seen. Because of the small magnitude and the direction of the effect on theophylline clearance, this interaction is unlikely to be of clinical concern. Nonetheless, individual patients may require additional titration of their theophylline dosage when lansoprazole is started or stopped to ensure clinically effective blood levels.

Warfarin: In a study of healthy subjects neither the pharmacokinetics of warfarin enantiomers nor prothrombin time were affected following single or multiple 60 mg doses of lansoprazole. However, there have been reports of increased International Normalized Ratio (INR) and prothrombin time in patients receiving proton pump inhibitors, including lansoprazole, and warfarin concomitantly. 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.

Methotrexate and 7-hydromethotrexate: In an open-label, single-arm, eight-day, pharmacokinetic study of 28 adult rheumatoid arthritis patients (who required the chronic use of 7.5 to 15 mg of methotrexate given weekly), administration of 7 days of naproxen 500 mg twice daily and lansoprazole 30 mg daily had no effect on the pharmacokinetics of methotrexate and 7-hydroxymethotrexate. While this study was not designed to assess the safety of this combination of drugs, no major adverse reactions were noted.

Amoxicillin: Lansoprazole has also been shown to have no clinically significant interaction with amoxicillin.

Sucralfate: In a single-dose crossover study examining lansoprazole 30 mg and omeprazole 20 mg each administered alone and concomitantly with sucralfate 1 gram, absorption of the proton pump inhibitors was delayed and their bioavailability was reduced by 17% and 16%, respectively, when administered concomitantly with sucralfate. Therefore, proton pump inhibitors should be taken at least 30 minutes prior to sucralfate. In clinical trials, antacids were administered concomitantly with lansoprazole and there was no evidence of a change in the efficacy of lansoprazole.

Clopidogrel: Clopidogrel is metabolized to its active metabolite in part by CYP2C19. A study of healthy subjects who were CYP2C19 extensive metabolizers, receiving once daily administration of clopidogrel 75 mg alone or concomitantly with lansoprazole 30 mg (n = 40), for 9 days was conducted. The mean AUC of the active metabolite of clopidogrel was reduced by approximately 14% (mean AUC ratio was 86%, with 90% CI of 80 to 92%) when lansoprazole was coadministered compared to administration of clopidogrel alone. Pharmacodynamic parameters were also measured and demonstrated that the change in inhibition of platelet aggregation (induced by 5 mM ADP) was related to the change in the exposure to clopidogrel active metabolite. The clinical significance of this finding is not clear.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

In two 24 month carcinogenicity studies, Sprague-Dawley rats were treated with oral lansoprazole doses of 5 to 150 mg/kg/day, about 1 to 40 times the exposure on a body surface (mg/m²) basis of a 50 kg person of average height [1.46 m² body surface area (BSA)] given the recommended human dose of

30 mg/day. Lansoprazole produced dose-related gastric enterochromaffin-like (ECL) cell hyperplasia and ECL cell carcinoids in both male and female rats. It also increased the incidence of intestinal metaplasia of the gastric epithelium in both sexes. In male rats, lansoprazole produced a dose-related increase of testicular interstitial cell adenomas. The incidence of these adenomas in rats receiving doses of 15 to 150 mg/kg/day (4 to 40 times the recommended human dose based on BSA) exceeded the low background incidence (range = 1.4 to 10%) for this strain of rat.

In a 24 month carcinogenicity study, CD-1 mice were treated with oral lansoprazole doses of 15 to 600 mg/kg/day, 2 to 80 times the recommended human dose based on BSA. Lansoprazole produced a dose-related increased incidence of gastric ECL cell hyperplasia. It also produced an increased incidence of liver tumors (hepatocellular adenoma plus carcinoma). The tumor incidences in male mice treated with 300 and 600 mg/kg/day (40 to 80 times the recommended human dose based on BSA) and female mice treated with 150 to 600 mg/kg/day (20 to 80 times the recommended human dose based on BSA) exceeded the ranges of background incidences in historical controls for this strain of mice. Lansoprazole treatment produced adenoma of rete testis in male mice receiving 75 to 600 mg/kg/day (10 to 80 times the recommended human dose based on BSA).

A 26 week p53 (+/-) transgenic mouse carcinogenicity study was not positive.

Lansoprazole was positive in the Ames test and the *in vitro* human lymphocyte chromosomal aberration assay. Lansoprazole was not genotoxic in the *ex vivo* rat hepatocyte unscheduled DNA synthesis (UDS) test, the *in vivo* mouse micronucleus test, or the rat bone marrow cell chromosomal aberration test.

Lansoprazole at oral doses up to 150 mg/kg/day (40 times the recommended human dose based on BSA) was found to have no effect on fertility and reproductive performance of male and female rats.

13.2 Animal Toxicology and/or Pharmacology

Reproductive Toxicology Studies

Reproduction studies have been performed in pregnant rats at oral lansoprazole doses up to 150 mg/kg/day [40 times the recommended human dose (30 mg/day) based on body surface area (BSA)] and pregnant rabbits at oral lansoprazole doses up to 30 mg/kg/day (16 times the recommended human dose based on BSA) and have revealed no evidence of impaired fertility or harm to the fetus due to lansoprazole.

14 CLINICAL STUDIES

Duodenal Ulcer

In a U.S. multicenter, double-blind, placebo-controlled, dose-response (15, 30, and 60 mg of lansoprazole once daily) study of 284 patients with endoscopically documented duodenal ulcer, the percentage of patients healed after two and four weeks was significantly higher with all doses of lansoprazole than with placebo. There was no evidence of a greater or earlier response with the two higher doses compared with lansoprazole 15 mg. Based on this study and the second study described below, the recommended dose of lansoprazole in duodenal ulcer is 15 mg per day (**Table 9**).

Table 9: Duodenal Ulcer Healing Rates

Week	Lansoprazole			Placebo (N = 72)
	15 mg daily (N = 68)	30 mg daily (N = 74)	60 mg daily (N = 70)	
2	42.4%*	35.6%*	39.1%*	11.3%
4	89.4%*	91.7%*	89.9%*	46.1%

* (p ≤ 0.001) versus placebo.

Lansoprazole 15 mg was significantly more effective than placebo in relieving day and nighttime abdominal pain and in decreasing the amount of antacid taken per day.

In a second U.S. multicenter study, also double-blind, placebo-controlled, dose-comparison (15 and 30 mg of lansoprazole once daily), and including a comparison with ranitidine, in 280 patients with endoscopically documented duodenal ulcer, the percentage of patients healed after four weeks was significantly higher with both doses of lansoprazole than with placebo. There was no evidence of a greater or earlier response with the higher dose of lansoprazole. Although the 15 mg dose of lansoprazole was superior to ranitidine at 4 weeks, the lack of significant difference at 2 weeks and the absence of a difference between 30 mg of lansoprazole and ranitidine leaves the comparative effectiveness of the two agents undetermined (**Table 10**) [see *Indications and Usage (1.1)*].

Table 10: Duodenal Ulcer Healing Rates

Week	Lansoprazole		Ranitidine	Placebo (N = 41)
	15 mg daily (N = 80)	30 mg daily (N = 77)	300 mg h.s. (N = 82)	
2	35.0%	44.2%	30.5%	34.2%
4	92.3%	80.3%*	70.5%*	47.5%

* (p ≤ 0.05) versus placebo.

***H. pylori* Eradication to Reduce the Risk of Duodenal Ulcer Recurrence**

Randomized, double-blind clinical studies performed in the U.S. in patients with *H. pylori* and duodenal ulcer disease (defined as an active ulcer or history of an ulcer within one year) evaluated the efficacy of lansoprazole in combination with amoxicillin capsules and clarithromycin tablets as triple 14 day therapy or in combination with amoxicillin capsules as dual 14 day therapy for the eradication of *H. pylori*. Based on the results of these studies, the safety and efficacy of two different eradication regimens were established:

Triple therapy: Lansoprazole 30 mg twice daily/amoxicillin 1 g twice daily/clarithromycin 500 mg twice daily

Dual therapy: Lansoprazole 30 mg three times daily/amoxicillin 1 g three times daily

All treatments were for 14 days. *H. pylori* eradication was defined as two negative tests (culture and histology) at 4 to 6 weeks following the end of treatment.

Triple therapy was shown to be more effective than all possible dual therapy combinations. Dual therapy was shown to be more effective than both monotherapies. Eradication of *H. pylori* has been shown to reduce the risk of duodenal ulcer recurrence.

A randomized, double-blind clinical study performed in the U.S. in patients with *H. pylori* and duodenal ulcer disease (defined as an active ulcer or history of an ulcer within one year) compared the efficacy of lansoprazole triple therapy for 10 and 14 days. This study established that the 10 day triple therapy was equivalent to the 14 day triple therapy in eradicating *H. pylori* (**Tables 11 and 12**) [see *Indications and Usage (1.2)*].

Table 11: *H. pylori* Eradication Rates - Triple Therapy

(Lansoprazole/amoxicillin/clarithromycin)
Percent of Patients Cured
[95% Confidence Interval]
(Number of patients)

Study	Duration	Triple Therapy Evaluable Analysis	Triple Therapy Intent-to-Treat Analysis
M93-131	14 days	92* [80.0 to 97.7] (N = 48)	86* [73.3 to 93.5] (N = 55)
M95-392	14 days	86† [75.7 to 93.6] (N = 66)	83† [72.0 to 90.8] (N = 70)
M95-399	14 days	85 [77.0 to 91.0] (N = 113)	82 [73.9 to 88.1] (N = 126)
	10 days	84 [76.0 to 89.8] (N = 123)	81 [73.9 to 87.6] (N = 135)

* (p < 0.05) versus lansoprazole/amoxicillin and lansoprazole/clarithromycin dual therapy.

† (p < 0.05) versus clarithromycin/amoxicillin dual therapy.

Table 12: H. pylori Eradication Rates - 14 Day Dual Therapy

(lansoprazole/amoxicillin) Percent of Patients Cured [95% Confidence Interval] (Number of patients)		
Study	Dual Therapy Evaluable Analysis	Dual Therapy Intent-to-Treat Analysis
M93-131	77* [62.5 to 87.2] (N = 51)	70* [56.8 to 81.2] (N = 60)
M93-125	66† [51.9 to 77.5] (N = 58)	61† [48.5 to 72.9] (N = 67)

* (p < 0.05) versus lansoprazole alone.

† (p < 0.05) versus lansoprazole alone or amoxicillin alone.

Long-Term Maintenance Treatment of Duodenal Ulcers

Lansoprazole has been shown to prevent the recurrence of duodenal ulcers. Two independent, double-blind, multicenter, controlled trials were conducted in patients with endoscopically confirmed healed duodenal ulcers. Patients remained healed significantly longer and the number of recurrences of duodenal ulcers was significantly less in patients treated with lansoprazole than in patients treated with placebo over a 12 month period (**Table 13**) [see *Indications and Usage (1.3)*].

Table 13: Endoscopic Remission Rates

Trial	Drug	No. of Pts.	Percent in Endoscopic Remission		
			0 to 3 mo.	0 to 6 mo.	0 to 12 mo.
#1	Lansoprazole	15			

	mg daily	86	90%*	87%*	84%*
	Placebo	83	49%	41%	39%
#2	Lansoprazole 30 mg daily	18	94%*	94%*	85%*
	Lansoprazole 15 mg daily	15	87%*	79%*	70%*
	Placebo	15	33%	0%	0%

* (p ≤ 0.001) versus placebo.

% = Life Table Estimate

In trial #2, no significant difference was noted between lansoprazole 15 mg and 30 mg in maintaining remission.

Gastric Ulcer

In a U.S. multicenter, double-blind, placebo-controlled study of 253 patients with endoscopically documented gastric ulcer, the percentage of patients healed at four and eight weeks was significantly higher with lansoprazole 15 mg and 30 mg once a day than with placebo (**Table 14**) [see *Indications and Usage* (1.4)].

Table 14: Gastric Ulcer Healing Rates

Week	Lansoprazole			Placebo (N = 64)
	15 mg daily (N = 65)	30 mg daily (N = 63)	60 mg daily (N = 61)	
4	64.6%*	58.1%*	53.3%*	37.5%
8	92.2%*	96.8%*	93.2%*	76.7%

* (p ≤ 0.05) versus placebo.

Patients treated with any lansoprazole dose reported significantly less day and night abdominal pain along with fewer days of antacid use and fewer antacid tablets used per day than the placebo group.

Independent substantiation of the effectiveness of lansoprazole 30 mg was provided by a meta-analysis of published and unpublished data.

Healing of NSAID-Associated Gastric Ulcer

In two U.S. and Canadian multicenter, double-blind, active-controlled studies in patients with endoscopically confirmed NSAID-associated gastric ulcer who continued their NSAID use, the percentage of patients healed after 8 weeks was statistically significantly higher with 30 mg of lansoprazole than with the active control. A total of 711 patients were enrolled in the study, and 701 patients were treated. Patients ranged in age from 18 to 88 years (median age 59 years), with 67% female patients and 33% male patients. Race was distributed as follows: 87% Caucasian, 8% Black, 5% Other. There was no statistically significant difference between lansoprazole 30 mg daily and the active control on symptom relief (i.e., abdominal pain) (**Table 15**) [see *Indications and Usage* (1.5)].

Table 15: NSAID-Associated Gastric Ulcer Healing Rates

	Study #1	
	Lansoprazole 30 mg daily	Active Control*
Week 4	60% (53/88) [†]	28% (23/83)
Week 8	79% (62/79) [†]	55% (41/74)

		Study #2	
	Lansoprazole 30 mg daily	Active Control*	
Week 4	53% (40/75)	38% (31/82)	
Week 8	77% (47/61) [†]	50% (33/66)	
* Dose for healing of gastric ulcer			
[†] (p ≤ 0.05) versus the active control			

Risk Reduction of NSAID-Associated Gastric Ulcer

In one large U.S., multicenter, double-blind, placebo- and misoprostol-controlled (misoprostol blinded only to the endoscopist) study in patients who required chronic use of an NSAID and who had a history of an endoscopically documented gastric ulcer, the proportion of patients remaining free from gastric ulcer at 4, 8, and 12 weeks was significantly higher with 15 or 30 mg of lansoprazole than placebo. A total of 537 patients were enrolled in the study, and 535 patients were treated. Patients ranged in age from 23 to 89 years (median age 60 years), with 65% female patients and 35% male patients. Race was distributed as follows: 90% Caucasian, 6% Black, 4% Other. The 30 mg dose of lansoprazole demonstrated no additional benefit in risk reduction of the NSAID-associated gastric ulcer than the 15 mg dose (**Table 16**) [see *Indications and Usage (1.6)*].

Table 16: Proportion of Patients Remaining Free of Gastric Ulcers

Week	Lansoprazole 15 mg daily	Lansoprazole 30 mg daily	Misoprostol 200 mcg four times daily	Placebo
	(N = 121)	(N = 116)	(N = 106)	(N = 112)
4	90%	92%	96%	66%
8	86%	88%	95%	60%
12	80%	82%	93%	51%

(p < 0.001) Lansoprazole 15 mg daily versus placebo; lansoprazole 30 mg daily versus placebo; and misoprostol 200 mcg four times daily versus placebo.

(p < 0.05) Misoprostol 200 mcg four times daily versus lansoprazole 15 mg daily; and misoprostol 200 mcg four times daily versus lansoprazole 30 mg daily.

Gastroesophageal Reflux Disease (GERD)

Symptomatic GERD: In a U.S. multicenter, double-blind, placebo-controlled study of 214 patients with frequent GERD symptoms, but no esophageal erosions by endoscopy, significantly greater relief of heartburn associated with GERD was observed with the administration of lansoprazole 15 mg once daily up to 8 weeks than with placebo. No significant additional benefit from lansoprazole 30 mg once daily was observed.

The intent-to-treat analyses demonstrated significant reduction in frequency and severity of day and night heartburn. Data for frequency and severity for the 8 week treatment period are presented in **Table 17** and in **Figures 1** and **2**:

Table 17: Frequency of Heartburn

Variable	Placebo	Lansoprazole 15 mg	Lansoprazole 30 mg

	(n = 43)	(n = 80)	(n = 86)
	Median		
% of Days without Heartburn			
Week 1	0%	71%*	46%*
Week 4	11%	81%*	76%*
Week 8	13%	84%*	82%*
% of Nights without Heartburn			
Week 1	17%	86%*	57%*
Week 4	25%	89%*	73%*
Week 8	36%	92%*	80%*

* (p < 0.01) versus placebo.

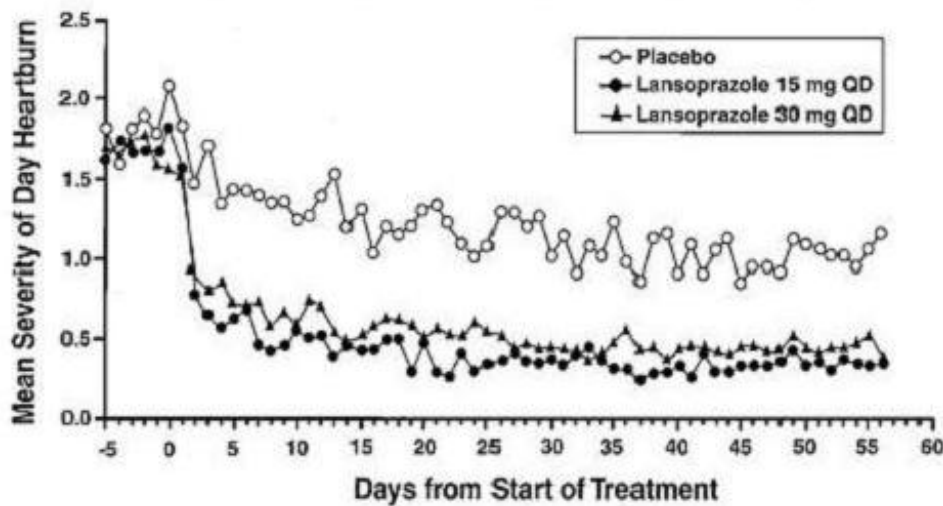


Figure 1: Mean Severity of Day Heartburn by Study Day for Evaluable Patients (3 = Severe, 2 = Moderate, 1 = Mild, 0 = None)

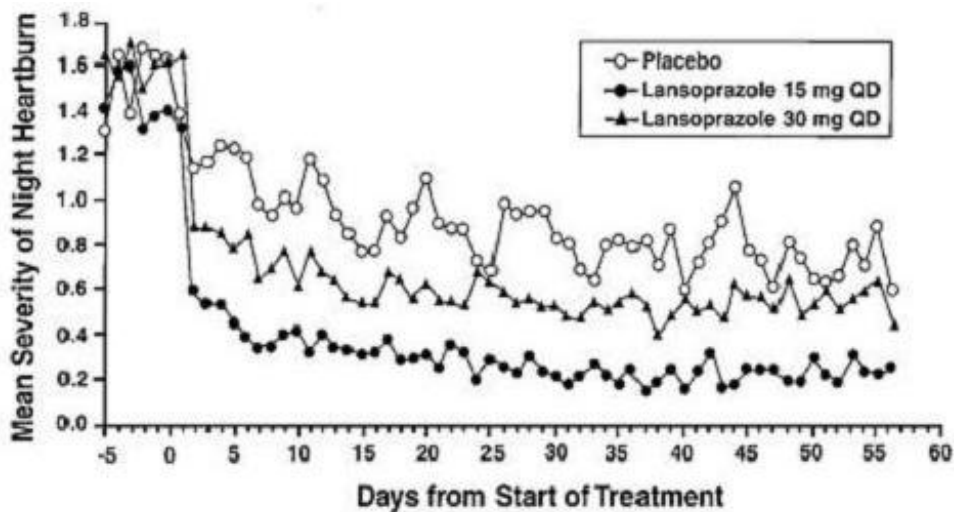


Figure 2: Mean Severity of Night Heartburn by Study Day for Evaluable Patients (3 = Severe, 2 = Moderate, 1 = Mild, 0 = None)

In two U.S., multicenter double-blind, ranitidine-controlled studies of 925 total patients with frequent

GERD symptoms, but no esophageal erosions by endoscopy, lansoprazole 15 mg was superior to ranitidine 150 mg (twice daily) in decreasing the frequency and severity of day and night heartburn associated with GERD for the 8 week treatment period. No significant additional benefit from lansoprazole 30 mg once daily was observed [see *Indications and Usage (1.7)*].

Erosive Esophagitis

In a U.S. multicenter, double-blind, placebo-controlled study of 269 patients entering with an endoscopic diagnosis of esophagitis with mucosal grading of 2 or more and grades 3 and 4 signifying erosive disease, the percentages of patients with healing are presented in **Table 18**:

Table 18: Erosive Esophagitis Healing Rates

Week	Lansoprazole			Placebo (N = 63)
	15 mg daily (N = 69)	30 mg daily (N = 65)	60 mg daily (N = 72)	
4	67.6%*	81.3%*,†	80.6%*,†	32.8%
6	87.7%*	95.4%*	94.3%*	52.5%
8	90.9%*	95.4%*	94.4%*	52.5%

* (p ≤ 0.001) versus placebo.
† (p ≤ 0.05) versus lansoprazole 15 mg.

In this study, all lansoprazole groups reported significantly greater relief of heartburn and less day and night abdominal pain along with fewer days of antacid use and fewer antacid tablets taken per day than the placebo group. Although all doses were effective, the earlier healing in the higher two doses suggests 30 mg daily as the recommended dose.

Lansoprazole was also compared in a U.S. multicenter, double-blind study to a low dose of ranitidine in 242 patients with erosive reflux esophagitis. Lansoprazole at a dose of 30 mg was significantly more effective than ranitidine 150 mg twice daily as shown below (**Table 19**).

Table 19: Erosive Esophagitis Healing Rates

Week	Lansoprazole 30 mg daily (N = 115)	Ranitidine 150 mg twice daily (N = 127)
2	66.7%*	38.7%
4	82.5%*	52.0%
6	93.0%*	67.8%
8	92.1%*	69.9%

* (p ≤ 0.001) versus ranitidine.

In addition, patients treated with lansoprazole reported less day and nighttime heartburn and took less antacid tablets for fewer days than patients taking ranitidine 150 mg twice daily.

Although this study demonstrates effectiveness of lansoprazole in healing erosive esophagitis, it does not represent an adequate comparison with ranitidine because the recommended ranitidine dose for esophagitis is 150 mg four times daily, twice the dose used in this study.

In the two trials described and in several smaller studies involving patients with moderate to severe erosive esophagitis, lansoprazole produced healing rates similar to those shown above.

In a U.S. multicenter, double-blind, active-controlled study, 30 mg of lansoprazole was compared with

ranitidine 150 mg twice daily in 151 patients with erosive reflux esophagitis that was poorly responsive to a minimum of 12 weeks of treatment with at least one H₂-receptor antagonist given at the dose indicated for symptom relief or greater, namely, cimetidine 800 mg/day, ranitidine 300 mg/day, famotidine 40 mg/day or nizatidine 300 mg/day. Lansoprazole 30 mg was more effective than ranitidine 150 mg twice daily in healing reflux esophagitis, and the percentage of patients with healing were as follows. This study does not constitute a comparison of the effectiveness of histamine H₂-receptor antagonists with lansoprazole, as all patients had demonstrated unresponsiveness to the histamine H₂-receptor antagonist mode of treatment. It does indicate, however, that lansoprazole may be useful in patients failing on a histamine H₂-receptor antagonist (**Table 20**) [see *Indications and Usage (1.7)*].

Table 20: Reflux Esophagitis Healing Rates in Patients Poorly Responsive to Histamine H₂-Receptor Antagonist Therapy

Week	Lansoprazole 30 mg daily (N = 100)	Ranitidine 150 mg twice daily (N = 51)
4	74.7%*	42.6%
8	83.7%*	32.0%

* (p ≤ 0.001) versus ranitidine.

Long-Term Maintenance Treatment of Erosive Esophagitis

Two independent, double-blind, multicenter, controlled trials were conducted in patients with endoscopically confirmed healed esophagitis. Patients remained in remission significantly longer and the number of recurrences of erosive esophagitis was significantly less in patients treated with lansoprazole than in patients treated with placebo over a 12 month period (**Table 21**).

Table 21: Endoscopic Remission Rates

Trial	Drug	No. of Pts.	Percent in Endoscopic Remission		
			0 to 3 mo.	0 to 6 mo.	0 to 12 mo.
#1	Lansoprazole 15 mg daily	59	83%*	81%*	79%*
	Lansoprazole 30 mg daily	56	93%*	93%*	90%*
	Placebo	55	31%	27%	24%
#2	Lansoprazole 15 mg daily	50	74%*	72%*	67%*
	Lansoprazole 30 mg daily	49	75%*	72%*	55%*
	Placebo	47	16%	13%	13%

* (p ≤ 0.001) versus placebo.

% = Life Table Estimate

Regardless of initial grade of erosive esophagitis, lansoprazole 15 mg and 30 mg were similar in maintaining remission.

In a U.S., randomized, double-blind, study, lansoprazole 15 mg daily (n = 100) was compared with ranitidine 150 mg twice daily (n = 106), at the recommended dosage, in patients with endoscopically-

proven healed erosive esophagitis over a 12 month period. Treatment with lansoprazole resulted in patients remaining healed (Grade 0 lesions) of erosive esophagitis for significantly longer periods of time than those treated with ranitidine ($p < 0.001$). In addition, lansoprazole was significantly more effective than ranitidine in providing complete relief of both daytime and nighttime heartburn. Patients treated with lansoprazole remained asymptomatic for a significantly longer period of time than patients treated with ranitidine [see *Indications and Usage (1.8)*].

Pathological Hypersecretory Conditions Including Zollinger-Ellison Syndrome

In open studies of 57 patients with pathological hypersecretory conditions, such as Zollinger-Ellison syndrome (ZES) with or without multiple endocrine adenomas, lansoprazole significantly inhibited gastric acid secretion and controlled associated symptoms of diarrhea, anorexia and pain. Doses ranging from 15 mg every other day to 180 mg per day maintained basal acid secretion below 10 mEq/hr in patients without prior gastric surgery and below 5 mEq/hr in patients with prior gastric surgery.

Initial doses were titrated to the individual patient need, and adjustments were necessary with time in some patients [see *Dosage and Administration (2.1)*]. Lansoprazole was well tolerated at these high dose levels for prolonged periods (greater than four years in some patients). In most ZES patients, serum gastrin levels were not modified by lansoprazole. However, in some patients, serum gastrin increased to levels greater than those present prior to initiation of lansoprazole therapy [see *Indications and Usage (1.9)*].

15 REFERENCES

1. National Committee for Clinical Laboratory Standards. Summary Minutes, Subcommittee on Antimicrobial Susceptibility Testing, Tampa, FL, January 11-13, 1998.

16 HOW SUPPLIED/STORAGE AND HANDLING

Lansoprazole delayed-release capsules USP are available as follows:

15 mg - hard gelatin capsules, with a light-blue opaque cap and flesh-colored opaque body, imprinted with "93" and "7350", filled with off-white to beige pellets, in

Bottles of	NDC 54868-
30	6197-0

30 mg - hard gelatin capsules, with a light-gray opaque cap and flesh-colored opaque body, imprinted with "93" and "7351", filled with off-white to beige pellets, in

Bottles of	NDC 54868-
30	6086-0

Bottles of	NDC 54868-
60	6086-1

Store at 20° to 25°C (68° to 77°F) [See USP Controlled Room Temperature]. Protect from moisture.

Dispense in a tight, light-resistant container as defined in the USP, with a child-resistant closure (as required).

17 PATIENT COUNSELING INFORMATION

[See FDA-Approved Patient Labeling]

Patient should be informed of the following:

Advise patients to immediately report and seek care for any cardiovascular or neurological symptoms including palpitations, dizziness, seizures, and tetany as these may be signs of hypomagnesemia [see *Warnings and Precautions (5.3)*].

Information for Patients

Lansoprazole is available as a capsule and is available in 15 mg and 30 mg strengths. Directions for use specific to the route and available methods of administration for this dosage form is presented below [see *Dosage and Administration (2.3)*].

- Lansoprazole delayed-release capsules should be taken before eating.
- Lansoprazole delayed-release capsules **SHOULD NOT BE CRUSHED OR CHEWED**.

Administration Options

Lansoprazole Delayed-Release Capsules- Oral Administration

- Lansoprazole delayed-release capsules should be swallowed whole.
- Alternatively, for patients who have difficulty swallowing capsules, lansoprazole delayed-release capsules can be opened and administered as follows:
 - Open capsule.
 - Sprinkle intact granules on one tablespoon of either applesauce, ENSURE[®] pudding, cottage cheese, yogurt or strained pears.
 - Swallow immediately.
- Lansoprazole delayed-release capsules may also be emptied into a small volume of either apple juice, orange juice or tomato juice and administered as follows:
 - Open capsule.
 - Sprinkle intact granules into a small volume of either apple juice, orange juice or tomato juice (60 mL — approximately 2 ounces).
 - Mix briefly.
 - Swallow immediately.
 - To ensure complete delivery of the dose, the glass should be rinsed with two or more volumes of juice and the contents swallowed immediately.

Lansoprazole Delayed-Release Capsules – Nasogastric Tube (≥ 16 French) Administration

- For patients who have a nasogastric tube in place, lansoprazole delayed-release capsules can be administered as follows:
 - Open capsule.
 - Mix intact granules into 40 mL of apple juice. **DO NOT USE OTHER LIQUIDS.**
 - Inject through the nasogastric tube into the stomach.
 - Flush with additional apple juice to clear the tube.

USE IN OTHER FOODS AND LIQUIDS HAS NOT BEEN STUDIED CLINICALLY AND IS THEREFORE NOT RECOMMENDED.

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TEVA PHARMACEUTICAL IND. LTD.

Jerusalem, 91010, Israel

Manufactured For:

TEVA PHARMACEUTICALS USA

Sellersville, PA 18960

Rev. H 11/2011

Relabeling and Repackaging by:

Physicians Total Care, Inc.

Tulsa, Oklahoma 74146

FDA-Approved Patient Labeling

Patient Information**Lansoprazole Delayed-Release Capsules USP**

Read this Patient Information that comes with lansoprazole delayed-release capsules USP before you start taking them and each time you get a refill. There may be new information. This leaflet does not take the place of talking with your doctor about your medical condition or your treatment.

What are lansoprazole delayed-release capsules USP?

Lansoprazole delayed-release capsules USP are a prescription medicine called a proton pump inhibitor (PPI). Lansoprazole delayed-release capsules USP reduce the amount of acid in your stomach.

Lansoprazole delayed-release capsules USP are used in adults:

- for 4 weeks to heal ulcers in the first part of the small bowel (duodenal ulcers).
- along with certain antibiotics to treat a stomach infection called *Helicobacter pylori*.
- for continued healing of duodenal ulcers.
- for up to 8 weeks to heal stomach ulcers.
- for up to 8 weeks to heal stomach ulcers in some people taking pain medicines called non-steroidal anti-inflammatory drugs (NSAIDs).
- for reducing the risk of stomach ulcers in some people taking NSAIDs.
- for up to 8 weeks for the relief of heartburn and other symptoms of gastroesophageal reflux disease (GERD).

GERD happens when acid from your stomach enters the tube (esophagus) that connects your mouth to your stomach. This may cause a burning feeling in your chest or throat, sour taste or burping. In some cases, acid can damage the lining of your esophagus. This damage is called erosive esophagitis.

- for 8 weeks to heal the acid-related damage to the lining of the esophagus (called erosive esophagitis) and to relieve symptoms, such as heartburn pain. If needed, your doctor may prescribe an additional 8 weeks of lansoprazole delayed-release capsules USP.
- for continued healing of erosive esophagitis.
- for the long-term treatment of conditions where your stomach makes too much acid. This includes a condition called Zollinger-Ellison syndrome.

Lansoprazole delayed-release capsules USP are used in children and adolescents (ages 1 to 17):

- for up to 12 weeks to treat GERD and erosive esophagitis in children 1 to 11 years old.
- for up to 8 weeks to treat GERD and erosive esophagitis in adolescents 12 to 17 years old.

Lansoprazole delayed-release capsules USP are not effective for symptoms of GERD in children under the age of 1 year.

Lansoprazole delayed-release capsules USP may help your acid-related symptoms, but you could still have serious stomach problems. Talk with your doctor.

Who should not take lansoprazole delayed-release capsules USP?

- Do not take lansoprazole delayed-release capsules USP if you are allergic to lansoprazole delayed-release capsules USP or any of its ingredients. See the end of this leaflet for a complete list of ingredients in lansoprazole delayed-release capsules USP.

What should I tell my doctor before taking lansoprazole delayed-release capsules USP?

Before you take lansoprazole delayed-release capsules USP, tell your doctor if you:

- have been told that you have low magnesium levels in your blood.
- have liver problems
- have any other medical conditions
- are pregnant or plan to become pregnant. It is not known if lansoprazole delayed-release capsules USP will harm your unborn baby. Talk to your doctor if you are pregnant or plan to become pregnant.
- are breast-feeding or planning to breast-feed. You and your doctor should decide if you will take lansoprazole delayed-release capsules USP or breast-feed. You should not do both without first talking with your doctor.

Tell your doctor about all the medicines you take, including prescription and non-prescription medicines, vitamins, and herbal supplements.

Lansoprazole delayed-release capsules USP may affect how other medicines work, and other medicines may affect how lansoprazole delayed-release capsules USP work.

Especially tell your doctor if you take:

- ampicillin sodium (Unasyn[®]) or ampicillin trihydrate (Principen[®])
- atazanavir (Reyataz[®])
- digoxin (Lanoxin[®])
- a product that contains iron
- ketoconazole (Nizoral[®])
- warfarin (Coumadin[®], Jantoven[®])
- tacrolimus (Prograf[®])
- theophylline (Theo-24[®], Elixophyllin, Theochron, Theolair[™])

Ask your doctor or pharmacist if you are not sure if your medicine is listed above.

How should I take lansoprazole delayed-release capsules USP?

- Take lansoprazole delayed-release capsules USP exactly as prescribed by your doctor.
- Do not change your dose or stop taking lansoprazole delayed-release capsules USP without talking to your doctor first.
- You should take lansoprazole delayed-release capsules USP before eating.
- **Lansoprazole delayed-release capsules USP:**
 - You should swallow lansoprazole delayed-release capsules USP whole.
 - **Do not crush or chew lansoprazole delayed-release capsules USP.**
 - If you have trouble swallowing a whole capsule, you can open the capsule and take the contents with certain foods or juices. See “Patient Instructions for Use” at the end of this leaflet for instructions on how to take lansoprazole delayed-release capsules USP with certain foods and juices.
 - See “Patient Instructions for Use” at the end of this leaflet for instructions on how to mix and give lansoprazole delayed-release capsules USP through a nasogastric tube.
- If you miss a dose, take it as soon as you remember. If it is almost time for your next dose, skip the missed dose. Just take the next dose at your regular time. Do not take 2 doses at the same time. If you are not sure about dosing, call your doctor. If you take too many lansoprazole delayed-release capsules USP, call your doctor right away.

What are the possible side effects of lansoprazole delayed-release capsules USP?

The most common side effects of lansoprazole delayed-release capsules USP in adults and children include:

- diarrhea
- stomach pain
- nausea

- constipation
- headache
- dizziness

Other side effects

- **Serious allergic reactions.** Tell your doctor if you get any of the following symptoms with lansoprazole delayed-release capsules USP.
 - rash
 - face swelling
 - throat tightness
 - difficulty breathing

Your doctor may stop lansoprazole delayed-release capsules USP if these symptoms happen.

- **Bone Fractures.** People who are taking multiple daily doses of proton pump inhibitor medicines for a long period of time may have an increased risk of fractures of the hip, wrist or spine.
- **Low magnesium levels in your body.** This problem can be serious. Low magnesium can happen in some people who take a proton pump inhibitor medicine for at least 3 months. If low magnesium levels happen, it is usually after a year of treatment. You may or may not have symptoms of low magnesium.

Tell your doctor right away if you have any of these symptoms:

- ◦ seizures
- dizziness
- abnormal or fast heartbeat
- jitteriness
- jerking movements or shaking (tremors)
- muscle weakness
- spasms of the hands and feet
- cramps or muscle aches
- spasm of the voice box

Your doctor may check the level of magnesium in your body before you start taking lansoprazole delayed-release capsules USP, or during treatment; if you will be taking lansoprazole delayed-release capsules USP for a long period of time.

Tell your doctor if you have any side effect that bothers you or that does not go away.

These are not all the possible side effects of lansoprazole delayed-release capsules USP. For more information, ask your doctor or pharmacist.

Call your doctor for medical advice about side effects. You may report side effects to the FDA at 1-800-FDA-1088.

How should I store lansoprazole delayed-release capsules USP?

- Store lansoprazole delayed-release capsules USP at room temperature between 20° to 25°C (68° to 77°F).

Keep lansoprazole delayed-release capsules USP and all medicines out of the reach of children.

General information about lansoprazole delayed-release capsules USP.

Medicines are sometimes prescribed for conditions other than those listed in a Patient Information Leaflet. Do not use lansoprazole delayed-release capsules USP for conditions for which they were not prescribed. Do not give lansoprazole delayed-release capsules USP to other people, even if they have the same symptoms you have. They may harm them.

This Patient Information Leaflet provides a summary of the most important information about lansoprazole delayed-release capsules USP. If you would like more information, talk with your doctor. You can ask your doctor or pharmacist for information that is written for healthcare professionals.

For more information, call 1-888-838-2872, MEDICAL AFFAIRS.

What are the ingredients in lansoprazole delayed-release capsules USP?

Active ingredient: lansoprazole.

Inactive ingredients in lansoprazole delayed-release capsules USP:

black iron oxide, gelatin, hypromellose, magnesium carbonate, methacrylic acid copolymer dispersion, propylene glycol, red iron oxide, shellac, sugar spheres (which contain sucrose and corn starch), talc, titanium dioxide, and triethyl citrate. Additionally, 15 mg capsule contains brilliant blue FCF - FD&C blue 1. The imprinting ink may contain potassium hydroxide.

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Manufactured In Israel By:

TEVA PHARMACEUTICAL IND. LTD.

Jerusalem, 91010, Israel

Manufactured For:

TEVA PHARMACEUTICALS USA

Sellersville, PA 18960

Rev. B 8/2011

Patient Instructions for Use

Lansoprazole Delayed-Release Capsules USP

Lansoprazole Delayed-Release Capsules USP

- ◦ Swallow lansoprazole delayed-release capsules USP whole. Do not crush or chew them.
 - You should take lansoprazole delayed-release capsules USP before eating.
- **Lansoprazole Delayed-Release Capsules USP with certain food:**

You can only use applesauce, ENSURE[®] pudding, cottage cheese, yogurt or strained pears.

1. Open the capsule.
2. Sprinkle the granules on 1 tablespoon of either applesauce, ENSURE[®] pudding, cottage cheese, yogurt or strained pears.
3. Swallow right away.

- **Lansoprazole Delayed-Release Capsules USP with certain juices:**

You can only use apple juice, orange juice or tomato juice.

1. Open the capsule.
2. Sprinkle the granules into 60 mL (about ¼ cup) of either apple juice, orange juice or tomato juice.
3. Stir.
4. Swallow right away.
5. To make sure that the entire dose is taken, rinse the glass with 1/2 cup or more of juice to get out any leftover granules. Swallow the juice right away.

Lansoprazole Delayed-Release Capsules USP through a nasogastric tube (NG tube) 16 French or larger, as prescribed by your doctor:

You can only use apple juice.

1. Open the capsule and empty the granules into a syringe.
2. Do not break or crush the granules.
3. Mix with 40 mL of apple juice. **Do not use other liquids.**
4. Attach the syringe to the NG tube and give the medicine in the syringe through the NG tube into the stomach.
5. After giving the granules, flush the NG tube with more apple juice to clear the tube.

Lansoprazole delayed-release capsules USP should not be used in foods or liquids not listed above.

How should I store lansoprazole delayed-release capsules USP?

- Store lansoprazole delayed-release capsules USP at room temperature between 20° to 25°C (68° to 77°F).

Keep lansoprazole delayed-release capsules USP and all medicines out of the reach of children.

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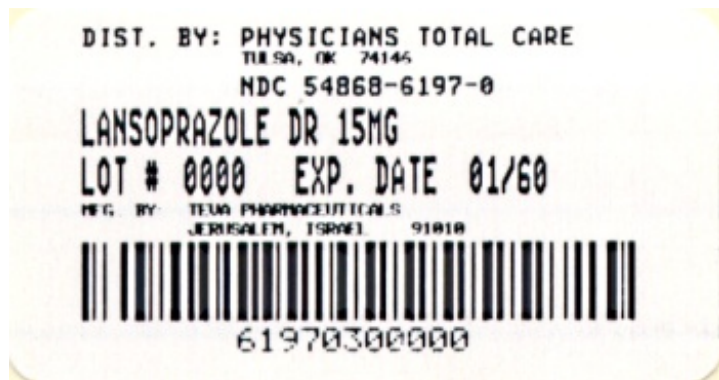
Manufactured For:

TEVA PHARMACEUTICALS USA

Sellersville, PA 18960

Iss. 5/2011

PRINCIPAL DISPLAY PANEL



Lansoprazole Delayed-Release Capsules USP 15 mg Text

LANSOPRAZOLE

DELAYED-RELEASE

Capsules USP, 15 mg

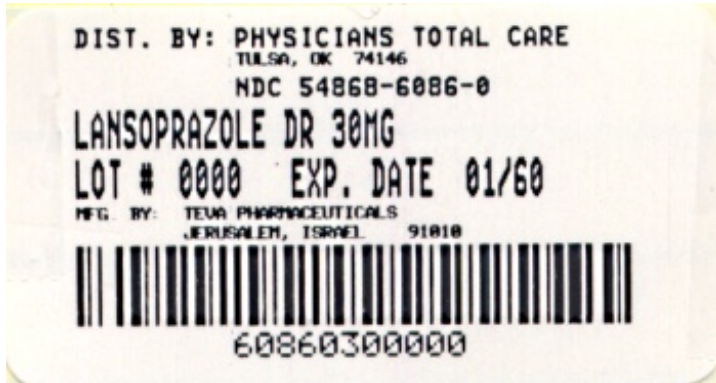
PHARMACIST: PLEASE

DISPENSE WTH ATTACHED

PATIENT INFORMATION LEAFLET

Rx only

PRINCIPAL DISPLAY PANEL



Lansoprazole Delayed-Release Capsules USP 30 mg Text

LANSOPRAZOLE

DELAYED-RELEASE

Capsules USP, 30 mg

PHARMACIST: PLEASE

DISPENSE WITH ATTACHED

PATIENT INFORMATION LEAFLET

Rx only

LANSOPRAZOLE

lansoprazole capsule, delayed release

Product Information

Product Type	HUMAN PRESCRIPTION DRUG	Item Code (Source)	NDC:54868-6197(NDC:0093-7350)
Route of Administration	ORAL		

Active Ingredient/Active Moiety

Ingredient Name	Basis of Strength	Strength
LANSOPRAZOLE (UNII: 0K5C5T2QPG) (LANSOPRAZOLE - UNII:0K5C5T2QPG)	LANSOPRAZOLE	15 mg

Inactive Ingredients

Ingredient Name	Strength
------------------------	-----------------

FERROSO FERRIC OXIDE (UNII: XM0M87F357)
GELATIN (UNII: 2G86QN327L)
HYPROMELLOSE 2910 (6 MPAS) (UNII: 0WZ8WG20P6)
MAGNESIUM CARBONATE (UNII: 0E53J927NA)
METHACRYLIC ACID - ETHYL ACRYLATE COPOLYMER (1:1) TYPE A (UNII: NX76LV5T8J)
PROPYLENE GLYCOL (UNII: 6DC9Q167V3)
FERRIC OXIDE RED (UNII: 1K09F3G675)
SHELLAC (UNII: 46N107B71O)
SUCROSE (UNII: C151H8M554)
STARCH, CORN (UNII: O8232NY3SJ)
TALC (UNII: 7SEV7J4R1U)
TITANIUM DIOXIDE (UNII: 15FIX9V2JP)
TRIETHYL CITRATE (UNII: 8Z96QXD6UM)
FD&C BLUE NO. 1 (UNII: H3R47K3TBD)
POTASSIUM HYDROXIDE (UNII: WZH3C48M4T)

Product Characteristics

Color	BLUE (light-blue) , WHITE (flesh-colored)	Score	no score
Shape	CAPSULE	Size	16mm
Flavor		Imprint Code	93;7350
Contains			

Packaging

#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:54868-6197-0	30 in 1 BOTTLE		

Marketing Information

Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
ANDA	ANDA077255	11/17/2010	

LANSOPRAZOLE

lansoprazole capsule, delayed release

Product Information

Product Type	HUMAN PRESCRIPTION DRUG	Item Code (Source)	NDC:54868-6086(NDC:0093-7351)
Route of Administration	ORAL		

Active Ingredient/Active Moiety

Ingredient Name	Basis of Strength	Strength
LANSOPRAZOLE (UNII: 0K5C5T2QPG) (LANSOPRAZOLE - UNII:0K5C5T2QPG)	LANSOPRAZOLE	30 mg

Inactive Ingredients

Ingredient Name	Strength
FERROSFERRIC OXIDE (UNII: XM0M87F357)	
GELATIN (UNII: 2G86QN327L)	
HYPROMELLOSE 2910 (6 MPAS) (UNII: 0WZ8WG20P6)	
MAGNESIUM CARBONATE (UNII: 0E53J927NA)	
METHACRYLIC ACID - ETHYL ACRYLATE COPOLYMER (1:1) TYPE A (UNII: NX76LV5T8J)	
PROPYLENE GLYCOL (UNII: 6DC9Q167V3)	
FERRIC OXIDE RED (UNII: 1K09F3G675)	
SHELLAC (UNII: 46N107B71O)	
SUCROSE (UNII: C151H8M554)	
STARCH, CORN (UNII: O8232NY3SJ)	
TALC (UNII: 7SEV7J4R1U)	
TITANIUM DIOXIDE (UNII: 15FIX9V2JP)	
TRIETHYL CITRATE (UNII: 8Z96QXD6UM)	
POTASSIUM HYDROXIDE (UNII: WZH3C48M4T)	

Product Characteristics

Color	GRAY (light-gray) , WHITE (flesh-colored)	Score	no score
Shape	CAPSULE	Size	19mm
Flavor		Imprint Code	93;7351
Contains			

Packaging

#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:54868-6086-0	30 in 1 BOTTLE		
2	NDC:54868-6086-1	60 in 1 BOTTLE		

Marketing Information

Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
ANDA	ANDA077255	11/17/2009	

Labeler - Physicians Total Care, Inc. (194123980)

Establishment

Name	Address	ID/FEI	Business Operations
Physicians Total Care, Inc.		194123980	relabel, repack