

CENTER FOR DRUG EVALUATION AND RESEARCH

Approval Package for:

APPLICATION NUMBER:

ANDA 62-756 / S-018, S-022, and S-026

Name: Primaxin[®] I.V. in ADD-Vantage[®] vials
(Imipenem-Cilastatin Sodium for Injection)

Sponsor: Merck Research Laboratories

Approval Date: October 11, 1996

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APPROVAL LETTER

The materials submitted are being retained in our files.

Sincerely yours,

J Phillips

10/11/96

Jerry Phillips
Director
Division of Labeling and Program Support
Office of Generic Drugs
Center for Drug Evaluation and Research

cc: AADA 62-756/S-018; S-022; S-026

Dup/Division File

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62756s26.apl

Approval - Multiple supplements

Jon Clark 9-30-96

Allyson 9/30/96

from 201/225 after 9/06/96

J Phillips

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APPLICATION NUMBER:

ANDA 62-756 / S-018, S-022, and S-026

LABELING

SL-026



7882121

PRIMAXIN® I.V. (Imipenem-Cilastatin Sodium for Injection)

MERCK & CO., INC.
West Point, PA 19486, USA

PRIMAXIN® I.V.

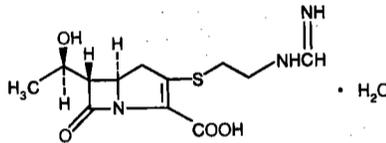
(IMIPENEM-CILASTATIN SODIUM FOR INJECTION)

For Intravenous Injection Only

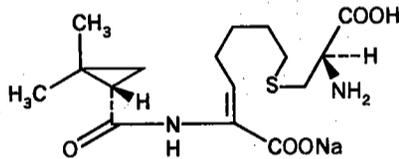
DESCRIPTION

PRIMAXIN[†] I.V. (Imipenem-Cilastatin Sodium for Injection) is a sterile formulation of imipenem (a thienamycin antibiotic) and cilastatin sodium (the inhibitor of the renal dipeptidase, dehydropeptidase II, with sodium bicarbonate added as a buffer. PRIMAXIN I.V. is a potent broad spectrum antibacterial agent for intravenous administration.

Imipenem (N-formimidoylthienamycin monohydrate) is a crystalline derivative of thienamycin, which is produced by *Streptomyces cattleya*. Its chemical name is (5R,6S)-3-[[2-(formimidoylamino)ethyl]thio]-6-[(R)-1-hydroxyethyl]-7-oxo-1-azabicyclo[3.2.0]hept-2-ene-2-carboxylic acid monohydrate. It is an off-white, nonhygroscopic crystalline compound with a molecular weight of 317.37. It is sparingly soluble in water, and slightly soluble in methanol. Its empirical formula is C₁₂H₁₇N₃O₄S·H₂O, and its structural formula is:



Cilastatin sodium is the sodium salt of a derivatized heptenoic acid. Its chemical name is sodium (2S)-7-[[[(R)-2-amino-2-carboxyethyl]thio]-2-[(S)-2,2-dimethylcyclopropanecarboxamido]-2-heptenoate. It is an off-white to yellowish-white, hygroscopic, amorphous compound with a molecular weight of 380.43. It is very soluble in water and in methanol. Its empirical formula is C₁₆H₂₅N₂O₅S Na, and its structural formula is:



PRIMAXIN I.V. is buffered to provide solutions in the pH range of 6.5 to 7.5. There is no significant change in pH when solutions are prepared and used as directed. (See **COMPATIBILITY AND STABILITY**). PRIMAXIN I.V. 250 contains 18.8 mg of sodium (0.8 mEq) and PRIMAXIN I.V. 500 contains 37.5 mg of sodium (1.6 mEq). Solutions of PRIMAXIN I.V. range from colorless to yellow. Variations of color within this range do not affect the potency of the product.

CLINICAL PHARMACOLOGY

Intravenous Administration

Intravenous infusion of PRIMAXIN I.V. over 20 minutes results in peak plasma levels of imipenem antimicrobial activity that range from 14 to 24 µg/mL for the 250 mg dose, from 21 to 58 µg/mL for the 500 mg dose and from 41 to 83 µg/mL for the 1000 mg dose. At these doses, plasma levels of imipenem antimicrobial activity decline to below 1 µg/mL or less in 4 to 6 hours. Peak plasma levels of cilastatin following a 20-minute intravenous infusion of PRIMAXIN I.V., range from 15 to 25 µg/mL for the 250 mg dose, from 31 to 49 µg/mL for the 500 mg dose and from 56 to 88 µg/mL for the 1000 mg dose.

General

The plasma half-life of each component is approximately 1 hour. The binding of imipenem to human serum proteins is approximately 20% and that of cilastatin is approximately 40%. Approximately 70% of the administered imipenem is recovered in the urine within 10 hours after which no further urinary excretion is detectable. Urine concentrations of imipenem in excess of 10 µg/mL can be maintained for up to 8 hours with PRIMAXIN I.V. at the 500 mg dose. Approximately 70% of the cilastatin sodium dose is recovered in the urine within 10 hours of administration of PRIMAXIN I.V.

No accumulation of PRIMAXIN I.V. in plasma or urine is observed with regimens administered as frequently as every 6 hours in patients with normal renal function.

Imipenem, when administered alone, is metabolized in the kidneys by dehydropeptidase I resulting in relatively low levels in urine. Cilastatin sodium, an inhibitor of this enzyme, effectively prevents renal metabolism of imipenem so that when imipenem and cilastatin sodium are given concomitantly, fully adequate antibacterial levels of imipenem are achieved in the urine.

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After a 1 gram dose of PRIMAXIN I.V., the following average levels of imipenem were measured (usually at 1 hour post-dose except where indicated) in the tissues and fluids listed:

Tissue or Fluid	n	Imipenem Level µg/mL or µg/g	Range
Vitreous Humor	3	3.4 (3.5 hours post dose)	2.88-3.6
Aqueous Humor	5	2.99 (2 hours post dose)	2.4-3.9
Lung Tissue	8	5.6 (median)	3.5-15.5
Sputum	1	2.1	—
Pleural	1	22.0	—
Peritoneal	12	23.9 S.D. ±5.3 (2 hours post dose)	—
Bile	2	5.3 (2.25 hours post dose)	4.6-6.0
CSF (uninflamed)	5	1.0 (4 hours post dose)	0.26-2.0
CSF (inflamed)	7	2.6 (2 hours post dose)	0.5-5.5
Fallopian Tubes	1	13.6	—
Endometrium	1	11.1	—
Myometrium	1	5.0	—
Bone	10	2.6	0.4-5.4
Interstitial Fluid	12	16.4	10.0-22.6
Skin	12	4.4	NA
Fascia	12	4.4	NA

Imipenem-cilastatin sodium is hemodialyzable. However, usefulness of this procedure in the overdosage setting is questionable. (See **OVERDOSAGE**.)

Microbiology

The bactericidal activity of imipenem results from the inhibition of cell wall synthesis. Its greatest affinity is for penicillin binding proteins (PBPs) 1A, 1B, 2, 4, 5 and 6 of *Escherichia coli*, and 1A, 1B, 2, 4 and 5 of *Pseudomonas aeruginosa*. The lethal effect is related to binding to PBP 2 and PBP 1B.

Imipenem has a high degree of stability in the presence of beta-lactamases, both penicillinases and cephalosporinases produced by gram-negative and gram-positive bacteria. It is a potent inhibitor of beta-lactamases from certain gram-negative bacteria which are inherently resistant to most beta-lactam antibiotics, e.g., *Pseudomonas aeruginosa*, *Serratia* spp., and *Enterobacter* spp.

Imipenem has *in vitro* activity against a wide range of gram-positive and gram-negative organisms. Imipenem is active against most strains of the following microorganisms *in vitro* and in clinical infections treated with the intravenous formulation of imipenem-cilastatin sodium. (See **INDICATIONS AND USAGE**.)

Gram-positive aerobes:

Enterococcus faecalis (formerly *S. faecalis*)

(NOTE: Imipenem is inactive *in vitro* against *Enterococcus faecium* (formerly *S. faecium*l).)

Staphylococcus aureus including penicillinase-producing strains

Staphylococcus epidermidis including penicillinase-producing strains

(NOTE: Methicillin-resistant staphylococci should be reported as resistant to imipenem.)

Streptococcus agalactiae (Group B streptococcus)

Streptococcus pneumoniae

Streptococcus pyogenes

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Gram-negative aerobes:

Acinetobacter spp.

Citrobacter spp.

Enterobacter spp.

Escherichia coli

Gardnerella vaginalis

Haemophilus influenzae

Haemophilus parainfluenzae

Klebsiella spp.

Morganella morganii

Proteus vulgaris

Providencia rettgeri

Pseudomonas aeruginosa

(NOTE: Imipenem is inactive *in vitro* against *Xanthomonas (Pseudomonas) maltophilia* and some strains of *P. cepacia*.)

Serratia spp., including *S. marcescens*

Gram-positive anaerobes:

Bifidobacterium spp.

Clostridium spp.

Eubacterium spp.

Peptococcus spp.

Peptostreptococcus spp.

Propionibacterium spp.

Gram-negative anaerobes:

Bacteroides spp., including *B. fragilis*

Fusobacterium spp.

The following *in vitro* data are available, **but their clinical significance is unknown.**

Imipenem exhibits *in vitro* minimum inhibitory concentrations (MIC's) of 4 µg/mL or less against most (≥90%) strains of the following microorganisms; however, the safety and effectiveness of imipenem in treating clinical infections due to these microorganisms have not been established in adequate and well-controlled clinical trials.

Gram-positive aerobes:

Listeria monocytogenes

Nocardia spp.

Group C streptococcus

Group G streptococcus

Viridans group streptococci

Gram-negative aerobes:

Achromobacter spp.

Aeromonas hydrophila

Alcaligenes spp.

Bordetella bronchiseptica

Campylobacter spp.

Hafnia alvei

Klebsiella oxytoca

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Klebsiella pneumoniae
Moraxella spp.
Neisseria gonorrhoeae including penicillinase-producing strains
Pasteurella multocida
Plesiomonas shigelloides
Proteus mirabilis
Providencia stuartii
Salmonella spp.
Serratia proteamaculans (formerly *S. liquefaciens*)
Shigella spp.
Yersinia spp., including *Y. enterocolitica* and *Y. pseudotuberculosis*

Gram-positive anaerobes:

Actinomyces spp.
Clostridium perfringens
Propionibacterium acnes

Gram-negative anaerobes:

Bacteroides spp., including *B. bivius*, *B. disiens*, *B. distans*, *B. intermedius* (formerly *B. melaninogenicus intermedius*), *B. ovatus*, *B. thetaiotaomicron*, and *B. vulgatus*
Porphyromonas asaccharolytica (formerly *B. asaccharolyticus*)

Vaillonella spp.

In vitro tests show imipenem to act synergistically with aminoglycoside antibiotics against some isolates of *Pseudomonas aeruginosa*.

Susceptibility Tests:

Measurement of MIC or minimum bactericidal concentration (MBC) and achieved antimicrobial compound concentrations may be appropriate to guide therapy in some infections. (See **CLINICAL PHARMACOLOGY** section for further information on drug concentrations achieved in infected body sites and other pharmacokinetic properties of this antimicrobial drug product.)

Diffusion Techniques:

Quantitative methods that require measurement of zone diameters provide reproducible estimates of the susceptibility of bacteria to antimicrobial compounds. One such standardized procedure¹ that has been recommended for use with disks to test the susceptibility of microorganisms to imipenem uses the 10-µg imipenem disk. Interpretation involves correlation of the diameter obtained in the disk test with the MIC for imipenem.

Reports from the laboratory providing results of the standard single-disk susceptibility test with a 10-µg imipenem disk should be interpreted according to the following criteria:

Zone Diameter (mm)	Interpretation
≥16	Susceptible (S)
14-15	Intermediate (I)
≤13	Resistant (R)

A report of "Susceptible" indicates that the pathogen is likely to be inhibited by usually achievable concentrations of the antimicrobial compound in blood. A report of "Intermediate" indicates that the result should be considered equivocal, and, if the microorganism is not fully susceptible to alternative, clinically feasible drugs, the test should be repeated. This category implies possible clinical applicability in body sites where the drug is physiologically concentrated or in situations where high dosage of drug can be used. This category also provides a buffer zone that prevents small uncontrolled technical factors from causing major discrepancies in interpretation. A report of "Resistant" indicates that usually achievable concentrations of the antimicrobial compound in the blood are unlikely to be inhibitory and that other therapy should be selected.

Standardized susceptibility test procedures require the use of laboratory control microorganisms. The 10-µg imipenem disk should provide the following diameters in these laboratory test quality control strains:

Microorganism	Zone Diameter (mm)
<i>E. coli</i> ATCC 25922	26-32
<i>P. aeruginosa</i> ATCC 27853	20-28

Dilution Techniques:

Quantitative methods that are used to determine MIC's provide reproducible estimates of the susceptibility of bacteria to antimicrobial compounds. One such procedure uses a standardized dilution method² (broth, agar, or microdilution) or equivalent with imipenem powder.

The MIC values obtained should be interpreted according to the following criteria:

MIC (µg/mL)	Interpretation
≤4	Susceptible (S)
8	Intermediate (I)
≥16	Resistant (R)

Interpretation should be as stated above for results using diffusion techniques.

As with standard diffusion techniques, dilution methods require the use of laboratory control microorganisms. Standard imipenem powder should provide the following MIC values:

Microorganism	MIC (µg/mL)
<i>E. coli</i> ATCC 25922	0.06-0.25
<i>S. aureus</i> ATCC 29213	0.015-0.06
<i>E. faecalis</i> ATCC 29212	0.5-2.0
<i>P. aeruginosa</i> ATCC 27853	1.0-4.0

Anaerobic techniques:

For anaerobic bacteria, the susceptibility to imipenem can be determined by the reference agar dilution method or by alternate standardized test methods.³

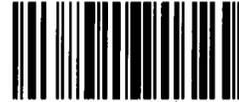
PRIMAXIN® I.V.
 (IMIPENEM-CILASTATIN SODIUM FOR INJECTION)

Circular Number 7882121



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As with other susceptibility techniques, the use of laboratory control microorganisms is required. Standard imipenem powder should provide the following MIC values:

Reference Agar Dilution Testing:

Microorganism	MIC (µg/mL)
<i>B. fragilis</i> ATCC 25285	0.03-0.12
<i>B. thetaiotaomicron</i> ATCC 29741	0.06-0.25
<i>E. lentum</i> ATCC 43055	0.25-1.0

Broth Microdilution Testing:

Microorganism	MIC (µg/mL)
<i>B. thetaiotaomicron</i> ATCC 29741	0.06-0.25
<i>E. lentum</i> ATCC 43055	0.12-0.5

INDICATIONS AND USAGE

PRIMAXIN I.V. is indicated for the treatment of serious infections caused by susceptible strains of the designated microorganisms in the diseases listed below:

(1) **Lower respiratory tract infections.** *Staphylococcus aureus* (penicillinase-producing strains), *Acinetobacter* species, *Enterobacter* species, *Escherichia coli*, *Haemophilus influenzae*, *Haemophilus parainfluenzae*, *Klebsiella* species, *Serratia marcescens*.

(2) **Urinary tract infections** (complicated and uncomplicated). *Enterococcus faecalis*, *Staphylococcus aureus* (penicillinase-producing strains), *Enterobacter* species, *Escherichia coli*, *Klebsiella* species, *Morganella morganii*, *Proteus vulgaris*, *Providencia rettgeri*, *Pseudomonas aeruginosa*.

(3) **Intra-abdominal infections.** *Enterococcus faecalis*, *Staphylococcus aureus* (penicillinase-producing strains), *Staphylococcus epidermidis*, *Citrobacter* species, *Enterobacter* species, *Escherichia coli*, *Klebsiella* species, *Morganella morganii*, *Proteus* species (indole positive and indole negative), *Pseudomonas aeruginosa*, *Bifidobacterium* species, *Clostridium* species, *Eubacterium* species, *Peptococcus* species, *Peptostreptococcus* species, *Propionibacterium* species, *Bacteroides* species including *B. fragilis*, *Fusobacterium* species.

(4) **Gynecologic infections.** *Enterococcus faecalis*, *Staphylococcus aureus* (penicillinase-producing strains), *Staphylococcus epidermidis*, *Streptococcus agalactiae* (Group B streptococcus), *Enterobacter* species, *Escherichia coli*, *Gardnerella vaginalis*, *Klebsiella* species, *Proteus* species (indole positive and indole negative), *Bifidobacterium* species, *Peptococcus* species, *Peptostreptococcus* species, *Propionibacterium* species, *Bacteroides* species including *B. fragilis*.

(5) **Bacterial septicemia.** *Enterococcus faecalis*, *Staphylococcus aureus* (penicillinase-producing strains), *Enterobacter* species, *Escherichia coli*, *Klebsiella* species, *Pseudomonas aeruginosa*, *Serratia* species, *Bacteroides* species including *B. fragilis*.

(6) **Bone and joint infections.** *Enterococcus faecalis*, *Staphylococcus aureus* (penicillinase-producing strains), *Staphylococcus epidermidis*, *Enterobacter* species, *Pseudomonas aeruginosa*.

(7) **Skin and skin structure infections.** *Enterococcus faecalis*, *Staphylococcus aureus* (penicillinase-producing strains), *Staphylococcus epidermidis*, *Acinetobacter* species, *Citrobacter* species, *Enterobacter* species, *Escherichia coli*, *Klebsiella* species, *Morganella morganii*, *Proteus vulgaris*, *Providencia rettgeri*, *Pseudomonas aeruginosa*, *Serratia* species, *Peptococcus* species, *Peptostreptococcus* species, *Bacteroides* species including *B. fragilis*, *Fusobacterium* species.

(8) **Endocarditis.** *Staphylococcus aureus* (penicillinase-producing strains).

(9) **Polymicrobial infections.** PRIMAXIN I.V. is indicated for polymicrobial infections including those in which *S. pneumoniae* (pneumonia, septicemia), Group A beta-hemolytic streptococcus (skin and skin structure), or nonpenicillinase-producing *S. aureus* is one of the causative organisms. However, monobacterial infections due to these organisms are usually treated with narrower spectrum antibiotics, such as penicillin G.

PRIMAXIN I.V. is not indicated in patients with meningitis because safety and efficacy have not been established.

Because of its broad spectrum of bactericidal activity against gram-positive and gram-negative aerobic and anaerobic bacteria, PRIMAXIN I.V. is useful for the treatment of mixed infections and as presumptive therapy prior to the identification of the causative organisms.

Although clinical improvement has been observed in patients with cystic fibrosis, chronic pulmonary disease, and lower respiratory tract infections caused by *Pseudomonas aeruginosa*, bacterial eradication may not necessarily be achieved.

As with other beta-lactam antibiotics, some strains of *Pseudomonas aeruginosa* may develop resistance fairly rapidly during treatment with PRIMAXIN I.V. During therapy of *Pseudomonas aeruginosa* infections, periodic susceptibility testing should be done when clinically appropriate.

Infections resistant to other antibiotics, for example, cephalosporins, penicillin, and aminoglycosides, have been shown to respond to treatment with PRIMAXIN I.V.

CONTRAINDICATIONS

PRIMAXIN I.V. is contraindicated in patients who have shown hypersensitivity to any component of this product.

WARNINGS

SERIOUS AND OCCASIONALLY FATAL HYPERSENSITIVITY (anaphylactic) REACTIONS HAVE BEEN REPORTED IN PATIENTS RECEIVING THERAPY WITH BETA-LACTAMS. THESE REACTIONS ARE MORE APT TO OCCUR IN PERSONS WITH A HISTORY OF SENSITIVITY TO MULTIPLE ALLERGENS.

*Efficacy for this organism in this organ system was studied in fewer than 10 infections.

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THERE HAVE BEEN REPORTS OF PATIENTS WITH A HISTORY OF PENICILLIN HYPERSENSITIVITY WHO HAVE EXPERIENCED SEVERE HYPERSENSITIVITY REACTIONS WHEN TREATED WITH ANOTHER BETA-LACTAM. BEFORE INITIATING THERAPY WITH PRIMAXIN I.V., CAREFUL INQUIRY SHOULD BE MADE CONCERNING PREVIOUS HYPERSENSITIVITY REACTIONS TO PENICILLINS, CEPHALOSPORINS, OTHER BETA-LACTAMS, AND OTHER ALLERGENS. IF AN ALLERGIC REACTION OCCURS, PRIMAXIN SHOULD BE DISCONTINUED.

SERIOUS ANAPHYLACTIC REACTIONS REQUIRE IMMEDIATE EMERGENCY TREATMENT WITH EPINEPHRINE, OXYGEN, INTRAVENOUS STEROIDS, AND AIRWAY MANAGEMENT, INCLUDING INTUBATION, MAY ALSO BE ADMINISTERED AS INDICATED.

Seizures and other CNS adverse experiences, such as confusional states and myoclonic activity, have been reported during treatment with PRIMAXIN I.V. (See PRECAUTIONS.)

Pseudomembranous colitis has been reported with nearly all antibacterial agents, including imipenem-cilastatin sodium, and may range in severity from mild to life threatening. Therefore, it is important to consider this diagnosis in patients who present with diarrhea subsequent to the administration of antibacterial agents.

Treatment with antibacterial agents alters the normal flora of the colon and may permit overgrowth of clostridia. Studies indicate that a toxin produced by *Clostridium difficile* is one primary cause of "antibiotic-associated colitis".

After the diagnosis of pseudomembranous colitis has been established, therapeutic measures should be initiated. Mild cases of pseudomembranous colitis usually respond to drug discontinuation alone. In moderate to severe cases, consideration should be given to management with fluids and electrolytes, protein supplementation and treatment with an antibacterial drug clinically effective against *C. difficile* colitis.

PRECAUTIONS**General**

CNS adverse experiences such as confusional states, myoclonic activity, and seizures have been reported during treatment with PRIMAXIN I.V., especially when recommended dosages were exceeded. These experiences have occurred most commonly in patients with CNS disorders (e.g., brain lesions or history of seizures) and/or compromised renal function. However, there have been reports of CNS adverse experiences in patients who had no recognized or documented underlying CNS disorder or compromised renal function.

When recommended doses were exceeded, adult patients with creatinine clearances of ≤ 20 mL/min/1.73 m², whether or not undergoing hemodialysis, had a higher risk of seizure activity than those without impairment of renal function. Therefore, close adherence to the dosing guidelines for these patients is recommended. (See DOSAGE AND ADMINISTRATION.)

Patients with creatinine clearances of ≤ 5 mL/min/1.73 m² should not receive PRIMAXIN I.V. unless hemodialysis is instituted within 48 hours.

For patients on hemodialysis, PRIMAXIN I.V. is recommended only when the benefit outweighs the potential risk of seizures.

Close adherence to the recommended dosage and dosage schedules is urged, especially in patients with known factors that predispose to convulsive activity. Anticonvulsant therapy should be continued in patients with known seizure disorders. If focal tremors, myoclonus, or seizures occur, patients should be evaluated neurologically, placed on anticonvulsant therapy if not already instituted, and the dosage of PRIMAXIN I.V. re-examined to determine whether it should be decreased or the antibiotic discontinued.

As with other antibiotics, prolonged use of PRIMAXIN I.V. may result in overgrowth of nonsusceptible organisms. Repeated evaluation of the patient's condition is essential. If superinfection occurs during therapy, appropriate measures should be taken.

Laboratory Tests

While PRIMAXIN I.V. possesses the characteristic low toxicity of the beta-lactam group of antibiotics, periodic assessment of organ system functions, including renal, hepatic, and hematopoietic, is advisable during prolonged therapy.

Drug Interactions

Generalized seizures have been reported in patients who received ganciclovir and PRIMAXIN. These drugs should not be used concomitantly unless the potential benefits outweigh the risks.

Since concomitant administration of PRIMAXIN and probenecid results in only minimal increases in plasma levels of imipenem and plasma half-life, it is not recommended that probenecid be given with PRIMAXIN.

PRIMAXIN should not be mixed with or physically added to other antibiotics. However, PRIMAXIN may be administered concomitantly with other antibiotics, such as aminoglycosides.

Carcinogenesis, Mutagenesis, Impairment of Fertility

Long term studies in animals have not been performed to evaluate carcinogenic potential of imipenem-cilastatin. Genetic toxicity studies were performed in a variety of bacterial and mammalian tests *in vivo* and *in vitro*. The tests used were: V79 mammalian cell mutagenesis assay (imipenem-cilastatin sodium alone and imipenem alone), Ames test (cilastatin sodium alone and imipenem alone), unscheduled DNA synthesis assay (imipenem-cilastatin sodium) and *in vivo* mouse cytogenetics test (imipenem-cilastatin sodium). None of these tests showed any evidence of genetic alterations.

Reproductive tests in male and female rats were performed with imipenem-cilastatin sodium at dosage levels up to





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11 times^{††} the usual human dose of the intravenous formulation (on a mg/kg basis). Slight decreases in live fetal body weight were restricted to the highest dosage level. No other adverse effects were observed on fertility, reproductive performance, fetal viability, growth or postnatal development of pups. Similarly, no adverse effects on the fetus or on lactation were observed when imipenem-cilastatin sodium was administered to rats late in gestation.

Pregnancy: Teratogenic Effects

Pregnancy Category C: Teratology studies with cilastatin sodium in rabbits and rats at 6 to 20 times^{††} the maximum recommended human dose of the intravenous formulation of imipenem-cilastatin sodium (50 mg/kg/day^{††}), respectively, showed no evidence of adverse effect on the fetus. No evidence of teratogenicity was observed in rabbits and rats given imipenem at doses up to 1 and 18 times^{††} the maximum recommended daily human dose of the intravenous formulation of imipenem-cilastatin sodium, respectively.

Teratology studies with imipenem-cilastatin sodium at doses up to 11 times^{††} the usual recommended human dose of the intravenous formulation (30 mg/kg/day^{††}) in pregnant mice and rats during the period of major organogenesis revealed no evidence of teratogenicity.

Imipenem-cilastatin sodium, when administered to pregnant rabbits at dosages equivalent to the usual human dose of the intravenous formulation and higher, caused body weight loss, diarrhea, and maternal deaths. When comparable doses of imipenem-cilastatin sodium were given to non-pregnant rabbits, body weight loss, diarrhea, and deaths were also observed. This intolerance is not unlike that seen with other beta-lactam antibiotics in this species and is probably due to alteration of gut flora.

A teratology study in pregnant cynomolgus monkeys given imipenem-cilastatin sodium at doses of 40 mg/kg/day (bolus intravenous injection) or 160 mg/kg/day (subcutaneous injection) resulted in maternal toxicity including emesis, inappetence, body weight loss, diarrhea, abortion and death in some cases. In contrast, no significant toxicity was observed when non-pregnant cynomolgus monkeys were given doses of imipenem-cilastatin sodium up to 180 mg/kg/day (subcutaneous injection). When doses of imipenem-cilastatin sodium (approximately 100 mg/kg/day or approximately 2 times^{††} the maximum recommended daily human dose of the intravenous formulation) were administered to pregnant cynomolgus monkeys at an intravenous infusion rate which mimics human clinical use, there was minimal maternal intolerance (occasional emesis), no maternal deaths, no evidence of teratogenicity, but an increase in embryonic loss relative to control groups.

There are, however, no adequate and well-controlled studies in pregnant women. PRIMAXIN I.V. should be used during pregnancy only if the potential benefit justifies the potential risk to the mother and fetus.

Nursing Mothers

It is not known whether imipenem-cilastatin sodium is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when PRIMAXIN I.V. is administered to a nursing woman.

Pediatric Use

Safety and effectiveness in infants and children below 12 years of age have not yet been established.

ADVERSE REACTIONS

PRIMAXIN I.V. is generally well tolerated. Many of the 1,723 patients treated in clinical trials were severely ill and had multiple background diseases and physiological impairments, making it difficult to determine causal relationship of adverse experiences to therapy with PRIMAXIN I.V.

Local Adverse Reactions

Adverse local clinical reactions that were reported as possibly, probably, or definitely related to therapy with PRIMAXIN I.V. were:

- Phlebitis/thrombophlebitis — 3.1%
- Pain at the injection site — 0.7%
- Erythema at the injection site — 0.4%
- Vein induration — 0.2%
- Infused vein infection — 0.1%

Systemic Adverse Reactions

The most frequently reported systemic adverse clinical reactions that were reported as possibly, probably, or definitely related to PRIMAXIN I.V. were nausea (2.0%), diarrhea (1.8%), vomiting (1.5%), rash (0.9%), fever (0.5%), hypotension (0.4%), seizures (0.4%) (see **PRECAUTIONS**), dizziness (0.3%), pruritus (0.3%), urticaria (0.2%), somnolence (0.2%).

Additional adverse systemic clinical reactions reported as possibly, probably, or definitely drug related occurring in less than 0.2% of the patients or reported since the drug was marketed are listed within each body system in order of decreasing severity: **Gastrointestinal** — pseudomembranous colitis (the onset of pseudomembranous colitis symptoms may occur during or after antibacterial treatment, see **WARNINGS**), hemorrhagic colitis, hepatitis, jaundice, gastroenteritis, abdominal pain, glossitis, tongue papillar hypertrophy, staining of the teeth, heartburn, pharyngeal pain, increased salivation; **Hematologic** — pancytopenia, bone marrow depression, thrombocytopenia, neutropenia, leukopenia, hemolytic anemia; **CNS** — encephalopathy, tremor, confusion, myoclonus, paresthesia, vertigo, headache, psychic disturbances including hallucinations; **Special Senses** — hearing loss, tinnitus, taste perversion; **Respiratory** — chest discomfort, dyspnea, hyperventilation, thoracic spine pain; **Cardiovascular** — palpitations, tachycardia; **Skin** — Stevens-Johnson syndrome, toxic epidermal necrolysis, erythema multiforme, angioneurotic edema, flushing, cyanosis, hyperhidrosis, skin texture changes, candidiasis, pruritus vulvae; **Body as a whole** — polyarthralgia, asthenia/weakness; **Renal** — acute renal failure, oliguria/anuria, polyuria, urine

^{††} Based on patient weight of 70 kg.

discoloration. The role of PRIMAXIN I.V. in changes in renal function is difficult to assess, since factors predisposing to pre-renal azotemia or to impaired renal function usually have been present.

Adverse Laboratory Changes

Adverse laboratory changes without regard to drug relationship that were reported during clinical trials or reported since the drug was marketed were:

Hepatic: Increased ALT (SGPT), AST (SGOT), alkaline phosphatase, bilirubin, and LDH.

Hemic: Increased eosinophils, positive Coombs test, increased WBC, increased platelets, decreased hemoglobin and hematocrit, agranulocytosis, increased monocytes, abnormal prothrombin time, increased lymphocytes, increased basophils.

Electrolytes: Decreased serum sodium, increased potassium, increased chloride.

Renal: Increased BUN, creatinine.

Urinalysis: Presence of urine protein, urine red blood cells, urine white blood cells, urine casts, urine bilirubin, and urine urobilinogen.

OVERDOSAGE

The acute intravenous toxicity of imipenem-cilastatin sodium in a ratio of 1:1 was studied in mice at doses of 751 to 1359 mg/kg. Following drug administration, ataxia was rapidly produced and clonic convulsions were noted in about 45 minutes. Deaths occurred within 4-56 minutes at all doses.

The acute intravenous toxicity of imipenem-cilastatin sodium was produced within 5-10 minutes in rats at doses of 771 to 1583 mg/kg. In all dosage groups, females had decreased activity, bradypnea and ptosis with clonic convulsions preceding death; in males, ptosis was seen at all dose levels while tremors and clonic convulsions were seen at all but the lowest dose (771 mg/kg). In another rat study, female rats showed ataxia, bradypnea and decreased activity in all but the lowest dose (550 mg/kg); deaths were preceded by clonic convulsions. Male rats showed tremors at all doses and clonic convulsions and ptosis were seen at the two highest doses (1130 and 1734 mg/kg). Deaths occurred between 6 and 88 minutes with doses of 771 to 1734 mg/kg.

In the case of overdosage, discontinue PRIMAXIN I.V., treat symptomatically, and institute supportive measures as required. Imipenem-cilastatin sodium is hemodialyzable. However, usefulness of this procedure in the overdosage setting is questionable.

DOSE AND ADMINISTRATION

The dosage recommendations for PRIMAXIN I.V. represent the quantity of imipenem to be administered. An equivalent amount of cilastatin is also present in the solution. Each 125 mg, 250 mg or 500 mg dose should be given by intravenous administration over 20 to 30 minutes. Each 750 mg or 1000 mg dose should be infused over 40 to 60 minutes. In patients who develop nausea during the infusion, the rate of infusion may be slowed.

The total daily dosage for PRIMAXIN I.V. should be based on the type or severity of infection and given in equally divided doses based on consideration of degree of susceptibility of the pathogen(s), renal function and body weight. Patients with impaired renal function, as judged by creatinine clearance ≤ 70 mL/min/1.73 m², require adjustment of dosage as described in the succeeding section of these guidelines.

Intravenous Dosage Schedule for Adults with Normal Renal Function and Body Weight ≥ 70 kg

Doses cited in Table I are based on a patient with normal renal function and a body weight of 70 kg. These doses should be used for a patient with a creatinine clearance of ≥ 71 mL/min/1.73 m² and a body weight of ≥ 70 kg. A reduction in dose must be made for a patient with a creatinine clearance of ≤ 70 mL/min/1.73 m² and/or a body weight less than 70 kg. (See Tables II and III.)

Dosage regimens in column A of Table I are recommended for infections caused by fully susceptible organisms which represent the majority of pathogenic species. Dosage regimens in column B of Table I are recommended for infections caused by organisms with moderate susceptibility to imipenem, primarily some strains of *P. aeruginosa*.

TABLE I
INTRAVENOUS DOSAGE SCHEDULE FOR ADULTS WITH
NORMAL RENAL FUNCTION AND BODY WEIGHT ≥ 70 kg

Type or Severity of Infection	A Fully susceptible organisms including gram-positive and gram-negative aerobes and anaerobes	B Moderately susceptible organisms, primarily some strains of <i>P. aeruginosa</i>
Mild	250 mg q6h (TOTAL DAILY DOSE = 1.0g)	500 mg q6h (TOTAL DAILY DOSE = 2.0g)
Moderate	500 mg q8h (TOTAL DAILY DOSE = 1.5g) or 500 mg q6h (TOTAL DAILY DOSE = 2.0g)	500 mg q6h (TOTAL DAILY DOSE = 2.0g) or 1 g q8h (TOTAL DAILY DOSE = 3.0g)
Severe, life threatening only	500 mg q6h (TOTAL DAILY DOSE = 2.0g)	1 g q8h (TOTAL DAILY DOSE = 3.0g) or 1 g q6h (TOTAL DAILY DOSE = 4.0g)
Uncomplicated urinary tract infection	250 mg q6h (TOTAL DAILY DOSE = 1.0g)	250 mg q6h (TOTAL DAILY DOSE = 1.0g)
Complicated urinary tract infection	500 mg q6h (TOTAL DAILY DOSE = 2.0g)	500 mg q6h (TOTAL DAILY DOSE = 2.0g)

PRIMAXIN® I.V. (Imipenem-Cilastatin Sodium for Injection)

Due to the high antimicrobial activity of PRIMAXIN I.V., it is recommended that the maximum total daily dosage not exceed 50 mg/kg/day or 4.0 g/day whichever is lower. There is no evidence that higher doses provide greater efficacy. However, patients over twelve years of age with cystic fibrosis and normal renal function have been treated with PRIMAXIN I.V. at doses up to 90 mg/kg/day in divided doses, not exceeding 4.0 g/day.

Reduced Intravenous Schedule for Adults with Impaired Renal Function and/or Body Weight <70 kg

Patients with creatinine clearance of ≤ 70 mL/min/1.73 m² and/or body weight less than 70 kg require dosage reduction of PRIMAXIN I.V. as indicated in the tables below. Creatinine clearance may be calculated from serum creatinine concentration by the following equation:

$$T_{cc} \text{ (Males)} = \frac{(\text{wt. in kg}) (140 - \text{age})}{(72) (\text{creatinine in mg/dL})}$$

$$T_{cc} \text{ (Females)} = 0.85 \times \text{above value}$$

To determine the dose for adults with impaired renal function and/or reduced body weight:

- Choose a total daily dose from Table I based on infection characteristics.
- a) If the total daily dose is 1.0 g, 1.5 g or 2.0 g, use the appropriate subsection of Table II and continue with step 3.
b) If the total daily dose is 3.0 g or 4.0 g, use the appropriate subsection of Table III and continue with step 3.
- From Table II or III:
a) Select the body weight on the far left which is closest to the patient's body weight (kg).
b) Select the patient's creatinine clearance category.
c) Where the row and column intersect is the reduced dosage regimen.

Patients with creatinine clearances of 6 to 20 mL/min/1.73 m² should be treated with PRIMAXIN I.V. 125 mg or 250 mg every 12 hours for most pathogens. There may be an increased risk of seizures when doses of 500 mg every 12 hours are administered to these patients.

Patients with creatinine clearance ≤ 5 mL/min/1.73 m² should not receive PRIMAXIN I.V. unless hemodialysis is instituted within 48 hours. There is inadequate information to rec-

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PRIMAXIN® I.V. (Imipenem-Cilastatin Sodium for Injection)

ommend usage of PRIMAXIN I.V. for patients undergoing peritoneal dialysis.

Hemodialysis

When treating patients with creatinine clearances of ≤ 5 mL/min/1.73 m² who are undergoing hemodialysis, use the dosage recommendations for patients with creatinine clearances of 6-20 mL/min/1.73 m². (See *Reduced Intravenous Dosage Schedule for Adults with Impaired Renal Function and/or Body Weight <70 kg*.) Both imipenem and cilastatin are cleared from the circulation during hemodialysis. The patient should receive PRIMAXIN I.V. after hemodialysis and at 12 hour intervals timed from the end of that hemodialysis session. Dialysis patients, especially those with background CNS disease, should be carefully monitored; for patients on hemodialysis, PRIMAXIN I.V. is recommended only when the benefit outweighs the potential risk of seizures. (See **PRECAUTIONS**.)

PREPARATION OF SOLUTION

Infusion Bottles

Contents of the infusion bottles of PRIMAXIN I.V. Powder should be restored with 100 mL of diluent (see list of diluents under **COMPATIBILITY AND STABILITY**) and shaken until a clear solution is obtained.

Vials

Contents of the vials must be suspended and transferred to 100 mL of an appropriate infusion solution.

A suggested procedure is to add approximately 10 mL from the appropriate infusion solution (see list of diluents under **COMPATIBILITY AND STABILITY**) to the vial. Shake well and transfer the resulting suspension to the infusion solution container.

CAUTION: THE SUSPENSION IS NOT FOR DIRECT INFUSION.

Repeat with an additional 10 mL of infusion solution to ensure complete transfer of vial contents to the infusion solution. **The resulting mixture should be agitated until clear.**

ADD-Vantage® Vials

See separate INSTRUCTIONS FOR USE OF 'PRIMAXIN I.V.' IN ADD-Vantage® VIALS. PRIMAXIN I.V. in ADD-Vantage® vials should be reconstituted with ADD-Vantage® diluent containers containing 100 mL of either 0.9% Sodium Chloride Injection or 100 mL 5% Dextrose Injection.

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PRIMAXIN® I.V. (Imipenem-Cilastatin Sodium for Injection)

COMPATIBILITY AND STABILITY

Before Reconstitution:

The dry powder should be stored at a temperature below 25°C (77°F).

Reconstituted Solutions:

Solutions of PRIMAXIN I.V. range from colorless to yellow. Variations of color within this range do not affect the potency of the product.

PRIMAXIN I.V., as supplied in infusion bottles and vials and reconstituted as above with the following diluents, maintains satisfactory potency for four hours at room temperature or for 24 hours under refrigeration (5°C). Solutions of PRIMAXIN I.V. should not be frozen.

- 0.9% Sodium Chloride Injection
- 5% or 10% Dextrose Injection
- 5% Dextrose and 0.9% Sodium Chloride Injection
- 5% Dextrose Injection with 0.225% or 0.45% saline solution
- 5% Dextrose Injection with 0.15% potassium chloride solution

Mannitol 5% and 10%

PRIMAXIN I.V. is supplied in single dose ADD-Vantage® vials and should be prepared as directed in the accompanying INSTRUCTIONS FOR USE OF 'PRIMAXIN I.V.' IN ADD-Vantage® VIALS using ADD-Vantage® diluent containers containing 100 mL of either 0.9% Sodium Chloride Injection or 5% Dextrose Injection. When prepared with either of these diluents, PRIMAXIN I.V. maintains satisfactory potency for 4 hours at room temperature.

PRIMAXIN I.V. should not be mixed with or physically added to other antibiotics. However, PRIMAXIN I.V. may be administered concomitantly with other antibiotics, such as aminoglycosides.

HOW SUPPLIED

PRIMAXIN I.V. is supplied as a sterile powder mixture in vials and infusion bottles containing imipenem (anhydrous equivalent) and cilastatin sodium as follows:

- No. 3514 — 250 mg imipenem equivalent and 250 mg cilastatin equivalent and 10 mg sodium bicarbonate as a buffer NDC 0006-3514-58 in trays of 25 vials (6505-01-332-4793 250 mg, 25's).
- No. 3516 — 500 mg imipenem equivalent and 500 mg cilastatin equivalent and 20 mg sodium bicarbonate as a buffer NDC 0006-3516-59 in trays of 25 vials (6505-01-332-4794 500 mg, 25's).
- No. 3515 — 250 mg imipenem equivalent and 250 mg cilastatin equivalent and 10 mg sodium bicarbonate as a buffer NDC 0006-3515-74 in trays of 10 infusion bottles (6505-01-246-4126 infusion bottle, 10's).
- No. 3517 — 500 mg imipenem equivalent and 500 mg cilastatin equivalent and 20 mg sodium bicarbonate as a buffer NDC 0006-3517-75 in trays of 10 infusion bottles (6505-01-234-0240 infusion bottle, 10's).
- No. 3551 — 250 mg imipenem equivalent and 250 mg cilastatin equivalent and 10 mg sodium bicarbonate as a buffer NDC 0006-3551-58 in trays of 25 ADD-Vantage® vials.
- No. 3552 — 500 mg imipenem equivalent and 500 mg cilastatin equivalent and 20 mg sodium bicarbonate as a buffer NDC 0006-3552-59 in trays of 25 ADD-Vantage® vials (6505-01-279-9627 500 mg ADD-Vantage®, 25's).

REFERENCES

- National Committee for Clinical Laboratory Standards, Performance Standards for Antimicrobial Disk Susceptibility Tests-Fifth Edition. Approved Standard NCCLS Document M2-A5, Vol. 13, No. 24 NCCLS, Villanova, PA, 1993.
- National Committee for Clinical Laboratory Standards, Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically-Third Edition. Approved Standard NCCLS Document M7-A3, Vol. 13, No. 25 NCCLS, Villanova, PA, 1993.
- National Committee for Clinical Laboratory Standards, Method for Antimicrobial Susceptibility Testing of Anaerobic Bacteria-Third Edition. Approved Standard NCCLS Document M11-A3, Vol. 13, No. 26 NCCLS, Villanova, PA, 1993.

TABLE II
REDUCED INTRAVENOUS DOSAGE OF PRIMAXIN I.V. IN ADULT PATIENTS WITH IMPAIRED RENAL FUNCTION AND/OR BODY WEIGHT <70 kg

and Body Weight (kg) is:	If TOTAL DAILY DOSE from TABLE I is:											
	1.0 g/day				1.5 g/day				2.0 g/day			
	and creatinine clearance (mL/min/1.73 m ²) is:				and creatinine clearance (mL/min/1.73 m ²) is:				and creatinine clearance (mL/min/1.73 m ²) is:			
	≥71	41-70	21-40	6-20	≥71	41-70	21-40	6-20	≥71	41-70	21-40	6-20
	then the reduced dosage regimen (mg) is:				then the reduced dosage regimen (mg) is:				then the reduced dosage regimen (mg) is:			
≥70	250 q6h	250 q8h	250 q12h	250 q12h	500 q8h	250 q6h	250 q8h	250 q12h	500 q6h	500 q8h	250 q6h	250 q12h
60	250 q8h	125 q6h	250 q12h	125 q12h	250 q6h	250 q8h	250 q8h	250 q12h	500 q8h	250 q6h	250 q8h	250 q12h
50	125 q6h	125 q6h	125 q8h	125 q12h	250 q6h	250 q8h	250 q12h	250 q12h	250 q6h	250 q6h	250 q8h	250 q12h
40	125 q6h	125 q8h	125 q12h	125 q12h	250 q8h	125 q6h	125 q8h	125 q12h	250 q6h	250 q8h	250 q12h	250 q12h
30	125 q8h	125 q8h	125 q12h	125 q12h	125 q6h	125 q8h	125 q8h	125 q12h	250 q8h	125 q6h	125 q8h	125 q12h

TABLE III
REDUCED INTRAVENOUS DOSAGE OF PRIMAXIN I.V. IN ADULT PATIENTS WITH IMPAIRED RENAL FUNCTION AND/OR BODY WEIGHT <70 kg

and Body Weight (kg) is:	If TOTAL DAILY DOSE from TABLE I is:							
	3.0 g/day				4.0 g/day			
	and creatinine clearance (mL/min/1.73 m ²) is:				and creatinine clearance (mL/min/1.73 m ²) is:			
	≥71	41-70	21-40	6-20	≥71	41-70	21-40	6-20
	then the reduced dosage regimen (mg) is:				then the reduced dosage regimen (mg) is:			
≥70	1000 q8h	500 q6h	500 q8h	500 q12h	1000 q6h	750 q8h	500 q6h	500 q12h
60	750 q8h	500 q8h	500 q8h	500 q12h	1000 q8h	750 q8h	500 q8h	500 q12h
50	500 q6h	500 q8h	250 q6h	250 q12h	750 q8h	500 q6h	500 q8h	500 q12h
40	500 q8h	250 q6h	250 q8h	250 q12h	500 q6h	500 q8h	250 q6h	250 q12h
30	250 q6h	250 q8h	250 q8h	250 q12h	500 q8h	250 q6h	250 q8h	250 q12h

Dist. by **MERCK & CO., INC.**, West Point, PA 19486, USA

Issued September 1995
Printed in USA

**INSTRUCTIONS FOR USE OF
PRIMAXIN® I.V.
(Imipenem-Cilastatin Sodium
for Injection)
IN ADD-Vantage® VIALS**

For IV Use Only.

INSTRUCTIONS FOR USE

To Open Diluent Container:

Peel overwrap from the corner and remove container. Some opacity of the plastic due to moisture absorption during the sterilization process may be observed. This is normal and does not affect the solution quality or safety. The opacity will diminish gradually.

**To Assemble Vial and Flexible Diluent Container:
(Use Aseptic Technique)**

- Remove the protective covers from the top of the vial and the vial port on the diluent container as follows:
 - To remove the breakaway vial cap, swing the pull ring over the top of the vial and pull down far enough to start the opening. (SEE FIGURE 1.) Pull the ring approximately half way around the cap and then pull straight up to remove the cap. (SEE FIGURE 2.) NOTE: DO NOT ACCESS VIAL WITH SYRINGE.

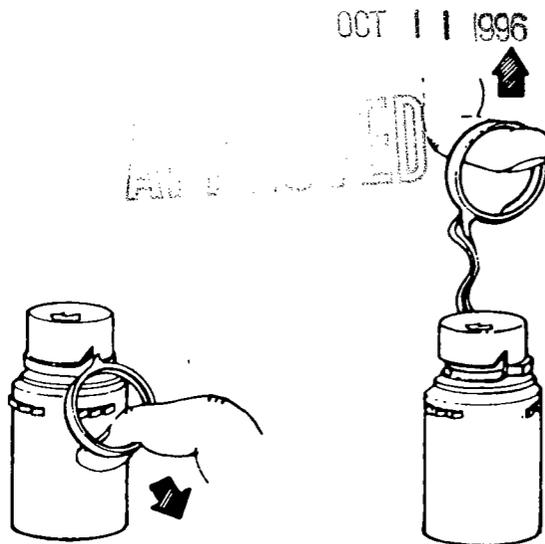


Fig. 1

Fig. 2

* Registered trademark of MERCK & CO., Inc.
** Registered trademark of ABBOTT LABORATORIES, Inc.

- To remove the vial port cover, grasp the tab on the pull ring, pull up to break the three tie strings, then pull back to remove the cover. (SEE FIGURE 3.)
- Screw the vial into the vial port until it will go no further. THE VIAL MUST BE SCREWED IN TIGHTLY TO ASSURE A SEAL. This occurs approximately ½ turn (180°) after the first audible click. (SEE FIGURE 4.) The clicking sound does not assure a seal; the vial must be turned as far as it will go. NOTE: Once vial is seated, do not attempt to remove. (SEE FIGURE 4.)
 - Recheck the vial to assure that it is tight by trying to turn it further in the direction of assembly.
 - Label appropriately.



Fig. 3

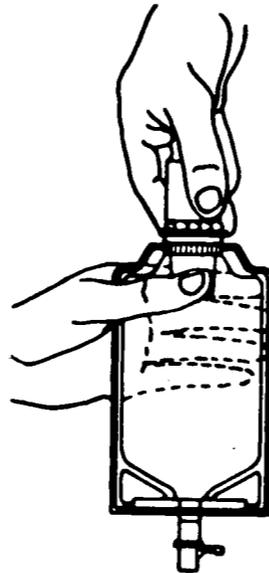


Fig. 4

To Prepare Admixture:

- Squeeze the bottom of the diluent container gently to inflate the portion of the container surrounding the end of the drug vial.
- With the other hand, push the drug vial down into the container telescoping the walls of the container. Grasp the inner cap of the vial through the walls of the container. (SEE FIGURE 5.)
- Pull the inner cap from the drug vial. (SEE FIGURE 6.) Verify that the rubber stopper has been pulled out, allowing the drug and diluent to mix.
- Mix container contents thoroughly and use within the specified time.

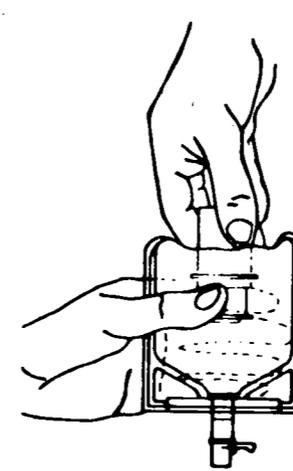


Fig. 5

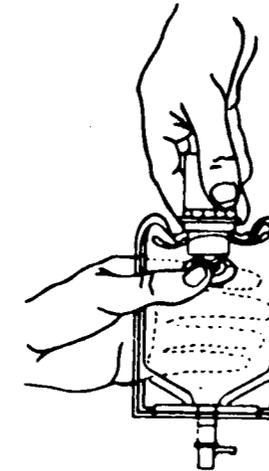


Fig. 6

**Preparation for Administration:
(Use Aseptic Technique)**

- Confirm the activation and admixture of vial contents.
- Check for leaks by squeezing container firmly. If leaks are found, discard unit as sterility may be impaired.
- Close flow control clamp of administration set.
- Remove cover from outlet port at bottom of container.
- Insert piercing pin of administration set into port with a twisting motion until the pin is firmly seated. NOTE: See full directions on administration set carton.
- Lift the free end of the hanger loop on the bottom of the vial, breaking the two tie strings. Bend the loop outward to lock it in the upright position, then suspend container from hanger.
- Squeeze and release drip chamber to establish proper fluid level in chamber.
- Open flow control clamp and clear air from set. Close clamp.
- Attach set to venipuncture device. If device is not indwelling, prime and make venipuncture.
- Regulate rate of administration with flow control clamp.

WARNING: Do not use flexible container in series connections.

Stability

PRIMAXIN I.V. (Imipenem-Cilastatin Sodium for Injection) 250 or 500 single dose ADD-Vantage® vials should be prepared with ADD-Vantage® diluent containers containing 100 mL of either 0.9 percent Sodium Chloride Injection or 5 percent Dextrose Injection. When prepared with either of these diluents, PRIMAXIN I.V. (Imipenem-Cilastatin Sodium for Injection) maintains satisfactory potency for 4 hours at room temperature.

Before administering, see accompanying package circular for PRIMAXIN I.V. (Imipenem-Cilastatin Sodium for Injection).

Lot No. and Exp. Date

500

6505-01-279-9627

PRIMAXIN® I.V.

Not to be divided.

11 1996

(IMIPENEM-CILASTATIN SODIUM FOR INJECTION)

IMIPENEM 500 mg (Anhydrous Equivalent) CILASTATIN EQUIVALENT 500 mg

Inactive ingredient: sodium bicarbonate 20 mg added to each vial as a buffer.

CAUTION: SINGLE DOSE VIAL / FOR I.V. USE ONLY / NOT FOR DIRECT INFUSION

For the Preparation of Intravenous Solutions and USUAL ADULT DOSAGE: See accompanying circular.

CAUTION: Federal (USA) law prohibits dispensing without prescription.

Color changes in solution from colorless to yellow do not affect potency. Store dry material below 25°C.

Consult accompanying INSTRUCTIONS FOR USE.

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PRIMAXIN® is a registered trademark of MERCK & CO., INC.
ADD-Vantage® is a registered trademark of ABBOTT LABORATORIES, INC.

APPROVED

ENLARGED TO 125%
BY FOIA STAFF

For the Preparation of Intravenous Solutions and USUAL ADULT DOSAGE: See accompanying circular. Store dry material below 25°C. After constitution as directed, the solution maintains satisfactory potency for 4 hours at room temperature. Consult accompanying INSTRUCTIONS FOR USE. Use only with ADD-Vantage® Diluent Containers. CAUTION: Federal (USA) law prohibits dispensing without prescription. 500 mg | No. 3552 7613405



 Single-dose ADD-Vantage® vial

 500

PRIMAXIN® I.V.

 (IMIPENEM-CILASTATIN SODIUM FOR INJECTION)

 IMIPENEM 500 mg (Amidolium Equivalent)

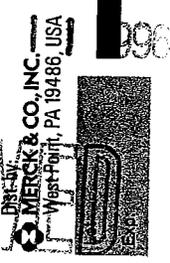
 CILASTATIN EQUIVALENT 300 mg

CAUTION: SINGLE DOSE VIAL FOR I.V. USE ONLY

NOT FOR DIRECT INFUSION

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 ADD-Vantage® is a registered trademark of ABBOTT LABORATORIES, Inc.



ENLARGED TO 125%
BY FULA STAFF

Lot No. and Exp. Date

250
PRIMAXIN® I.V.

Not to be divided.

(IMPENEM-CILASTATIN SODIUM FOR INJECTION)

IMPENEM 250 mg (Anhydrous Equivalent) CILASTATIN EQUIVALENT 250 mg

Inactive ingredient: sodium bicarbonate 10 mg added to each vial as a buffer.

CAUTION: SINGLE DOSE VIAL / FOR I.V. USE ONLY / NOT FOR DIRECT INFUSION

For the Preparation of Intravenous Solutions and USUAL ADULT DOSAGE: See accompanying circular.

CAUTION: Federal (USA) law prohibits dispensing without prescription.

Color changes in solution from colorless to yellow do not affect potency. Store dry material below 25°C.

Consult accompanying INSTRUCTIONS FOR USE.

Dist. by:

 **MERCK & CO., INC.,** West Point, PA 19486, USA

PRIMAXIN® is a registered trademark of MERCK & CO., INC.
400 Montross Street, P.O. Box 2000, Rahway, NJ 07065-2000
ABOTT LABORATORIES, Inc.

APPROVED
48830

ENLARGED TO 125%
BY FOIA STAFF

For the Preparation of
 Intravenous Solutions and
USUAL ADULT DOSAGE:
 See accompanying circular.
 Store dry material below 25°C.
 After constitution as directed,
 the solution maintains satisfac-
 tory potency for 4 hours at
 room temperature.
 Consult accompanying IN-
STRUCTIONS FOR USE. Use
 only with ADD-Vantage®
 Diluent Containers.

Single-dose ADD-Vantage® vial
 250
PRIMAXIN® I.V.
 (IMIPENEM-CILASTATIN SODIUM FOR INJECTION)
 IMIPENEM 250 mg (Anhydrous Equivalent)
 CILASTATIN EQUIVALENT 250 mg
CAUTION: SINGLE DOSE VIAL / FOR I.V. USE ONLY
NOT FOR DIRECT INFUSION
 PRIMAXIN® is a registered trademark of HENCKES FOR...
 ADD-Vantage® is a registered trademark of ABBOTT LABORATORIES, Inc.

CAUTION Federal (USA) law pro-
 hibits dispensing without prescription.
 NADA 141-3551
 7613306

HENCKES & CO., INC.
 West Chester, PA 19380, USA

APPROVED

ENLARGED TO 125%
 BY FOIA STAFF

CENTER FOR DRUG EVALUATION AND RESEARCH

APPLICATION NUMBER:

ANDA 62-756 / S-018, S-022, and S-026

ADMINISTRATIVE DOCUMENTS

AP

M E M O R A N D U M

DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
FOOD AND DRUG ADMINISTRATION
CENTER FOR DRUG EVALUATION AND RESEARCH

DATE: 5/23/96

FROM:

Johns Grace

, Consumer Safety Officer

SUBJECT: Special Supplement - Changes Placed into Effect

TO:

Document Room

Please make the following entry in the MIS concerning the status of this Special Supplement - Changes Placed into Effect.

ANDA(s)

SUPPLEMENT(s)

GRANTED

DENIED

62756

SLD 20

This form is to accompany the action package/jacket.

Thank you,

Johns Grace 5/28/96

Signature of CSO and Date

CC:

ANDA
DIVISION FILE

CENTER FOR DRUG EVALUATION AND RESEARCH

APPLICATION NUMBER:

ANDA 62-756 / S-018, S-022, and S-026

CORRESPONDENCE

41

NDA NO. _____ REF. NO. SKI-018
NDA SUPPL FOR Revised labeling

RECEIVED

AUG 21 1992

GENERIC DRUGS

ANDA 62-756

August 18, 1992

PRIMAXIN® I.V. in ADD-Vantage® Vials
(Imipenem-Cilastatin Sodium
for Injection)
SPECIAL SUPPLEMENT
CHANGES BEING EFFECTED
Final Printed Labeling
Merck Research Laboratories

*Under review and
HPD-520
10/1
3-19-93*

*See memo to SD 8/19
dated 6/18/93 → 8/21/93
in vol. 4.1*

*not approvable letter
6/13/95 A. V. J. J.
NA letter similar supplement
for NDA 50-587 (S-030)
y/mille
7/12/95*

Information and data submitted herein contains trade secrets, or privileged or confidential information, the property of Merck & Co., Inc., and government agencies are not authorized to make it public without written permission from Merck.

SPECIAL

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MERCK SHARP & DOHME RESEARCH LABORATORIES

DIVISION OF MERCK & CO., INC.
WEST POINT, PENNSYLVANIA 19486

RONALD A. SALERNO, PH.D.
ASSOCIATE DIRECTOR
REGULATORY AFFAIRS

(215) 834-2958
(215) 661-5000
FAX (215) 834-2962

August 18, 1992

Mr. John D. Harrison, Chief
Antibiotic Drug Review Branch
HFD-635, Room 17B-31
Division of Generic Drugs
Office of Generic Drugs (CDER)
Food and Drug Administration
5600 Fishers Lane
Rockville, Maryland 20857

Dear Mr. Harrison:

SPECIAL SUPPLEMENT - CHANGES BEING EFFECTED

ANDA 62-756: Primaxin® I.V. in ADD-Vantage® Vials
(Imipenem-Cilastatin Sodium for Injection)

Pursuant to Section 505(b) of the Food Drug and Cosmetic Act and in accordance with 21 CFR 314.70(c), we submit a supplement to ANDA 62-756.

As indicated on the attached Form FDA 356h, the supplemental application provides for changes in Item 4 of the approved Abbreviated New Drug Application for Primaxin® I.V. in ADD-Vantage® Vials.

Attached are a summary of revisions (Tab 1) draft annotated package circular (Tab 2), and the final printed package circular (No. 7362417) (Tab 5). The circular has been revised under ADVERSE REACTIONS based on safety data from Merck-sponsored studies described in the rationale for revisions (Tab 4). A computer disk is being provided containing the draft circular in Word Perfect 5.1 (Tab 3).

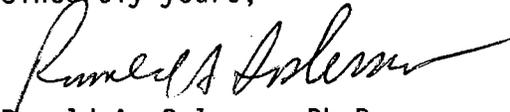
The changes will become effective on or about October 1, 1992 and will apply to all packages of Primaxin® I.V. in ADD-Vantage® Vials distributed from the company's manufacturing facilities at West Point, Pennsylvania.

We consider the filing of this Supplemental Abbreviated New Drug Application to be a confidential matter, and request the Food and Drug Administration not to make its content, nor any future communications in regard to it, public without first obtaining the written permission of Merck & Co., Inc.

Mr. John D. Harrison, Chief
ANDA 62-756: Primaxin® I.V. in
ADD-Vantage® Vials
Page 2

Questions concerning this supplemental application should be directed to
Ronald A. Salerno, Ph.D. (215/397-2958) or, in my absence, to Kenneth R.
Brown, M.D. (215/397-2552).

Sincerely yours,


Ronald A. Salerno, Ph.D.
Associate Director
Regulatory Affairs

WL/cat
75H

Attachments

Circular No. 7362417

Certified No. P 712 126 029

AADA 62-756/——, S-017, S-018, S-019

DEC 29 1993

Merck Sharp & Dohme Research Laboratories
Attention: Ronald A. Salerno, Ph.D.
Sumneytown Pike
West Point, PA 19486

Dear Sir:

Reference is made to your supplemental antibiotic drug applications dated _____ July 17, 1992, (S-017); August 8, 1992, (S-018); June 18, 1993, (S-019); submitted pursuant to Section 314.70 of the Regulations, regarding your abbreviated antibiotic application for Primaxin® I.V. (Imipenem-Cilastatin Sodium for Injection), ADD-Vantage vials.

The supplemental applications provide for revised package insert labeling reflecting updated text.

We have reviewed the material submitted and have the following comments:

We defer review of these supplements, pending actions on your similar supplemental applications by the Division of Anti-Infective Drug Products (HFD-520). When you have received a response for the related supplemental applications for NDA 50-587, please notify us and include a copy of the letter. Until that time, no further action will be taken on these supplements.

The material submitted is being retained as a part of your application.

Sincerely,

Yana Ruth Miller for/ 12/29/93

Robert W. Pollock
Director, Division of Labeling and
Program Support
Office of Generic Drugs
Center For Drug Evaluation and Research

cc: AADA 62-756/—— S-017, S-018, S-019

Dup/Division File

HFD-613/KRoberts/AVezza/JPhillips (no cc:) A Vezza 12/22/93 (+ for K Roberts)

HFD-600/RF

HFC-130/JAllen

mpd 12/21/93/62756.RD

Review Deferred

Jerry Phillips 12/22/93

Henrietta N. Ukwu, M.D.
Director
Regulatory Liaison

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Merck & Co., Inc.
P.O. Box 4, BLA-30A
West Point PA 19486-0004
Fax 610 397 2962
Tel 610 397 7176
215 652 5000

August 25, 1994



Mr. John D. Harrison, Chief
Office of Generic Drugs, CDER, FDA
HFD-635, Room #MPN2
Document Control Room
5600 Fishers Lane
Rockville, Maryland 20857

NDA NO. _____ REF. NO. SL0221
NDA SUPPL FOR Lbk Ref DRAFT LBL

*approvable letter
A. Uzzow
3/29/95
ajm/llk
7/12/95*

Dear Mr. Harrison:

Supplemental Abbreviated Antibiotic Drug Application

**AADA 62-756: PRIMAXIN I.V.® in ADD-VANTAGE® Vials
(Imipenem-Cilastatin Sodium for Injection)**

Pursuant to Section 505(b) of the Food Drug and Cosmetic Act and in accordance with 21 CFR 314.50 and 21 CFR 314.70(b), we submit, for your approval, a supplement to AADA 62-756.

As indicated on the attached Form FDA 356h, the supplemental application provides for changes in Item 4(c)i of the approved Abbreviated Antibiotic Drug Application for PRIMAXIN I.V.® in ADD-VANTAGE® Vials.

The circular has been revised as a result of discussions between Merck Manufacturing Division and the Baltimore District FDA. The FDA requested revisions in the COMPATIBILITY AND STABILITY section of the circular to comply with stability guidelines. Revisions are as follows:

COMPATIBILITY AND STABILITY, Page 5

- Deletion of the following diluents:
 - Mannitol 2.5%,
 - 5% Dextrose injection with 0.02% sodium bicarbonate solution, due to the unavailability of these products; and
 - NORMOSOL-M in D5W due to inability of constituted solution to meet specifications.

RECEIVED

AUG 29 1994

GENERIC DRUGS

ORIGINAL

*Madeline
9-9-94*

Mr. John Harrison, Chief

AADA 62-756: PRIMAXIN I.V.® in ADD-VANTAGE® Vials

Page 2

- Revision of holding times for constituted solutions to be consistent for all diluents.

Attached are 4 copies of the draft annotated package circular.

We consider the filing of this Supplemental New Drug Application to be a confidential matter, and request the Food and Drug Administration not to make its content, nor any future communications in regard to it, public without first obtaining the written permission of Merck & Co., Inc.

Questions concerning this supplemental application should be directed to Henrietta N. Ukwu, M.D. (610/397-7176) or, in my absence, to Kenneth Brown, M.D. (610/397-2552).

Sincerely,



Henrietta N. Ukwu, M.D.
Director
Regulatory Liaison

Attachments

Certified No. P 151 563 429

AADA 62-756/S-018

Merck Research Laboratories
Attention: Henrietta N. Ukwu, M.D. JUL 12 1995
Sumneytown Pike
West Point, PA 19486

Dear Madam:

Reference is made to your supplemental antibiotic drug application dated August 18, 1992, submitted pursuant to Section 314.70(c) (Special Supplement - Changes Being Effected) of the Regulations, regarding your abbreviated antibiotic application for Primaxin® I.V. (Imipenem-Cilastatin Sodium for Injection), ADD-Vantage® vials.

Reference is also made to your similar submission, dated August 18, 1992, to your related NDA, Primaxin® I.V. (Imipenem-Cilastatin Sodium for Injection) (50-587/S-039).

The supplemental application provides for the addition of a new subsection titled "Granulocytopenic Patients" to the ADVERSE REACTIONS section of the labeling.

The supplemental application is deficient and therefore, not approvable under Section 505 of the Act for the following reason:

The Division of Anti-Infective Drug Products has reviewed the supplemental application and has found that the data as submitted does not permit identification of the patients involved; therefore, it is impossible to arrive at a cause-effect relationship for an increased incidence of nausea and vomiting in granulocytopenic patients treated with Primaxin®.

The file is now closed. You are required to take an action described under 21 CFR 314.120 which will either amend or withdraw the supplemental application, or if you have substantial disagreement with our reasons for not approving this supplemental application, you may request an opportunity for a hearing.

Sincerely,

Yana Ruth Mille

7/12/95

Yana Ruth Mille
Acting Director
Division of Labeling and Program Support
Office of Generic Drugs
Center for Drug Evaluation and Research

cc:

ANDA 62-756/S-018

Dup/Division File

HFD-613/Avezza/APayne/JPhillips

HFD-600/RF *Avezza 6/30/95 C. Zimmerman 7/11/95*

Field Copy

6/13/95/LET/62756.S18

Not approvable

Y. Mille 7/12/95

APPEARS THIS WAY
ON ORIGINAL

AADA 62-756/S-022

Merck Research Laboratories
Attention: Henrietta N. Ukwu, M.D. JUL 12 1995
Sumneytown Pike
West Point, PA 19486

Dear Madam:

Reference is made to your supplemental antibiotic drug application dated August 25, 1994, submitted pursuant to Section 314.70 of the Regulations, regarding your abbreviated antibiotic application for Primaxin[®] I.V. (Imipenem-Cilastatin Sodium for Injection), ADD-Vantage vials.

The supplemental application provides for revisions in the DOSAGE AND ADMINISTRATION section (COMPATIBILITY AND STABILITY subsection) of the package insert labeling.

We have completed our review of this supplemental application and it is approvable. However, before the supplemental application may be approved, it is necessary that you submit final printed insert labeling as an amendment to this supplemental application and include the revisions as set forth in supplements S-011, S-017, and S-019.

The changes provided for in this supplemental application may not be initiated until you have been notified in writing that the supplemental application is approved.

Sincerely,

Yana Ruth Mille

7/12/95

Yana Ruth Mille
Acting Director
Division of Labeling and Program Support
Office of Generic Drugs
Center for Drug Evaluation and Research

CC:

ANDA 62-756/S-022

Dup/Division File

HFD-613/Avezza/CZimmermann/JPhillips

HFD-600/RF *avezza 6/20/95 CZimmermann 7/1/95*

Field Copy

6/1/95/62756.S22

Approvable

g/mille 2/12/93

**APPEARS THIS WAY
ON ORIGINAL**

Henrietta N. Ukwu, M.D.
Director
Regulatory Liaison

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Merck & Co., Inc.
P.O. Box 4, BLA-30A
West Point PA 19486-0004
Fax 610 397 2962
Tel 610 397 7176
215 652 5000

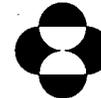
Suppl. Amend. 10
Primaxin
5-413
S-39
SL026/AE

NDA NO. 62756 REF. NO. SL026
~~Labeling Revision~~

May 14, 1996

Mr. John D. Harrison, Chief
Office of Generic Drugs, CDER, FDA
HFD-635, Room #MPN2
Document Control Room
5600 Fishers Lane
Rockville, Maryland 20857

RECEIVED



MERCK

Research Laboratories

John Harrison: the
sup to CC: the
chemist
if fine

SUPL AMENDEMENT
SLI-018/AL
SL-022/AL

MAY 15 1996

GENERIC DRUGS

Dear Mr. Harrison:

SPECIAL SUPPLEMENT - CHANGES BEING EFFECTED

FINAL PRINTED LABELING

AADA 62-756/S-017, S-011, S-019, S-022, S-018: PRIMAXIN® I.V. in ADD-Vantage® Vials

Pursuant to Section 505(b) of the Food Drug and Cosmetic Act and in accordance with 21 CFR 314.70 (c)(2), we submit a supplement to AADA 62-756/S-017, S-011, S-019, S-022, S-018.

As indicated on the attached Form FDA 356h, the supplemental application provides for changes in Item 4(c)(ii) of the approved New Drug Application for PRIMAXIN® I.V. in ADD-Vantage® Vials. - *mention*

The following revisions are being submitted as Changes Being Effected:

- Header: The statement that PRIMAXIN® I.V. is for intravenous injection only has been added for clarity and consistency with the PRIMAXIN I.M. circular.
- COMPATIBILITY AND STABILITY
The storage temperature for the dry powder has been revised from 30°C to 25°C (77°F)

Additionally, reference is made to the following Supplemental New Drug Applications for AADA 62-756 for PRIMAXIN® I.V. in ADD-Vantage® Vials.

<u>Supplement Number</u>	<u>Date of Submission</u>	<u>FDA Approval Letter</u>
S-017	7/17/92	7/12/95
S-011	6/14/91	7/12/95
S-019	6/18/93	7/12/95
S-022	8/24/94	3/21/95 - AE → <i>AD 5-91 NDA</i>
S-018	8/18/92	6/1/95 - Na <i>9 solutions</i>

The enclosed circular is being submitted as Final Printed Labeling for the above mentioned supplements. The circular has been revised under CLINICAL PHARMACOLOGY, WARNINGS, ADVERSE REACTIONS and COMPATIBILITY AND STABILITY. Please see Summary of Labeling Revisions (Tab 1) for details.

Handwritten signature
5-22-96

Attached with this submission are the following:

- Tab 1: Summary of Revisions
- Tab 2: Printed Package Circular No. 7882121 (15 copies)
Instructions for Use in ADD-Vantage Vials (15 copies)
- Tab 3: Paste-up of the circular annotated for revisions
- Tab 4: Printed Carton labels (15 copies each)
 - #7488205
 - #7613405
 - #7488304
 - #7613306

The changes will become effective on or about May 15, 1996 and will apply to all packages of PRIMAXIN® I.V. in ADD-Vantage® Vials distributed from the company's manufacturing facilities at West Point, PA.

As required by Section 306(k)(1) of the Generic Enforcement Act [21 U.S.C. 335a(k)(1)], we hereby certify that, in connection with this application, Merck & Co., Inc. did not and will not use in any capacity the services of any person debarred under subsections 306(a) or (b) of the Act.

We consider the filing of this Supplemental New Drug Application to be a confidential matter, and request the Food and Drug Administration not to make its content, nor any future communications in regard to it, public without first obtaining the written permission of Merck & Co., Inc.

Questions concerning this supplemental application should be directed to Henrietta N. Ukwu, M.D. (610/397-7176) or, in my absence Bonnie J. Goldmann, M.D. (610/397-2383).

Sincerely yours,



for Henrietta Ukwu, M.D.
Director
Regulatory Liaison

Attachments
Circular No. 7882121
Q/YARB/CHRISTA/LTR/PRIMSUPL

Federal Express

Merck Research Laboratories
Attention: Henrietta N. Ukwu
Sumneytown Pike
West Point, PA 19486

SEP 5 1996



Dear Madam:

This is in reference to your supplemental antibiotic drug applications dated August 18, 1992 (S-018) (Special Supplement-Changes Being Effected); August 25, 1994 (S-022) and May 14, 1996 (S-026), submitted pursuant to Section 314.70 of the Regulations, regarding your antibiotic application for PRIMAXIN® I.V. (Imipenem-Cilastatin Sodium for Injection) ADD-Vantage® Vials 250 mg and 500 mg.

Reference is also made to your amendment dated May 14, 1996 (S-018 and S-022).

The supplemental applications provide for the following:

1. S-026 - Instructions for Use and Carton labeling (250 mg and 500 mg) insert labeling reflecting a change in the DOSAGE AND ADMINISTRATION (Compatibility and Stability) section revising the storage temperature for the dry powder from 30° C to 25° C.
2. S-018 - Changes in the ADVERSE REACTIONS deleting "Granulocytopenic Patients" from the ADVERSE REACTIONS section.
3. S-022 - Changes in the DOSAGE AND ADMINISTRATION (Compatibility and Stability section deleting several diluents) section.

We are aware that a similar supplement dated May 14, 1996 was submitted to the Division of Anti-Infective Drug Products (HFD-520). When similarly revised insert labeling is approved or is otherwise addressed for your NDA(50-587/S-039), please provide us with a copy of the approval letter so that we may respond to these supplements accordingly.

Until that time no further action will be taken on these supplements.

Please keep us informed as to the status of your related NDA supplement.

The material submitted is being retained in our files.

Sincerely yours,

Jerry Phillips 9/6/96

Jerry Phillips
Director
Division of Labeling and Program Support
Office of Generic Drugs
Center for Drug Evaluation and Research

cc: AADA 62-756/S-018; S-022; S-026

Dup/Division File

HFD-600 R/F

FIELD COPY

HFD-613/APayne/AVEzza (no cc) *Ally 9/4/96* *Aford 5/29/96*

HFD-643/Harrison

njg/8/27/96/x:\new\...Merck\lts&rev\62756s22.rdl; 62756s18.rdl;
62756s26.rdl

Review Deferred- Multiple supplements