

Y36-002-642  
Package Insert

**DUPLEX®**  
DRUG DELIVERY SYSTEM

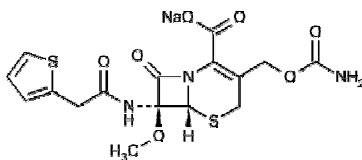
## Cefoxitin for Injection and Dextrose Injection

**Rx only**

To reduce the development of drug-resistant bacteria and maintain the effectiveness of Cefoxitin for Injection and Dextrose Injection and other antibacterial drugs, Cefoxitin for Injection and Dextrose Injection should be used only to treat or prevent infections that are proven or strongly suspected to be caused by bacteria.

### DESCRIPTION

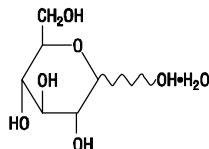
The drug chamber is filled with cefoxitin sodium USP, a semi-synthetic, broad-spectrum cepha antibiotic sealed under nitrogen for intravenous administration. It is derived from cephamycin C, which is produced by *Streptomyces lactamdurans*. Its chemical name is sodium (6R,7S)-3-(hydroxymethyl)-7-methoxy-8-oxo-7-[2-(2-thienyl)acetamido]-5-thia-1-azabicyclo[4.2.0]oct-2-ene-2-carboxylate carbamate (ester). The empirical formula is  $C_{16}H_{16}N_3NaO_7S_2$ , and the molecular weight is 449.44. The structural formula is:



Cefoxitin sodium contains approximately 53.8 mg (2.3 mEq) of sodium per gram of cefoxitin activity.

Cefoxitin for Injection and Dextrose Injection is supplied as a sterile, nonpyrogenic, single use packaged combination of cefoxitin (filled using Cefoxitin Sodium USP) and Dextrose Injection (diluent). After reconstitution, each 50 mL contains cefoxitin sodium equivalent to either 1 gram or 2 grams cefoxitin. The diluent chamber contains Dextrose Injection. The concentration of Dextrose Hydrus USP in Water for Injection USP has been adjusted to render the reconstituted drug product iso-osmotic. Dextrose Hydrus USP has been added to adjust the osmolality to approximately 290 mOsmol/kg (approximately 2 g (4% w/v) and 1.1 g (2.2% w/v) to the 1 g and 2 g doses, respectively). Dextrose Injection is sterile, nonpyrogenic, and contains no bacteriostatic or antimicrobial agents.

Dextrose Hydrus USP has the following structural (molecular) formula:



The molecular weight of Dextrose Hydrus USP is 198.17.

After removing the peelable foil strip, activating the seals, and thoroughly mixing, the reconstituted drug product is intended for single intravenous use. When reconstituted according to instructions in the product labeling, the approximate osmolality of the reconstituted solution of Cefoxitin for Injection and Dextrose Injection is approximately 290 mOsmol/kg. After reconstitution, the pH is approximately 6.5. Solutions of Cefoxitin for Injection and Dextrose Injection range from colorless to light amber.

The DUPLEX Container is Latex-free, PVC-free, and Di(2-ethylhexyl)phthalate (DEHP)-free.

The DUPLEX dual chamber container is made from a specially formulated material. The product (diluent and drug) contact layer is a mixture of thermoplastic rubber and a polypropylene ethylene copolymer that contains no plasticizers. The safety of the container system is supported by USP biological evaluation procedures.

### CLINICAL PHARMACOLOGY

#### **Clinical Pharmacology**

Following an intravenous dose of 1 gram, serum concentrations were 110 mcg/mL at 5 minutes, declining to less than 1 mcg/mL at 4 hours. The half-life after an intravenous dose is 41 to 59 minutes. Approximately

85 percent of cefoxitin is excreted unchanged by the kidneys over a 6-hour period, resulting in high urinary concentrations. Probenecid slows tubular excretion and produces higher serum levels and increases the duration of measurable serum concentrations.

Cefoxitin passes into pleural and joint fluids and is detectable in antibacterial concentrations in bile.

In a published study of geriatric patients ranging in age from 64 to 88 years with normal renal function for their age (creatinine clearance ranging from 31.5 to 174.0 mL/min), the half-life for cefoxitin ranged from 51 to 90 minutes, resulting in higher plasma concentrations than in younger adults. These changes were attributed to decreased renal function associated with the aging process.

### **Microbiology**

The bactericidal action of cefoxitin results from inhibition of cell wall synthesis. Cefoxitin has *in vitro* activity against a wide range of gram-positive and gram-negative organisms. The methoxy group in the 7 alpha position provides cefoxitin with a high degree of stability in the presence of beta-lactamases, both penicillinases and cephalosporinases, of gram-negative bacteria.

Cefoxitin has been shown to be active against most strains of the following microorganisms, both *in vitro* and in clinical infections as described in the **INDICATIONS AND USAGE** section.

#### **Aerobic gram-positive microorganisms**

*Staphylococcus aureus*<sup>a</sup> (including penicillinase-producing strains)

*Staphylococcus epidermidis*<sup>a</sup>

*Streptococcus agalactiae*

*Streptococcus pneumoniae*

*Streptococcus pyogenes*

<sup>a</sup> Staphylococci resistant to methicillin/oxacillin should be considered resistant to cefoxitin.

Most strains of enterococci, e.g., *Enterococcus faecalis*, are resistant.

#### **Aerobic gram-negative microorganisms**

*Escherichia coli*

*Haemophilus influenzae*

*Klebsiella* spp. (including *K. pneumoniae*)

*Morganella morganii*

*Neisseria gonorrhoeae* (including penicillinase-producing strains)

*Proteus mirabilis*

*Proteus vulgaris*

*Providencia* spp. (including *Providencia rettgeri*)

#### **Anaerobic gram-positive microorganisms**

*Clostridium* spp.

*Peptococcus niger*

*Peptostreptococcus* spp.

#### **Anaerobic gram-negative microorganisms**

*Bacteroides distasonis*

*Bacteroides fragilis*

*Bacteroides ovatus*

*Bacteroides thetaiotaomicron*

*Bacteroides* spp.

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

Cefoxitin exhibits *in vitro* minimum inhibitory concentrations (MIC's) of 8 mcg/mL or less for aerobic microorganisms and 16 mcg/mL or less for anaerobic microorganisms against most ( $\geq 90\%$ ) strains of the following microorganisms; however, the safety and effectiveness of cefoxitin in treating clinical infections due to these microorganisms have not been established in adequate and well-controlled clinical trials.

#### **Aerobic gram-negative microorganisms**

*Eikenella corrodens* [non-beta-lactamase producers]

*Klebsiella oxytoca*

#### **Anaerobic gram-positive microorganisms**

*Clostridium perfringens*

### **Anaerobic gram-negative microorganisms**

*Prevotella bivia* (formerly *Bacteroides bivius*)

Cefoxitin is inactive *in vitro* against most strains of *Pseudomonas aeruginosa* and enterococci and many strains of *Enterobacter cloacae*.

### **Susceptibility Tests**

#### Dilution Techniques:

Quantitative methods are used to determine antimicrobial minimum inhibitory concentrations (MIC's). These MIC's provide estimates of the susceptibility of bacteria to antimicrobial compounds. The MIC's should be determined using a standardized procedure. Standardized procedures are based on a dilution method<sup>1</sup> (broth or agar) or equivalent with standardized inoculum concentrations and standardized concentrations of cefoxitin powder. The MIC values should be interpreted according to the following criteria:

For testing aerobic microorganisms<sup>a,b,c</sup> other than *Neisseria gonorrhoeae*:

<b>MIC (mcg/mL)</b>	<b>Interpretation</b>
≤8	Susceptible (S)
16	Intermediate (I)
≥32	Resistant (R)

<sup>a</sup> Staphylococci exhibiting resistance to methicillin/oxacillin should be reported as also resistant to cefoxitin despite apparent *in vitro* susceptibility.

<sup>b</sup> For testing *Haemophilus influenzae* these interpretative criteria applicable only to tests performed by broth microdilution method using *Haemophilus* Test Medium (HTM)<sup>1</sup>.

<sup>c</sup> For testing streptococci these interpretative criteria applicable only to tests performed by broth microdilution method using cation-adjusted Mueller-Hinton broth with 2 to 5% lysed horse blood<sup>1</sup>.

For testing *Neisseria gonorrhoeae*<sup>d</sup>:

<b>MIC (mcg/mL)</b>	<b>Interpretation</b>
≤2	Susceptible (S)
4	Intermediate (I)
≥8	Resistant (R)

<sup>d</sup> Interpretative criteria applicable only to tests performed by agar dilution method using GC agar base with 1% defined growth supplement and incubated in 5% CO<sub>2</sub><sup>1</sup>. A report of "Susceptible" indicates that the pathogen is likely to be inhibited if the antimicrobial compound in the blood reaches the concentrations usually achievable. 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 which prevents small uncontrolled technical factors from causing major discrepancies in interpretation. A report of "Resistant" indicates that the pathogen is not likely to be inhibited if the antimicrobial compound in the blood reaches the concentrations usually achievable; other therapy should be selected.

Standardized susceptibility test procedures require the use of laboratory control microorganisms to control the technical aspects of the laboratory procedures. Standard cefoxitin powder should provide the following MIC values:

<b>Microorganism</b>		<b>MIC (mcg/mL)</b>
<i>Escherichia coli</i>	ATCC 25922	1-4
<i>Neisseria gonorrhoeae</i> <sup>a</sup>	ATCC 49226	0.5-2
<i>Staphylococcus aureus</i>	ATCC 29213	1-4

<sup>a</sup> Interpretative criteria applicable only to tests performed by agar dilution method using GC agar base with 1% defined growth supplement and incubated in 5% CO<sub>2</sub><sup>1</sup>.

#### Diffusion Techniques:

Quantitative methods that require measurement of zone diameters also provide reproducible estimates of the susceptibility of bacteria to antimicrobial compounds. One such standardized procedure<sup>2</sup> requires the

use of standardized inoculum concentrations. This procedure uses paper disks impregnated with 30-mcg cefoxitin to test the susceptibility of microorganisms to cefoxitin.

Reports from the laboratory providing results of the standard single-disk susceptibility test with a 30-mcg cefoxitin disk should be interpreted according to the following criteria:

For testing aerobic microorganisms<sup>a,b,c</sup> other than *Neisseria gonorrhoeae*:

<b>Zone Diameter (mm)</b>	<b>Interpretation</b>
≥18	Susceptible (S)
15-17	Intermediate (I)
≤14	Resistant (R)

- <sup>a</sup> Staphylococci exhibiting resistance to methicillin/oxacillin should be reported as also resistant to cefoxitin despite apparent *in vitro* susceptibility.
- <sup>b</sup> For testing *Haemophilus influenzae* these interpretative criteria applicable only to tests performed by disk diffusion method using Haemophilus Test Medium (HTM)<sup>1</sup>.
- <sup>c</sup> For testing streptococci these interpretative criteria applicable only to tests performed by disk diffusion method using Mueller-Hinton agar with 5% defibrinated sheep blood and incubated in 5% CO<sub>2</sub><sup>2</sup>.

For testing *Neisseria gonorrhoea*<sup>d</sup>:

<b>Zone Diameter (mm)</b>	<b>Interpretation</b>
≥28	Susceptible (S)
24-27	Intermediate (I)
≤23	Resistant (R)

- <sup>d</sup> Interpretative criteria applicable only to tests performed by disk diffusion method using GC agar base with 1% defined growth supplement and incubated in 5% CO<sub>2</sub><sup>2</sup>.

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

Interpretation involves correlation of the diameter obtained in the disk test with the MIC for cefoxitin.

As with standardized dilution techniques, diffusion methods require the use of laboratory control microorganisms that are used to control the technical aspects of the laboratory procedures. For the diffusion technique, the 30-mcg cefoxitin disk should provide the following zone diameters in these laboratory test quality control strains:

<b>Microorganism</b>		<b>Zone Diameter (mm)</b>
<i>Escherichia coli</i>	ATCC 25922	23-29
<i>Neisseria gonorrhoeae</i> <sup>a</sup>	ATCC 49226	33-41
<i>Staphylococcus aureus</i>	ATCC 25923	23-29

- <sup>a</sup> Interpretative criteria applicable only to tests performed by disk diffusion method using GC agar base with 1% defined growth supplement and incubated in 5% CO<sub>2</sub><sup>2</sup>.

#### Anaerobic Techniques:

For anaerobic bacteria, the susceptibility to cefoxitin as MIC's can be determined by standardized test methods<sup>3</sup>. The MIC values obtained should be interpreted according to the following criteria:

<b>MIC (mcg/mL)</b>	<b>Interpretation</b>
≤16	Susceptible (S)
32	Intermediate (I)
≥64	Resistant (R)

Interpretation is identical to that stated above for results using dilution techniques.

As with other susceptibility techniques, the use of laboratory control microorganisms is required to control the technical aspects of the laboratory standardized procedures. Standard cefoxitin powder should provide the following MIC values:

Using either an Agar Dilution Method<sup>a</sup> or Using a Broth<sup>b</sup> Microdilution Method:

<b>Microorganism</b>		<b>MIC (mcg/mL)</b>
<i>Bacteroides fragilis</i>	ATCC 25285	4-16
<i>Bacteroides thetaiotaomicron</i>	ATCC 29741	8-32

<sup>a</sup> Range applicable only to tests performed using either Brucella blood or Wilkins-Chalgren agar.

<sup>b</sup> Range applicable only to tests performed in the broth formulation of Wilkins-Chalgren agar<sup>3</sup>.

## INDICATIONS AND USAGE

To reduce the development of drug-resistant bacteria and maintain the effectiveness of Cefoxitin for Injection and Dextrose Injection and other antibacterial drugs, Cefoxitin for Injection and Dextrose Injection should be used only to treat or prevent infections that are proven or strongly suspected to be caused by susceptible bacteria. When culture and susceptibility information are available, they should be considered in selecting or modifying antibacterial therapy. In the absence of such data, local epidemiology and susceptibility patterns may contribute to the empiric selection of therapy.

### Treatment

Cefoxitin for Injection and Dextrose Injection 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**, including pneumonia and lung abscess, caused by *Streptococcus pneumoniae*, other streptococci (excluding enterococci, e.g., *Enterococcus faecalis* [formerly *Streptococcus faecalis*]), *Staphylococcus aureus* (including penicillinase-producing strains), *Escherichia coli*, *Klebsiella* species, *Haemophilus influenzae*, and *Bacteroides* species.
- (2) Urinary tract infections** caused by *Escherichia coli*, *Klebsiella* species, *Proteus mirabilis*, *Morganella morganii*, *Proteus vulgaris* and *Providencia* species (including *P. rettgeri*).
- (3) Intra-abdominal infections**, including peritonitis and intra-abdominal abscess, caused by *Escherichia coli*, *Klebsiella* species, *Bacteroides* species including *Bacteroides fragilis*, and *Clostridium* species.
- (4) Gynecological infections**, including endometritis, pelvic cellulitis, and pelvic inflammatory disease caused by *Escherichia coli*, *Neisseria gonorrhoeae* (including penicillinase-producing strains), *Bacteroides* species including *B. fragilis*, *Clostridium* species, *Peptococcus niger*, *Peptostreptococcus* species, and *Streptococcus agalactiae*. Cefoxitin, like cephalosporins, has no activity against *Chlamydia trachomatis*. Therefore, when cefoxitin is used in the treatment of patients with pelvic inflammatory disease and *C. trachomatis* is one of the suspected pathogens, appropriate anti-chlamydial coverage should be added.
- (5) Septicemia** caused by *Streptococcus pneumoniae*, *Staphylococcus aureus* (including penicillinase-producing strains), *Escherichia coli*, *Klebsiella* species, and *Bacteroides* species including *B. fragilis*.
- (6) Bone and joint infections** caused by *Staphylococcus aureus* (including penicillinase-producing strains).
- (7) Skin and skin structure infections** caused by *Staphylococcus aureus* (including penicillinase-producing strains), *Staphylococcus epidermidis*, *Streptococcus pyogenes* and other streptococci (excluding enterococci, e.g., *Enterococcus faecalis* [formerly *Streptococcus faecalis*]), *Escherichia coli*, *Proteus mirabilis*, *Klebsiella* species, *Bacteroides* species including *B. fragilis*, *Clostridium* species, *Peptococcus niger*, and *Peptostreptococcus* species.

Appropriate culture and susceptibility studies should be performed to determine the susceptibility of the causative organisms to cefoxitin. Therapy may be started while awaiting the results of these studies.

In randomized comparative studies, cefoxitin and cephalothin were comparably safe and effective in the management of infections caused by gram-positive cocci and gram-negative rods susceptible to the cephalosporins. Cefoxitin has a high degree of stability in the presence of bacterial beta-lactamases, both penicillinases and cephalosporinases.

Many infections caused by aerobic and anaerobic gram-negative bacteria resistant to some cephalosporins respond to cefoxitin. Similarly, many infections caused by aerobic and anaerobic bacteria resistant to some penicillin antibiotics (ampicillin, carbenicillin, penicillin G) respond to treatment with cefoxitin. Many infections caused by mixtures of susceptible aerobic and anaerobic bacteria respond to treatment with cefoxitin.

### **Prevention**

Cefoxitin is indicated for the prophylaxis of infection in patients undergoing uncontaminated gastrointestinal surgery, vaginal hysterectomy, abdominal hysterectomy, or cesarean section.

If there are signs of infection, specimens for culture should be obtained for identification of the causative organism so that appropriate treatment may be instituted.

### **CONTRAINDICATIONS**

Cefoxitin for Injection and Dextrose Injection is contraindicated in patients who have shown hypersensitivity to cefoxitin and the cephalosporin group of antibiotics.

Solutions containing dextrose may be contraindicated in patients with hypersensitivity to corn products.

### **WARNINGS**

BEFORE THERAPY WITH CEFOXITIN FOR INJECTION AND DEXTROSE INJECTION IS INSTITUTED, CAREFUL INQUIRY SHOULD BE MADE TO DETERMINE WHETHER THE PATIENT HAS HAD PREVIOUS HYPERSENSITIVITY REACTIONS TO CEFOXITIN, CEPHALOSPORINS, PENICILLINS, OR OTHER DRUGS. THIS PRODUCT SHOULD BE GIVEN WITH CAUTION TO PENICILLIN-SENSITIVE PATIENTS. ANTIBIOTICS SHOULD BE ADMINISTERED WITH CAUTION TO ANY PATIENT WHO HAS DEMONSTRATED SOME FORM OF ALLERGY, PARTICULARLY TO DRUGS. IF AN ALLERGIC REACTION TO CEFOXITIN FOR INJECTION AND DEXTROSE INJECTION OCCURS, DISCONTINUE THE DRUG. SERIOUS HYPERSENSITIVITY REACTIONS MAY REQUIRE EPINEPHRINE AND OTHER EMERGENCY MEASURES.

*Clostridium difficile* associated diarrhea (CDAD) has been reported with use of nearly all antibacterial agents, including Cefoxitin for Injection and Dextrose Injection, and may range in severity from mild diarrhea to fatal colitis. Treatment with antibacterial agents alters the normal flora of the colon leading to overgrowth of *C. difficile*.

*C. difficile* produces toxins A and B which contribute to the development of CDAD. Hypertoxin producing strains of *C. difficile* cause increased morbidity and mortality, as these infections can be refractory to antimicrobial therapy and may require colectomy. CDAD must be considered in all patients who present with diarrhea following antibiotic use. Careful medical history is necessary since CDAD has been reported to occur over two months after the administration of antibacterial agents.

If CDAD is suspected or confirmed, ongoing antibiotic use not directed against *C. difficile* may need to be discontinued. Appropriate fluid and electrolyte management, protein supplementation, antibiotic treatment of *C. difficile*, and surgical evaluation should be instituted as clinically indicated.

### **PRECAUTIONS**

#### **General**

Prescribing Cefoxitin for Injection and Dextrose Injection in the absence of a proven or strongly suspected bacterial infection or a prophylactic indication is unlikely to provide benefit to the patient and increases the risk of the development of drug-resistant bacteria.

The total daily dose should be reduced when Cefoxitin for Injection and Dextrose Injection is administered to patients with transient or persistent reduction of urinary output due to renal insufficiency (see **DOSAGE AND ADMINISTRATION**), because high and prolonged serum antibiotic concentrations can occur in such individuals from usual doses.

Antibiotics (including cephalosporins) should be prescribed with caution in individuals with a history of gastrointestinal disease, particularly colitis.

As with other antibiotics, prolonged use of cefoxitin 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.

As with other dextrose-containing solutions, Cefoxitin for Injection and Dextrose Injection should be prescribed with caution in patients with overt or known subclinical diabetes mellitus or carbohydrate intolerance for any reason.

If administration is controlled by a pumping device, care must be taken to discontinue pumping action before the container runs dry or air embolism may result.

Use only if solution is clear and container and seals are intact.

### **Information for Patients**

Diarrhea is a common problem caused by antibiotics which usually ends when the antibiotic is discontinued. Sometimes after starting treatment with antibiotics, patients can develop watery and bloody stools (with or without stomach cramps and fever) even as late as two or more months after having taken the last dose of the antibiotic. If this occurs, patients should contact their physician as soon as possible.

Patients should be counseled that antibacterial drugs including Cefoxitin for Injection and Dextrose Injection should only be used to treat bacterial infections. They do not treat viral infections (e.g., the common cold). When Cefoxitin for Injection and Dextrose Injection is prescribed to treat a bacterial infection, patients should be told that although it is common to feel better early in the course of therapy, the medication should be taken exactly as directed. Skipping doses or not completing the full course of therapy may (1) decrease the effectiveness of the immediate treatment and (2) increase the likelihood that bacteria will develop resistance and will not be treatable by Cefoxitin for Injection and Dextrose Injection or other antibacterial drugs in the future.

### **Laboratory Tests**

As with any potent antibacterial agent, periodic assessment of organ system functions, including renal, hepatic, and hematopoietic, is advisable during prolonged therapy.

### **Drug Interactions**

Increased nephrotoxicity has been reported following concomitant administration of cephalosporins and aminoglycoside antibiotics.

### **Drug/Laboratory Test Interactions**

As with cephalothin, high concentrations of cefoxitin (>100 mcg/mL) may interfere with measurement of serum and urine creatinine levels by Jaffé reaction, and produce false increases of modest degree in the levels of creatinine reported. Serum samples from patients treated with cefoxitin should not be analyzed for creatinine if withdrawn within 2 hours of drug administration.

High concentrations of cefoxitin in the urine may interfere with measurement of urinary 17-hydroxy-corticosteroids by the Porter-Silber reaction, and produce false increases of modest degree in the levels reported.

A false-positive reaction for glucose in the urine may occur. This has been observed with Clinitest<sup>®†</sup> reagent tablets.

### **Carcinogenesis, Mutagenesis, Impairment of Fertility**

Long term studies in animals have not been performed with cefoxitin to evaluate carcinogenic or mutagenic potential. Studies in rats treated intravenously with 400 mg/kg of cefoxitin (approximately three times the maximum recommended human dose) revealed no effects on fertility or mating ability.

### **Pregnancy**

*Pregnancy Category B.* Reproduction studies performed in rats and mice at parenteral doses of approximately one to seven and one-half times the maximum recommended human dose did not reveal teratogenic or fetal toxic effects, although a slight decrease in fetal weight was observed.

There are, however, no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed.

In the rabbit, cefoxitin was associated with a high incidence of abortion and maternal death. This was not considered to be a teratogenic effect but an expected consequence of the rabbit's unusual sensitivity to antibiotic-induced changes in the population of the microflora of the intestine.

### **Nursing Mothers**

Cefoxitin is excreted in human milk in low concentrations. Caution should be exercised when cefoxitin is administered to a nursing woman.

### **Pediatric Use**

Safety and efficacy in pediatric patients from birth to three months of age have not yet been established. In pediatric patients three months of age and older, higher doses of cefoxitin have been associated with an increased incidence of eosinophilia and elevated SGOT.

### **Geriatric Use**

Of the 1,775 subjects who received cefoxitin in clinical studies, 424 (24%) were 65 and over, while 124 (7%) were 75 and over. No overall differences in safety or effectiveness were observed between these

subjects and younger subjects, and other reported clinical experience has not identified differences in responses between the elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out (see **CLINICAL PHARMACOLOGY**).

This drug is known to be substantially excreted by the kidney, and the risk of toxic reactions to this drug may be greater in patients with impaired renal function. Because elderly patients are more likely to have decreased renal function, care should be taken in dose selection, and it may be useful to monitor renal function (see **DOSAGE AND ADMINISTRATION** and **PRECAUTIONS**).

#### **ADVERSE REACTIONS**

Cefoxitin is generally well tolerated. The most common adverse reactions have been local reactions following intravenous injection. Other adverse reactions have been encountered infrequently.

##### ***Local Reactions***

Thrombophlebitis has occurred with intravenous administration.

##### ***Allergic Reactions***

Rash (including exfoliative dermatitis and toxic epidermal necrolysis), urticaria, flushing, pruritus, eosinophilia, fever, dyspnea, and other allergic reactions including anaphylaxis, interstitial nephritis and angioedema have been noted.

##### ***Cardiovascular***

Hypotension.

##### ***Gastrointestinal***

Diarrhea, including documented pseudomembranous colitis which can appear during or after antibiotic treatment. Nausea and vomiting have been reported rarely.

##### ***Neuromuscular***

Possible exacerbation of myasthenia gravis.

##### ***Blood***

Eosinophilia, leukopenia including granulocytopenia, neutropenia, anemia, including hemolytic anemia, thrombocytopenia, and bone marrow depression. A positive direct Coombs test may develop in some individuals, especially those with azotemia.

##### ***Liver Function***

Transient elevation in SGOT, SGPT, serum LDH, and serum alkaline phosphatase; and jaundice have been reported.

##### ***Renal Function***

Elevations in serum creatinine and/or blood urea nitrogen levels have been observed. As with the cephalosporins, acute renal failure has been reported rarely. The role of cefoxitin in changes in renal function tests is difficult to assess, since factors predisposing to prerenal azotemia or to impaired renal function usually have been present.

In addition to the adverse reactions listed above which have been observed in patients treated with cefoxitin, the following adverse reactions and altered laboratory test results have been reported for cephalosporin class antibiotics:

Urticaria, erythema multiforme, Stevens-Johnson syndrome, serum sickness-like reactions, abdominal pain, colitis, renal dysfunction, toxic nephropathy, false-positive test for urinary glucose, hepatic dysfunction including cholestasis, elevated bilirubin, aplastic anemia, hemorrhage, prolonged prothrombin time, pancytopenia, agranulocytosis, superinfection, vaginitis including vaginal candidiasis.

Several cephalosporins have been implicated in triggering seizures, particularly in patients with renal impairment when the dosage was not reduced. (See **DOSAGE AND ADMINISTRATION**.) If seizures associated with drug therapy occur, the drug should be discontinued. Anticonvulsant therapy can be given if clinically indicated.

#### **OVERDOSAGE**

The acute intravenous LD<sub>50</sub> in the adult female mouse and rabbit was about 8 g/kg and greater than 1 g/kg, respectively. The acute intraperitoneal LD<sub>50</sub> in the adult rat was greater than 10 g/kg.

## DOSAGE AND ADMINISTRATION

Cefoxitin for Injection and Dextrose Injection in the DUPLEX® Container is intended for intravenous use only.

### TREATMENT

#### Adults

The usual adult dosage range is 1 gram to 2 grams every six to eight hours. Dosage should be determined by susceptibility of the causative organisms, severity of infection, and the condition of the patient (see Table 1 for dosage guidelines).

If *C. trachomatis* is a suspected pathogen, appropriate anti-chlamydial coverage should be added, because cefoxitin sodium has no activity against this organism.

Cefoxitin for Injection and Dextrose Injection may be used in patients with reduced renal function with the following dosage adjustments:

**In adults with renal insufficiency**, an initial loading dose of 1 gram to 2 grams may be given. After a loading dose, the recommendations for *maintenance dosage* (Table 2) may be used as a guide.

**When only the serum creatinine level is available**, the following formula (based on sex, weight, and age of the patient) may be used to convert this value into creatinine clearance. The serum creatinine should represent a steady state of renal function.

Males: 
$$\frac{\text{Weight (kg)} \times (140 - \text{age})}{72 \times \text{serum creatinine (mg/100 mL)}}$$

Females: 0.85 x above value

**In patients undergoing hemodialysis**, the loading dose of 1 to 2 grams should be given after each hemodialysis, and the maintenance dose should be given as indicated in Table 2.

Antibiotic therapy for group A beta-hemolytic streptococcal infections should be maintained for at least 10 days to guard against the risk of rheumatic fever or glomerulonephritis. In staphylococcal and other infections involving a collection of pus, surgical drainage should be carried out where indicated.

#### Pediatric Patients

The recommended dosage in pediatric patients three months of age and older is 80 to 160 mg/kg of body weight per day divided into four to six equal doses. The higher dosages should be used for more severe or serious infections. The total daily dosage should not exceed 12 grams.

At this time no recommendation is made for pediatric patients from birth to three months of age (see **PRECAUTIONS**).

In pediatric patients with renal insufficiency, the dosage and frequency of dosage should be modified consistent with the recommendations for adults (see Table 2).

### PREVENTION

Effective prophylactic use depends on the time of administration. Cefoxitin for Injection and Dextrose Injection usually should be given one-half to one hour before the operation, which is sufficient time to achieve effective levels in the wound during the procedure. Prophylactic administration should usually be stopped within 24 hours since continuing administration of any antibiotic increases the possibility of adverse reactions but, in the majority of surgical procedures, does not reduce the incidence of subsequent infection.

For prophylactic use in uncontaminated gastrointestinal surgery, vaginal hysterectomy, or abdominal hysterectomy, the following doses are recommended:

#### Adults

2 grams administered intravenously just prior to surgery (approximately one-half to one hour before the initial incision) followed by 2 grams every 6 hours after the first dose for no more than 24 hours.

#### Pediatric Patients (3 months and older)

30 to 40 mg/kg doses may be given at the times designated above.

#### Cesarean section patients

For patients undergoing cesarean section, either a single 2 gram dose administered intravenously as soon as the umbilical cord is clamped OR a 3-dose regimen consisting of 2 grams given intravenously as

soon as the umbilical cord is clamped followed by 2 grams 4 and 8 hours after the initial dose is recommended. (See **CLINICAL STUDIES**.)

<b>Table 1 - Guidelines for Dosage of Cefoxitin for Injection</b>		
<b>Type of Infection</b>	<b>Daily Dosage</b>	<b>Frequency and Route</b>
Uncomplicated forms <sup>‡</sup> of infections such as pneumonia, urinary tract infection, cutaneous infection	3-4 grams	1 gram every 6-8 hours IV
Moderately severe or severe infections	6-8 grams	1 gram every 4 hours <i>or</i> 2 grams every 6-8 hours IV
Infections commonly needing antibiotics in higher dosage (e.g., gas gangrene)	12 grams	2 grams every 4 hours <i>or</i> 3 grams every 6 hours IV
<sup>‡</sup> Including patients in whom bacteremia is absent or unlikely.		

<b>Table 2 - Maintenance Dosage of Cefoxitin for Injection in Adults with Reduced Renal Function</b>			
<b>Renal Function</b>	<b>Creatinine Clearance (mL/min)</b>	<b>Dose (grams)</b>	<b>Frequency</b>
Mild impairment	50-30	1-2	every 8-12 hours
Moderate impairment	29-10	1-2	every 12-24 hours
Severe impairment	9-5	0.5-1	every 12-24 hours
Essentially no function	<5	0.5-1	every 24-48 hours

**ADMINISTRATION**

The intravenous route is preferable for patients with bacteremia, bacterial septicemia, or other severe or life-threatening infections, or for patients who may be poor risks because of lowered resistance resulting from such debilitating conditions as malnutrition, trauma, surgery, diabetes, heart failure, or malignancy, particularly if shock is present or impending.

Cefoxitin for Injection and Dextrose Injection may be administered through the tubing system by which the patient may be receiving other intravenous solutions. However, during infusion of the solution containing Cefoxitin for Injection and Dextrose Injection, it is advisable to temporarily discontinue administration of any other solutions at the same site.

Solutions of Cefoxitin for Injection and Dextrose Injection, like those of most beta-lactam antibiotics, should not be added to aminoglycoside solutions (e.g., gentamicin sulfate, tobramycin sulfate, amikacin sulfate) because of potential interaction. However, Cefoxitin for Injection and Dextrose Injection and aminoglycosides may be administered separately to the same patient.

**CAUTION:** Do not use plastic containers in series connections. Such use would result in air embolism due to residual air being drawn from the primary container before administration of the fluid from the secondary container is complete.

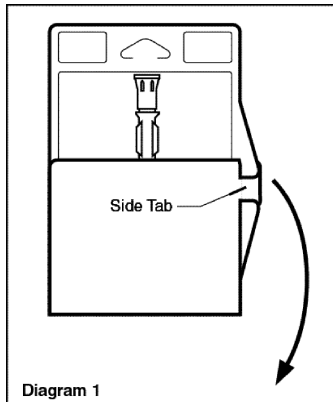
**NOTE:** Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration.

## DUPLEX<sup>®</sup> Drug Delivery System Directions for Use

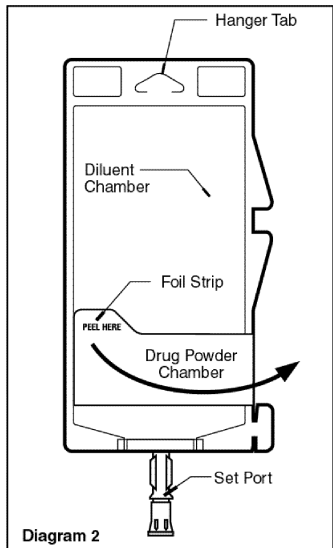
- To avoid inadvertent activation, DUPLEX Container should remain in the folded position until activation is intended.

### Patient Labeling and Drug Powder/Diluent Inspection

- Apply patient-specific label on foil side of container. USE CARE to avoid activation. Do not cover any portion of foil strip with patient label.
- Unlatch side tab and unfold DUPLEX Container. (See Diagram 1.)



- Visually inspect diluent chamber for particulate matter.
- Use only if container and seals are intact.
- To inspect the drug powder for foreign matter or discoloration, peel foil strip from drug chamber. (See Diagram 2.)



- Protect from light after removal of foil strip.

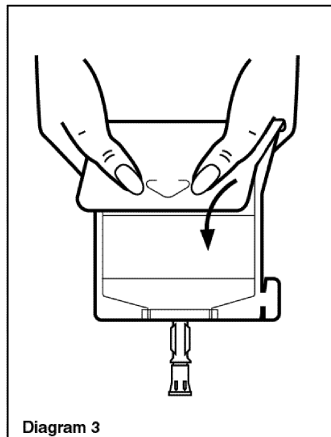
**Note: If foil strip is removed, product must be used within 7 days, but not beyond the labeled expiration date.**

- The product should be re-folded and the side tab latched until ready to activate.

### Reconstitution (Activation)

- Do not use directly after storage by refrigeration, allow the product to equilibrate to room temperature before patient use.

- Unfold the DUPLEX Container and point the set port in a downward direction. Starting at the hanger tab end, fold the DUPLEX Container just below the diluent meniscus trapping all air above the fold. To activate, squeeze the folded diluent chamber until the seal between the diluent and powder opens, releasing diluent into the drug powder chamber. (See Diagram 3.)

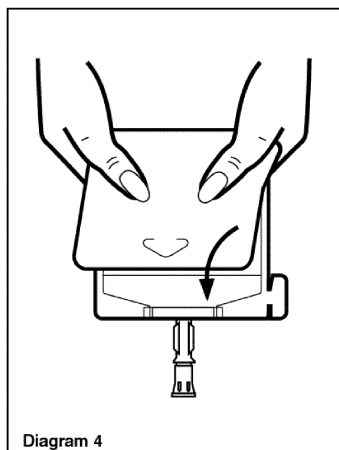


- Agitate the liquid-powder mixture until the drug powder is completely dissolved.

**Note: Following reconstitution (activation), product must be used within 12 hours if stored at room temperature or within 7 days if stored under refrigeration.**

#### **Administration**

- Visually inspect the reconstituted solution for particulate matter.
- Point the set port in a downwards direction. Starting at the hanger tab end, fold the DUPLEX Container just below the solution meniscus trapping all air above the fold. Squeeze the folded DUPLEX Container until the seal between reconstituted drug solution and set port opens, releasing liquid to set port. (See Diagram 4.)



- Prior to attaching the IV set, check for minute leaks by squeezing container firmly. If leaks are found, discard container and solution as sterility may be impaired.
- Using aseptic technique, remove the set port cover from the set port and attach sterile administration set.
- Refer to Directions for Use accompanying the administration set.

#### **Precautions**

- As with other cephalosporins, reconstituted Cefoxitin for Injection and Dextrose Injection tends to darken depending on storage conditions, within the stated recommendations. However, product potency is not adversely affected.
- Use only if prepared solution is clear and free from particulate matter.

- Do not use in series connection.
- Do not introduce additives into the DUPLEX Container.
- Do not freeze.

#### HOW SUPPLIED

Cefoxitin for Injection and Dextrose Injection in the DUPLEX<sup>®</sup> Drug Delivery System is a flexible dual chamber container supplied in two concentrations. After reconstitution, the concentrations are equivalent to 1 g and 2 g cefoxitin. The diluent chamber contains approximately 50 mL of Dextrose Injection. Dextrose Injection has been adjusted to 4% w/v and 2.2% w/v for the 1 g and 2 g doses, respectively, such that the reconstituted solution is iso-osmotic.

Cefoxitin for Injection and Dextrose Injection is supplied sterile and nonpyrogenic in the DUPLEX Drug Delivery System containers packaged 24 units per case.

NDC	Cat. No.	Dose	Volume
Cefoxitin for Injection and Dextrose Injection 0264-3123-11	3123-11	1 g	50 mL
Cefoxitin for Injection and Dextrose Injection 0264-3125-11	3125-11	2 g	50 mL

Store the unactivated unit at 20-25°C (68-77°F). Excursions permitted to 15-30°C (59-86°F). [See USP Controlled Room Temperature.]

#### CLINICAL STUDIES

A prospective, randomized, double-blind, placebo-controlled clinical trial was conducted to determine the efficacy of short-term prophylaxis with cefoxitin in patients undergoing cesarean section who were at high risk for subsequent endometritis because of ruptured membranes. Patients were randomized to receive either three doses of placebo (n=58), a single dose of cefoxitin (2 g) followed by two doses of placebo (n=64), or a three-dose regimen of cefoxitin (each dose consisting of 2 g) (n=60), given intravenously, usually beginning at the time of clamping of the umbilical cord, with the second and third doses given 4 and 8 hours post-operatively. Endometritis occurred in 16/58 (27.6%) patients given placebo, 5/63 (7.9%) patients given a single dose of cefoxitin, and 3/58 (5.2%) patients given three doses of cefoxitin. The differences between the two groups treated with cefoxitin and placebo with respect to endometritis were statistically significant (p<0.01) in favor of cefoxitin. The differences between the one-dose and three-dose regimens of cefoxitin were not statistically significant.

Two double-blind, randomized studies compared the efficacy of a single 2 gram intravenous dose of cefoxitin to a single 2 gram intravenous dose of cefotetan in the prevention of surgical site-related infection (major morbidity) and non-site-related infections (minor morbidity) in patients following cesarean section. In the first study, 82/98 (83.7%) patients treated with cefoxitin and 71/95 (74.7%) patients treated with cefotetan experienced no major or minor morbidity. The difference in the outcomes in this study (95% CI: -0.03, +0.21) was not statistically significant. In the second study, 65/75 (86.7%) patients treated with cefoxitin and 62/76 (81.6%) patients treated with cefotetan experienced no major or minor morbidity. The difference in the outcomes in this study (95% CI: -0.08, +0.18) was not statistically significant.

In clinical trials of patients with intra-abdominal infections due to *Bacteroides fragilis* group microorganisms, eradication rates at 1 to 2 weeks post-treatment for isolates were in the range of 70% to 80%. Eradication rates for individual species are listed below:

<i>Bacteroides distasonis</i>	7/10	(70%)
<i>Bacteroides fragilis</i>	26/33	(79%)
<i>Bacteroides ovatus</i>	10/13	(77%)
<i>B. thetaiotaomicron</i>	13/18	(72%)

#### REFERENCES

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2. National Committee for Clinical Laboratory Standards. Performance Standards for Antimicrobial Disk Susceptibility Tests – Sixth Edition. Approved Standard NCCLS Document M2-A6, Vol. 17, No. 1, NCCLS, Wayne, PA, January 1997.

3. National Committee for Clinical Laboratory Standards. Methods for Antimicrobial Susceptibility Testing of Anaerobic Bacteria – Fourth Edition. Approved Standard NCCLS Document M11-A4, Vol. 17, No. 22, NCCLS, Villanova, PA, December 1997.

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U.S. Patent Nos. D388,168, D397,789, D402,366, D407,816, 5,176,634, 5,944,709, 6,165,161, 6,203,535, 6,846,305, and 6,996,951.

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