

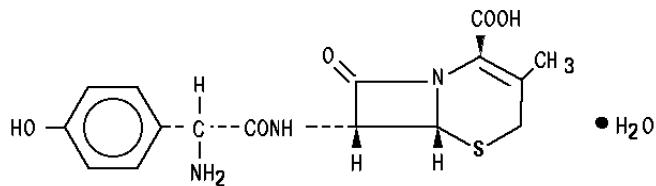
Rx only

DURICEF®

(cefadroxil monohydrate, USP)

DESCRIPTION

DURICEF® (cefadroxil monohydrate, USP) is a semisynthetic cephalosporin antibiotic intended for oral administration. It is a white to yellowish-white crystalline powder. It is soluble in water and it is acid-stable. It is chemically designated as 5-Thia-1-azabicyclo[4.2.0]oct-2-ene-2-carboxylic acid, 7-[[amino(4-hydroxyphenyl)acetyl]amino]-3-methyl-8-oxo-, monohydrate, [6R-[6 α ,7 β (R*)]]-. It has the formula C₁₆H₁₇N₃O₅S•H₂O and the molecular weight of 381.40. It has the following structural formula:



DURICEF film-coated tablets, 1 g, contain the following inactive ingredients: microcrystalline cellulose, hydroxypropyl methylcellulose, magnesium stearate, polyethylene glycol, polysorbate 80, simethicone emulsion, and titanium dioxide.

DURICEF for Oral Suspension contains the following inactive ingredients: FD&C Yellow No. 6, flavors (natural and artificial), polysorbate 80, sodium benzoate, sucrose, and xanthan gum.

DURICEF capsules contain the following inactive ingredients: D&C Red No. 28, FD&C Blue No. 1, FD&C Red No. 40, gelatin, magnesium stearate, and titanium dioxide.

CLINICAL PHARMACOLOGY

DURICEF is rapidly absorbed after oral administration. Following single doses of 500 mg and 1000 mg, average peak serum concentrations were approximately 16 and 28 µg/mL, respectively. Measurable levels were present 12 hours after administration. Over 90% of the drug is excreted unchanged in the urine within 24 hours. Peak urine concentrations are approximately 1800 µg/mL during the period following a single 500-mg oral dose. Increases in dosage generally produce a proportionate increase in DURICEF (cefadroxil monohydrate, USP) urinary concentration. The urine antibiotic concentration, following a 1-g dose, was maintained well above the MIC of susceptible urinary pathogens for 20 to 22 hours.

Microbiology

In vitro tests demonstrate that the cephalosporins are bactericidal because of their inhibition of cell-wall synthesis. Cefadroxil has been shown to be active against the following organisms both *in vitro* and in clinical infections (see **INDICATIONS AND USAGE**):

Beta-hemolytic streptococci
Staphylococci, including penicillinase-producing strains
Streptococcus (Diplococcus) pneumoniae
Escherichia coli
Proteus mirabilis
Klebsiella species
Moraxella (Branhamella) catarrhalis

Note: Most strains of *Enterococcus faecalis* (formerly *Streptococcus faecalis*) and *Enterococcus faecium* (formerly *Streptococcus faecium*) are resistant to DURICEF. It is not active against most strains of *Enterobacter* species, *Morganella morganii* (formerly *Proteus morganii*), and *P. vulgaris*. It has no activity against *Pseudomonas* species and *Acinetobacter calcoaceticus* (formerly *Mima* and *Herellea* species).

Susceptibility tests: Diffusion techniques

The use of antibiotic disk susceptibility test methods which measure zone diameter give an accurate estimation of antibiotic susceptibility. One such standard procedure¹ which has been recommended for use with disks to test susceptibility of organisms to cefadroxil uses the

cephalosporin class (cephalothin) disk. Interpretation involves the correlation of the diameters obtained in the disk test with the minimum inhibitory concentration (MIC) for cefadroxil.

Reports from the laboratory giving results of the standard single-disk susceptibility test with a 30 µg cephalothin disk should be interpreted according to the following criteria:

Zone diameter (mm)	Interpretation
≥18	(S) Susceptible
15–17	(I) Intermediate
≤14	(R) Resistant

A report of “Susceptible” indicates that the pathogen is likely to be inhibited by generally achievable blood levels. A report of “Intermediate susceptibility” suggests that the organism would be susceptible if high dosage is used or if the infection is confined to tissue and fluids (eg, urine) in which high antibiotic levels are attained. A report of “Resistant” indicates that achievable concentrations of the antibiotic are unlikely to be inhibitory and other therapy should be selected.

Standardized procedures require the use of laboratory control organisms. The 30 µg cephalothin disk should give the following zone diameters:

Organism	Zone Diameter (mm)
Staphylococcus aureus ATCC 25923	29–37
Escherichia coli ATCC 25922	17–22

Dilution Techniques

When using the NCCLS agar dilution or broth dilution (including microdilution) method² or equivalent, a bacterial isolate may be considered susceptible if the MIC (minimum inhibitory concentration) value for cephalothin is 8 µg/mL or less. Organisms are considered resistant if the MIC is 32 µg/mL or greater. Organisms with an MIC value of less than 32 µg/mL but greater than 8 µg/mL are intermediate.

As with standard diffusion methods, dilution procedures require the use of laboratory control organisms. Standard cephalothin powder should give MIC values in the range of 0.12 µg/mL and 0.5 µg/mL for *Staphylococcus aureus* ATCC 29213. For *Escherichia coli* ATCC 25922,

the MIC range should be between 4.0 µg/mL and 16.0 µg/mL. For *Streptococcus faecalis* ATCC 29212, the MIC range should be between 8.0 and 32.0 µg/mL.

INDICATIONS AND USAGE

DURICEF is indicated for the treatment of patients with infection caused by susceptible strains of the designated organisms in the following diseases:

Urinary tract infections caused by *E. coli*, *P. mirabilis*, and *Klebsiella* species.

Skin and skin structure infections caused by staphylococci and/or streptococci.

Pharyngitis and/or tonsillitis caused by *Streptococcus pyogenes* (Group A beta-hemolytic streptococci).

Note: Only penicillin by the intramuscular route of administration has been shown to be effective in the prophylaxis of rheumatic fever. DURICEF is generally effective in the eradication of streptococci from the oropharynx. However, data establishing the efficacy of DURICEF for the prophylaxis of subsequent rheumatic fever are not available.

Note: Culture and susceptibility tests should be initiated prior to and during therapy. Renal function studies should be performed when indicated.

CONTRAINDICATIONS

DURICEF is contraindicated in patients with known allergy to the cephalosporin group of antibiotics.

WARNINGS

BEFORE THERAPY WITH DURICEF IS INSTITUTED, CAREFUL INQUIRY SHOULD BE MADE TO DETERMINE WHETHER THE PATIENT HAS HAD PREVIOUS HYPERSENSITIVITY REACTIONS TO CEFADROXIL, CEPHALOSPORINS, PENICILLINS, OR OTHER DRUGS. IF THIS PRODUCT IS TO BE GIVEN TO PENICILLIN-SENSITIVE PATIENTS, CAUTION SHOULD BE EXERCISED BECAUSE CROSS-SENSITIVITY AMONG BETA-LACTAM ANTIBIOTICS HAS BEEN CLEARLY

DOCUMENTED AND MAY OCCUR IN UP TO 10% OF PATIENTS WITH A HISTORY OF PENICILLIN ALLERGY.

IF AN ALLERGIC REACTION TO DURICEF OCCURS, DISCONTINUE THE DRUG. SERIOUS ACUTE HYPERSENSITIVITY REACTIONS MAY REQUIRE TREATMENT WITH EPINEPHRINE AND OTHER EMERGENCY MEASURES, INCLUDING OXYGEN, INTRAVENOUS FLUIDS, INTRAVENOUS ANTIHISTAMINES, CORTICOSTEROIDS, PRESSOR AMINES, AND AIRWAY MANAGEMENT, AS CLINICALLY INDICATED.

Pseudomembranous colitis has been reported with nearly all antibacterial agents, including cefadroxil, and may range 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 indicated that a toxin produced by *Clostridium difficile* is a 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 discontinuation of the drug alone. In moderate to severe cases, consideration should be given to management with fluids and electrolytes, protein supplementation and treatment with an antibacterial drug effective against *Clostridium difficile*.

PRECAUTIONS

General

DURICEF (cefadroxil monohydrate, USP) should be used with caution in the presence of markedly impaired renal function (creatinine clearance rate of less than 50 mL/min/1.73 M²). (See **DOSAGE AND ADMINISTRATION**.) In patients with known or suspected renal impairment, careful clinical observation and appropriate laboratory studies should be made prior to and during therapy.

Prolonged use of DURICEF may result in the overgrowth of nonsusceptible organisms. Careful observation of the patient is essential. If superinfection occurs during therapy, appropriate measures should be taken.

DURICEF should be prescribed with caution in individuals with history of gastrointestinal disease particularly colitis.

Drug/Laboratory Test Interactions

Positive direct Coombs' tests have been reported during treatment with the cephalosporin antibiotics. In hematologic studies or in transfusion cross-matching procedures when antiglobulin tests are performed on the minor side or in Coombs' testing of newborns whose mothers have received cephalosporin antibiotics before parturition, it should be recognized that a positive Coombs' test may be due to the drug.

Carcinogenesis, Mutagenesis and Impairment of Fertility

No long-term studies have been performed to determine carcinogenic potential. No genetic toxicity tests have been performed.

Pregnancy: Pregnancy Category B

Reproduction studies have been performed in mice and rats at doses up to 11 times the human dose and have revealed no evidence of impaired fertility or harm to the fetus due to cefadroxil monohydrate. 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.

Labor and Delivery

DURICEF has not been studied for use during labor and delivery. Treatment should only be given if clearly needed.

Nursing Mothers

Caution should be exercised when cefadroxil monohydrate is administered to a nursing mother.

Pediatric Use

(See **DOSAGE AND ADMINISTRATION**.)

Geriatric Use

Of approximately 650 patients who received cefadroxil for the treatment of urinary tract infections in three clinical trials, 28% were 60 years and older, while 16% were 70 years and older. Of approximately 1000 patients who received cefadroxil for the treatment of skin and skin structure infection in 14 clinical trials, 12% were 60 years and older while 4% were 70 years and over. No overall differences in safety were observed between the elderly patients in these studies and younger patients. Clinical studies of cefadroxil for the treatment of pharyngitis or tonsillitis did not include sufficient numbers of patients 65 years and older to determine whether they respond differently from younger patients. Other reported clinical experience with cefadroxil has not identified differences in responses between elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out.

Cefadroxil is substantially excreted by the kidney, and dosage adjustment is indicated for patients with renal impairment (see **DOSAGE AND ADMINISTRATION: Renal Impairment**). 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.

ADVERSE REACTIONS

Gastrointestinal

Onset of pseudomembranous colitis symptoms may occur during or after antibiotic treatment (see **WARNINGS**). Dyspepsia, nausea and vomiting have been reported rarely. Diarrhea has also occurred.

Hypersensitivity

Allergies (in the form of rash, urticaria, angioedema, and pruritus) have been observed. These reactions usually subsided upon discontinuation of the drug. Anaphylaxis has also been reported.

Other

Other reactions have included hepatic dysfunction including cholestasis and elevations in serum transaminase, genital pruritus, genital moniliasis, vaginitis, moderate transient neutropenia, fever. Agranulocytosis, thrombocytopenia, idiosyncratic hepatic failure, erythema multiforme, Stevens-Johnson syndrome, serum sickness, and arthralgia have been rarely reported.

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

Toxic epidermal necrolysis, abdominal pain, superinfection, renal dysfunction, toxic nephropathy, aplastic anemia, hemolytic anemia, hemorrhage, prolonged prothrombin time, positive Coombs' test, increased BUN, increased creatinine, elevated alkaline phosphatase, elevated aspartate aminotransferase (AST), elevated alanine aminotransferase (ALT), elevated bilirubin, elevated LDH, eosinophilia, pancytopenia, neutropenia.

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

OVERDOSAGE

A study of children under six years of age suggested that ingestion of less than 250 mg/kg of cephalosporins is not associated with significant outcomes. No action is required other than general support and observation. For amounts greater than 250 mg/kg, induce gastric emptying.

In five anuric patients, it was demonstrated that an average of 63% of a 1 g oral dose is extracted from the body during a 6–8 hour hemodialysis session.

DOSAGE AND ADMINISTRATION

DURICEF (cefadroxil monohydrate, USP) is acid-stable and may be administered orally without regard to meals. Administration with food may be helpful in diminishing potential gastrointestinal complaints occasionally associated with oral cephalosporin therapy.

Adults

Urinary Tract Infections: For uncomplicated lower urinary tract infections (i.e., cystitis) the usual dosage is 1 or 2 g per day in a single (q.d.) or divided doses (b.i.d.).

For all other urinary tract infections the usual dosage is 2 g per day in divided doses (b.i.d.).

Skin and Skin Structure Infections: For skin and skin structure infections the usual dosage is 1 g per day in single (q.d.) or divided doses (b.i.d.).

Pharyngitis and Tonsillitis: Treatment of group A beta-hemolytic streptococcal pharyngitis and tonsillitis—1 g per day in single (q.d.) or divided doses (b.i.d.) for 10 days.

Children

For urinary tract infections, the recommended daily dosage for children is 30 mg/kg/day in divided doses every 12 hours. For pharyngitis, tonsillitis, and impetigo, the recommended daily dosage for children is 30 mg/kg/day in a single dose or in equally divided doses every 12 hours. For other skin and skin structure infections, the recommended daily dosage is 30 mg/kg/day in equally divided doses every 12 hours. In the treatment of beta-hemolytic streptococcal infections, a therapeutic dosage of DURICEF should be administered for at least 10 days.

See chart for total daily dosage for children.

DAILY DOSAGE OF DURICEF® SUSPENSION					
Child's Weight					
lbs	kg	125 mg/5 mL	250 mg/5 mL	500 mg/5 mL	
10	4.5	1 tsp	—		
20	9.1	2 tsp	1 tsp		

DAILY DOSAGE OF DURICEF® SUSPENSION				
Child's Weight				
30	13.6	3 tsp	1-1/2 tsp	
40	18.2	4 tsp	2 tsp	1 tsp
50	22.7	5 tsp	2-1/2 tsp	1-1/4 tsp
60	27.3	6 tsp	3 tsp	1-1/2 tsp
70 & above	31.8 +	—	—	2 tsp

Renal Impairment

In patients with renal impairment, the dosage of cefadroxil monohydrate should be adjusted according to creatinine clearance rates to prevent drug accumulation. The following schedule is suggested. In adults, the initial dose is 1000 mg of DURICEF and the maintenance dose (based on the creatinine clearance rate [mL/min/1.73 M²]) is 500 mg at the time intervals listed below.

Creatinine Clearances	Dosage Interval
0–10 mL/min	36 hours
10–25 mL/min	24 hours
25–50 mL/min	12 hours

Patients with creatinine clearance rates over 50 mL/min may be treated as if they were patients having normal renal function.

Reconstitution Directions for Oral Suspension

Bottle Size	Reconstitution Directions
100 mL	Suspend in a total of 67 mL water. Method: Tap bottle lightly to loosen powder. Add 67 mL of water in two portions. Shake well after each addition.
75 mL	Suspend in a total of 51 mL water. Method: Tap bottle lightly to loosen powder. Add 51 mL of water in two portions. Shake well after each addition.
50 mL	Suspend in a total of 34 mL water. Method: Tap bottle lightly to loosen powder. Add 34 mL of water in two portions. Shake well after each addition.
After reconstitution, store in refrigerator. Shake well before using. Keep container tightly closed. Discard unused portion after 14 days.	

HOW SUPPLIED

DURICEF® (cefadroxil monohydrate, USP) 500 mg Capsules: opaque, maroon and white hard gelatin capsules, imprinted with “PPP” and “784” on one end and with “DURICEF” and “500 mg” on the other end.

Capsules are supplied as follows:

NDC 0087-0784-07	Bottle of 20
NDC 0087-0784-46	Bottle of 50
NDC 0087-0784-42	Bottle of 100
NDC 0087-0784-44	10 strips of 10 individually labeled blisters with 1 capsule per blister

Store at controlled room temperature (15°–30° C).

DURICEF® 1 gram Tablets: white to off white, top bisected, oval shaped, imprinted with “PPP” on one side of the bisect and “785” on the other side of the bisect. Tablets are supplied as follows:

NDC 0087-0785-43	Bottle of 50
NDC 0087-0785-42	Bottle of 100
NDC 0087-0785-44	10 strips of 10 individually labeled blisters with one tablet per blister

Store at controlled room temperature (15°–30° C).

DURICEF® for Oral Suspension is orange-pineapple flavored, and is supplied as follows:

125 mg/5 mL	NDC 0087-0786-42	50 mL Bottle
	NDC 0087-0786-41	100 mL Bottle
250 mg/5 mL	NDC 0087-0782-42	50 mL Bottle
	NDC 0087-0782-41	100 mL Bottle
500 mg/5 mL	NDC 0087-0783-42	50 mL Bottle
	NDC 0087-0783-05	75 mL Bottle
	NDC 0087-0783-41	100 mL Bottle

Prior to reconstitution: Store at controlled room temperature (15°–30° C).

REFERENCES

1. National Committee for Clinical Laboratory Standards, Approved Standard, *Performance Standards for Antimicrobial Disk Susceptibility Test*, 4th Edition, Vol. 10 (7): M2-A4, Villanova, PA, April, 1990.
2. National Committee for Clinical Laboratory Standards, Approved Standard: *Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically*, 2nd Edition, Vol. 10 (8): M7-A2, Villanova, PA, April, 1990.

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Janice Soreth
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