NOVACEF Injection (Cefuroxime sodium)

**Composition**

Novacef 1.5 gm Injection
Each vial contains
Cefuroxime Sodium IP equivalent to
Cefuroxime ......................... 1.5 gm
(As sterile powder for reconstitution)

Novacef 750 mg Injection
Each vial contains
Cefuroxime Sodium IP equivalent to
Cefuroxime......................... 750 mg
(As sterile powder for reconstitution)

**Dosage Form**

Powder for Injection

**Pharmacology**

**Pharmacodynamics**

Cefuroxime is a semi-synthetic, broad-spectrum, cephalosporin antibiotic for parenteral administration. It is the sodium salt of (6R, 7R)-3-carbamoyloxymethyl 7- ceph-3-em-4-carboxylate. Cefuroxime has in vitro activity against a wide range of Gram-positive and Gram-negative organisms, and it is highly stable in the presence of beta-lactamases of certain Gram-negative bacteria. The bactericidal action of cefuroxime results from inhibition of cell-wall synthesis.

**Microbiology**

Cefuroxime is usually active against the following organisms in vitro:

*Aerobic Gram-positive Microorganisms*

*Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus pneumoniae, and Streptococcus pyogenes* (and other streptococci)

*NOTE*: Most strains of *enterococci*, e.g., *Enterococcus faecalis* (formerly *Streptococcus faecalis*), are resistant to cefuroxime. *Methicillin-resistant staphylococci* and *Listeria monocytogenes* are resistant to cefuroxime.

*Aerobic Gram-negative Microorganisms*

*Citrobacter spp., Enterobacter spp., Escherichia coli, Haemophilus influenzae* (including ampicillin-resistant strains), *Haemophilus parainfluenzae, Klebsiella spp.* (including *Klebsiella pneumoniae*), *Moraxella (Branhamella) catarrhalis* (including ampicillin- and cephalothin-resistant strains), *Morganella morganii* (formerly *Proteus morganii*), *Neisseria gonorrhoeae* (including penicillinase- and non-penicillinase-producing strains), *Neisseria meningitidis, Proteus mirabilis,*
Providencia rettgeri (formerly Proteus rettgeri), Salmonella spp., and Shigella spp.

Note: Some strains of Morganella morganii, Enterobacter cloacae, and Citrobacter spp. have been shown by in vitro tests to be resistant to cefuroxime and other cephalosporins. Pseudomonas and Campylobacter spp., Legionella spp., Acinetobacter calcoaceticus, and most strains of Serratia spp. and Proteus vulgaris are resistant to most first- and second-generation cephalosporins.

Anaerobic Gram-positive and Gram-negative Microorganisms

Gram-positive and Gram-negative cocci (including Peptococcus and Peptostreptococcus spp.), Gram-positive bacilli (including Clostridium spp.) and Gram-negative bacilli (including Bacteroides and Fusobacterium spp.)

Note: Clostridium difficile and most strains of Bacteroides fragilis are resistant to cefuroxime.

Pharmacokinetics

After intramuscular (I.M.) injection of a 750 mg dose of cefuroxime to normal volunteers, the mean peak serum concentration was 27 mcg/mL. The peak occurred at approximately 45 minutes (range, 15 to 60 minutes). Following intravenous (I.V.) doses of 750 mg and 1.5 g, serum concentrations were approximately 50 and 100 mcg/mL at 15 minutes. Therapeutic serum concentrations of approximately 2 mcg/mL or more were maintained for 5.3 hours and 8 hours or more, respectively. There was no evidence of accumulation of cefuroxime in the serum following I.V. administration of 1.5 g doses every 8 hours to normal volunteers. The serum half-life after either I.M. or I.V. injections is approximately 80 minutes.

Approximately 89% of a dose of cefuroxime is excreted by the kidneys over an 8-hour period, resulting in high urinary concentrations.

Following the I.M. administration of a 750 mg single dose, urinary concentrations averaged 1,300 mcg/mL during the first 8 hours. I.V. doses of 750 mg and 1.5 g produced urinary levels averaging 1,150 and 2,500 mcg/mL, respectively, during the first 8-hour period.

The concomitant oral administration of probenecid with cefuroxime slows tubular secretion, decreases renal clearance by approximately 40%, increases the peak serum level by approximately 30%, and increases the serum half-life by approximately 30%. Cefuroxime is detectable in therapeutic concentrations in pleural fluid, joint fluid, bile, sputum, bone, and aqueous humor.

Cefuroxime is detectable in therapeutic concentrations in the cerebrospinal fluid (CSF) of adults and pediatric patients with meningitis. The following table shows the concentrations of cefuroxime achieved in CSF during multiple dosing of patients with meningitis.

<table>
<thead>
<tr>
<th>Patients</th>
<th>Dose</th>
<th>Number of Patients</th>
<th>Mean (Range) CSF Cefuroxime Concentrations (mcg/mL) Achieved Within 8 Hours Post-Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric patients (aged 4 weeks to 6.5 years)</td>
<td>200 mg/kg/day, divided q.6 hours</td>
<td>5</td>
<td>6.6 (0.9 to 17.3)</td>
</tr>
<tr>
<td>Pediatric patients (aged 7 months to 9 years)</td>
<td>200 to 230 mg/kg/day, divided q.8 hours</td>
<td>6</td>
<td>8.3 (&lt;2 to 22.5)</td>
</tr>
<tr>
<td>Adults</td>
<td>1.5 g q.8 hours</td>
<td>2</td>
<td>5.2 (2.7 to 8.9)</td>
</tr>
<tr>
<td>Adults</td>
<td>1.5 g q.6 hours</td>
<td>10</td>
<td>6.0 (1.5 to 13.5)</td>
</tr>
</tbody>
</table>
Cefuroxime is approximately 50% bound to serum protein.

**Indications**

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

**Lower Respiratory Tract Infections**, including pneumonia, caused by *Streptococcus pneumoniae*, *Haemophilus influenzae* (including ampicillin-resistant strains), *Klebsiella* spp., *Staphylococcus aureus* (penicillinase- and non-penicillinas-producing strains), *Streptococcus pyogenes*, and *Escherichia coli*.

Urinary Tract Infections caused by *Escherichia coli* and *Klebsiella* spp.

Skin and Skin-Structure Infections caused by *Staphylococcus aureus* (penicillinase- and non-penicillinase-producing strains), *Streptococcus pyogenes*, *Escherichia coli*, *Klebsiella* spp., and *Enterobacter* spp.

Septicemia caused by *Staphylococcus aureus* (penicillinase- and non-penicillinase-producing strains), *Streptococcus pneumoniae*, *Escherichia coli*, *Haemophilus influenzae* (including ampicillin-resistant strains), and *Klebsiella* spp.

Meningitis caused by *Streptococcus pneumoniae*, *Haemophilus influenzae* (including ampicillin-resistant strains), and *Klebsiella* spp., *Neisseria meningitidis*, and *Staphylococcus aureus* (penicillinase- and non-penicillinase-producing strains).

Gonorrhea: Uncomplicated and disseminated gonococcal infections due to *Neisseria gonorrhoeae* (penicillinase- and non-penicillinase-producing strains) in both males and females.

Bone and Joint Infections caused by *Staphylococcus aureus* (penicillinase- and non-penicillinase-producing strains).

Clinical microbiological studies in skin and skin-structure infections frequently reveal the growth of susceptible strains of both aerobic and anaerobic organisms. Cefuroxime has been used successfully in these mixed infections in which several organisms have been isolated.

In certain cases of confirmed or suspected Gram-positive or Gram-negative sepsis or in patients with other serious infections in which the causative organism has not been identified, cefuroxime may be used concomitantly with an aminoglycoside (refer to **WARNINGS AND PRECAUTIONS**). The recommended doses of both antibiotics may be given depending on the severity of the infection and the patient’s condition.

To reduce the development of drug-resistant bacteria and maintain the effectiveness of cefuroxime and other antibacterial drugs, cefuroxime 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.

**Prophylaxis (Prevention):** The pre-operative prophylactic administration of cefuroxime may prevent the growth of susceptible disease-causing bacteria and, thereby, may reduce the incidence of certain post-operative infections in patients undergoing surgical procedures (e.g., vaginal hysterectomy) that are classified as clean-contaminated or potentially contaminated procedures. Effective prophylactic use of antibiotics in surgery depends on the time of administration. Cefuroxime should usually be given half-hour to 1 hour before the operation to allow sufficient time to achieve effective antibiotic concentrations in the wound tissues during the procedure. The dose should be repeated intra-operatively if the surgical procedure is lengthy.

Prophylactic administration is usually not required after the surgical procedure ends and should be stopped within 24 hours. In the majority of surgical procedures, continuing prophylactic administration of any antibiotic does not reduce the incidence of subsequent infections but will increase the possibility of adverse reactions and the development of bacterial resistance.

The perioperative use of cefuroxime has also been effective during open heart surgery for surgical patients in whom infections at the operative site would present a serious risk. For these patients, it is recommended that therapy with
Cefuroxime be continued for at least 48 hours after the surgical procedure ends. If an infection is present, specimens for culture should be obtained for the identification of the causative organism, and appropriate antimicrobial therapy should be instituted.

Dosage And Administration

Cefuroxime injection is for I.V. and/or I.M. administration

Dosage

Adults
The usual adult dosage range for cefuroxime is 750 mg to 1.5 g every 8 hours, usually for 5 to 10 days. In uncomplicated urinary tract infections, skin and skin-structure infections, disseminated gonococcal infections, and uncomplicated pneumonia, a 750 mg dose every 8 hours is recommended. In severe or complicated infections, a 1.5 g dose every 8 hours is recommended.

In bone and joint infections, a 1.5 g dose every 8 hours is recommended. In clinical trials, surgical intervention was performed when indicated as an adjunct to therapy with cefuroxime. A course of oral antibiotics was administered when appropriate following the completion of parenteral administration of cefuroxime.

In life-threatening infections or infections due to less susceptible organisms, 1.5 g every 6 hours may be required. In bacterial meningitis, the dosage should not exceed 3 g every 8 hours. For preventive use for clean-contaminated or potentially contaminated surgical procedures, a 1.5 g I.V. dose administered just before surgery (approximately half-hour to 1 hour before the initial incision) is recommended. Thereafter, give I.V. 750 mg every 8 hours when the procedure is prolonged.

For Preventive Use
During open heart surgery, a 1.5 g I.V. dose administered at the induction of anesthesia and every 12 hours thereafter for a total of 6 g is recommended.

Sequential Therapy

Adults
Duration of both parenteral and oral therapy is determined by the severity of the infection and the clinical status of the patient.

Pneumonia: 1.5 g cefuroxime three times daily or twice daily (given I.V) for 48 to 72 hours, followed by 500 mg twice-daily cefuroxime axetil (oral therapy) for 7 to 10 days.

Acute Exacerbations of Chronic Bronchitis: 750 mg cefuroxime three times daily or twice daily (given I.V) for 48 to 72 hours, followed by 500 mg twice daily cefuroxime axetil (oral therapy) for 5 to 10 days.

Impaired Renal Function: A reduced dosage must be employed when renal function is impaired. Dosage should be determined by the degree of renal impairment and the susceptibility of the causative organism (see Table 2).

Table 2: Dosage of Cefuroxime in Adults with Reduced Renal Function

<table>
<thead>
<tr>
<th>Creatinine Clearance (mL/min)</th>
<th>Dose</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;20</td>
<td>750 mg to 1.5 g</td>
<td>q.8h</td>
</tr>
</tbody>
</table>

*Since cefuroxime is dialyzable, patients on hemodialysis should be given a further dose at the end of the dialysis.*
When only serum creatinine is available, the following formula² (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: Creatinine clearance (mL/min) = \[
\frac{\text{Weight (kg)} \times (140 - \text{age})}{72 \times \text{serum creatinine (mg/dL)}}
\]

Females: 0.85 × male value

Note: As with antibiotic therapy in general, administration of cefuroxime should be continued for a minimum of 48 to 72 hours after the patient becomes asymptomatic or after evidence of bacterial eradication has been obtained; a minimum of 10 days of treatment is recommended in infections caused by *Streptococcus pyogenes* in order to guard against the risk of rheumatic fever or glomerulonephritis; frequent bacteriologic and clinical appraisal is necessary during therapy of chronic urinary tract infection and may be required for several months after therapy has been completed; persistent infections may require treatment for several weeks; and doses smaller than those indicated above should not be used. In staphylococcal and other infections involving a collection of pus, surgical drainage should be carried out where indicated.

**Pediatric Patients Above 3 Months of Age:** Administration of 50 to 100 mg/kg/day in equally divided doses every 6 to 8 hours has been successful for most infections susceptible to cefuroxime. The higher dosage of 100 mg/kg/day (not to exceed the maximum adult dosage) should be used for the more severe or serious infections.

In bone and joint infections, 150 mg/kg/day (not to exceed the maximum adult dosage) is recommended in equally divided doses every 8 hours. In clinical trials, a course of oral antibiotics was administered to pediatric patients following the completion of parenteral administration of cefuroxime.

In cases of bacterial meningitis, a larger dosage of cefuroxime is recommended, i.e., 200 to 240 mg/kg/day (I.V.) in divided doses every 6 to 8 hours.

In pediatric patients with renal insufficiency, the frequency of dosing should be modified consistent with the recommendations for adults.

### Preparation of Solution and Suspension

The directions for preparing cefuroxime for both I.V. use are summarized in Table 3.

**For I.V. Use:** Each 750 mg vial should be constituted with at least 6 mL of Sterile Water for Injection. Withdraw completely the resulting solution for injection.

Each 1.5 g vial should be constituted with 15.0 ml of Sterile Water for Injection, and the solution should be completely withdrawn for injection.

**For I.V. Infusion:** Dissolve 1.5 g of cefuroxime in 15.0 ml of Sterile Water for Injection. Add the reconstituted solution of cefuroxime to 50 to 100 ml of compatible infusion fluid (refer to the information on compatibility below). These solutions may be given directly into the vein or introduced into the tubing of the giving set if the patient is receiving parenteral fluids.

### Table 3: Preparation of Solution and Suspension

<table>
<thead>
<tr>
<th>Strength</th>
<th>Amount of Diluent to Be Added (mL)</th>
<th>Volume to Be Withdrawn</th>
<th>Approximate Cefuroxime Concentration (mg/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>750 mg Vial</td>
<td>6.0 (I.V.)</td>
<td>Total</td>
<td>90</td>
</tr>
</tbody>
</table>
After constitution, cefuroxime may be given via the I.V. route or by deep I.M. injection into a large muscle mass (such as the gluteus or lateral part of the thigh). Before injecting intramuscularly, aspiration is necessary to avoid inadvertent injection into a blood vessel.

I.V. Administration

The I.V. route may be preferable for patients with bacterial septicemia or other severe or life-threatening infections, or for patients who may be poor risks because of lowered resistance, particularly if shock is present or impending.

For direct intermittent I.V. administration, slowly inject the solution into a vein over a period of 3 to 5 minutes or give it through the tubing system by which the patient is also receiving other I.V. solutions.

For intermittent I.V. infusion with a Y-type administration set, dosing can be accomplished through the tubing system by which the patient may be receiving other I.V. solutions. However, during infusion of the solution containing Cefuroxime, it is advisable to temporarily discontinue administration of any other solutions at the same site.

For continuous I.V. infusion, a solution of cefuroxime may be added to an I.V. infusion pack containing one of the following fluids: 0.9% Sodium Chloride Injection; 5% Dextrose Injection; 10% Dextrose Injection; 5% Dextrose and 0.9% Sodium Chloride Injection; 5% Dextrose and 0.45% Sodium Chloride Injection; or 1/6 M Sodium Lactate Injection.

Solutions of cefuroxime, like those of most beta-lactam antibiotics, should not be added to solutions of aminoglycoside antibiotics because of potential interaction.

However, if concurrent therapy with cefuroxime and an aminoglycoside is indicated, each of these antibiotics can be administered separately to the same patient.

Compatibility and Stability

I.V.: When the 750 mg and 1.5 mg solutions of cefuroxime for I.V. administration are constituted as directed with Sterile Water for Injection; they maintain satisfactory potency for 24 hours at room temperature and for 48 hours (750 mg and 1.5 g vials) under refrigeration (5°C). More dilute solutions, such as 750 mg or 1.5 g plus 100 mL of Sterile Water for Injection, 5% Dextrose Injection or 0.9% Sodium Chloride Injection, also maintain satisfactory potency for 24 hours at room temperature and for 7 days under refrigeration.

These solutions may be further diluted to concentrations of between 1 and 30 mg/mL in the following solutions and will lose not more than 10% activity for 24 hours at room temperature or for at least 7 days under refrigeration: 0.9% Sodium Chloride Injection; Lactated Ringer's Injection; 5% Dextrose and 0.9% Sodium Chloride Injection; 5% Dextrose Injection; 5% Dextrose and 0.45% Sodium Chloride Injection; 5% Dextrose and 0.225% Sodium Chloride Injection; 10% Dextrose Injection.

Unused solutions should be discarded after the time periods mentioned above.

Cefuroxime has also been found compatible for 24 hours at room temperature when admixed in I.V. infusion with heparin (10 and 50 U/mL) in 0.9% Sodium Chloride Injection and Potassium Chloride (10 and 40 mEq/L) in 0.9% Sodium Chloride Injection. Sodium Bicarbonate Injection, USP, is not recommended for the dilution of Cefuroxime.

1.5g Cefuroxime constituted with 15 ml of water for injections may be added to metronidazole injection (500mg/100ml) and both retain their activity for up to 24 hours below 25°C.

1.5g Cefuroxime is compatible with azlocillin 1g (in 15ml) or 5g (in 50ml) for up to 24 hours at 4°C or 6 hours below 25°C.

Cefuroxime (5mg/ml) in 5% w/v or 10% w/v xylitol injections may be stored for up to 24 hours at 25°C.

Cefuroxime is compatible with aqueous solutions containing up to 1% lignocaine hydrochloride.

Cefuroxime is compatible with more commonly used I.V. infusion fluids. It will retain potency for up to 24 hours at room
Note: Parenteral drug products should be inspected visually for particulate matter and discoloration before administration whenever solution and container permit. As with other cephalosporins, cefuroxime powder as well as solutions and suspensions tend to darken, depending on storage conditions, without adversely affecting product potency.

**Contraindications**

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

**Warnings And Precautions**

Before therapy with cefuroxime is instituted, careful inquiry should be made to determine whether the patient has had previous hypersensitivity reactions to cephalosporins, penicillins, or other drugs. This product should be given cautiously 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 cefuroxime occurs, discontinue the drug. Serious acute hypersensitivity reactions may require epinephrine and other emergency measures.

*Clostridium difficile*-associated diarrhea (CDAD) has been reported with the use of nearly all antibacterial agents, including cefuroxime, 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 *Clostridium difficile*. It produces toxins A and B, which contribute to the development of CDAD. Hypertoxin-producing strains of *Clostridium difficile* cause increased morbidity and mortality, as these infections can be refractory to antimicrobial therapy and may require a 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 2 months after the administration of antibacterial agents.

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

When the colitis is not relieved by drug discontinuation or when it is severe, oral vancomycin is the treatment of choice for antibiotic associated pseudomembranous colitis produced by *Clostridium difficile*. Other causes of colitis should also be considered.

**General**

Although cefuroxime rarely produces alterations in kidney function, evaluation of renal status during therapy is recommended, especially in seriously ill patients receiving the maximum doses. Cephalosporins should be given with caution to patients receiving concurrent treatment with potent diuretics such as frusemide or aminoglycosides, as these regimens are suspected of adversely affecting renal function.

The total daily dose of cefuroxime should be reduced in patients with transient or persistent renal insufficiency, because high and prolonged serum antibiotic concentrations can occur in such individuals from usual doses.

As with other antibiotics, prolonged use of cefuroxime may result in overgrowth of non-susceptible organisms. Careful
observation of the patient is essential. If super-infection occurs during therapy, appropriate measures should be taken. Broad-spectrum antibiotics should be prescribed with caution in individuals with a history of gastrointestinal disease, particularly colitis.

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

As with other therapeutic regimens used in the treatment of meningitis, mild-to-moderate hearing loss has been reported in a few pediatric patients treated with cefuroxime. Persistence of positive CSF (cerebrospinal fluid) cultures at 18 to 36 hours has also been noted with cefuroxime injection as well as with other antibiotic therapies; however, the clinical relevance of this is unknown.

Cephalosporins may be associated with a fall in prothrombin activity. Those at risk include patients with renal or hepatic impairment, or poor nutritional state, as well as patients receiving a protracted course of antimicrobial therapy, and patients previously stabilized on anticoagulant therapy. Prothrombin time should be monitored in patients at risk and exogenous vitamin K administered as indicated. Prescribing cefuroxime 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.

With a sequential therapy regime, the timing of change of oral therapy is determined by severity of the infection, clinical status of the patient and susceptibility of the pathogens involved. If there is no clinical improvement within 72 hours, then the parenteral course of treatment must be continued. Before initiating sequential therapy please refer to the relevant prescribing information for cefuroxime axetil.

### Drug Interactions

In common with other antibiotics, cefuroxime may affect the gut flora, leading to lower estrogen re-absorption and reduced efficacy of combined estrogen/progesterone oral contraceptives.

**Drug/Laboratory Test Interactions**

A false-positive reaction for glucose in the urine may occur with copper reduction tests (Benedict's or Fehling's solution or with CLINITEST® tablets) but not with enzyme-based tests for glycosuria. As a false-negative result may occur in the ferricyanide test, it is recommended that either the glucose oxidase or hexokinase method be used to determine blood plasma glucose levels in patients receiving cefuroxime. Cefuroxime does not interfere with assay of serum and urine creatinine by the alkaline picrate method.

### Renal Impairment

**Impaired Renal Function:** A reduced dosage must be employed when renal function is impaired. Dosage should be determined by the degree of renal impairment and the susceptibility of the causative organism (refer to DOSAGE AND ADMINISTRATION).

### Hepatic Impairment

Care should be taken because transient elevation of SGOT, SGPT, LDH, bilirubin and alkaline phosphatase has occasionally been reported during cefuroxime therapy.

### Pregnancy

**Pregnancy Category B:** There are 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.

### Lactation
Since, cefuroxime is excreted in human milk; caution should be exercised when cefuroxime is administered to a nursing mother.

### Pediatric Use

Safety and effectiveness in pediatric patients below 3 months of age have not been established. Accumulation of other members of the cephalosporin class in newborn infants (with resulting prolongation of drug half-life) has been reported.

### Geriatric Use

This drug is known to be substantially excreted by the kidneys, 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.

### Undesirable Effects

Cefuroxime is generally well tolerated. The most common adverse effects have been local reactions following I.V. administration. Other adverse reactions have been encountered only rarely.

**Local Reactions:** Thrombophlebitis has occurred with I.V. administration in 1 in 60 patients.

**Gastrointestinal:** Gastrointestinal symptoms occurred in 1 in 150 patients and included diarrhea (1 in 220 patients) and nausea (1 in 440 patients). The onset of pseudomembranous colitis may occur during or after antibacterial treatment (refer to **WARNINGS AND PRECAUTIONS**).

**Hypersensitivity Reactions:** Hypersensitivity reactions have been reported in fewer than 1% of the patients treated with cefuroxime and include rash (1 in 125). Pruritus, urticaria and positive Coombs' test each occurred in fewer than 1 in 250 patients, and, as with other cephalosporins, rare cases of anaphylaxis, drug fever, erythema multiforme, interstitial nephritis, toxic epidermal necrolysis, and Stevens-Johnson syndrome have occurred.

**Blood:** A decrease in hemoglobin and hematocrit has been observed in 1 in 10 patients and transient eosinophilia in 1 in 14 patients. Less common reactions seen were transient neutropenia (fewer than 1 in 100 patients) and leukopenia (1 in 750 patients). A similar pattern and incidence were seen with other cephalosporins used in controlled studies. As with other cephalosporins, there have been rare reports of thrombocytopenia.

**Hepatic:** Transient rise in SGOT and SGPT (1 in 25 patients), alkaline phosphatase (1 in 50 patients), LDH (1 in 75 patients), and bilirubin (1 in 500 patients) levels has been noted.

**Kidney:** Elevations in serum creatinine and/or blood urea nitrogen and a decreased creatinine clearance have been observed, but their relationship to Cefuroxime is unknown.

### Postmarketing Experience with Cefuroxime Products

In addition to the adverse events reported during clinical trials, the following events have been observed during clinical practice in patients treated with cefuroxime and were reported spontaneously. Data are generally insufficient to allow an estimate of incidence or to establish causation.

**Immune System Disorders:** Cutaneous vasculitis.

**Neurologic:** Seizure.

**Non-site Specific:** Angioedema.

Cephalosporin-class Adverse Reactions

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

**Adverse Reactions:** Vomiting, abdominal pain, colitis, vaginitis, including vaginal candidiasis, toxic nephropathy, and hepatic dysfunction, including cholestasis, aplastic anemia, hemolytic anemia, and hemorrhage.
Several cephalosporins, including cefuroxime, have been implicated in triggering seizures, particularly in patients with renal impairment when the dosage was not reduced (refer to DOSAGE AND ADMINISTRATION). If seizures associated with drug therapy should occur, the drug should be discontinued. Anticonvulsant therapy can be given if clinically indicated. 

**Altered Laboratory Tests:** Prolonged prothrombin time, pancytopenia, agranulocytosis.

## Overdosage

Overdosage of cephalosporins can cause cerebral irritation, leading to convulsions. Serum levels of cefuroxime can be reduced by hemodialysis and peritoneal dialysis.

## Incompatibility

Cefuroxime should not be mixed in the syringe with aminoglycosides antibiotics. The pH of 2.74% w/v Sodium Bicarbonate Injection BP considerably affects the colour of the solution and therefore this solution is not recommended for the dilution of cefuroxime. However, is required, for patients receiving Sodium Bicarbonate Injections by infusion cefuroxime may be introduced into the tube of giving set.

## Storage And Handling Instructions

Store in a dry place at temperature not exceeding 25°C. Protect from light.

## Packaging Information

Novacef 1.5 gm injection: Vial of 20 ml  
Novacef 750 mg injection: Vial of 15 ml  
Last Updated: **Sept 2014**  
Last Reviewed: **July 2016**

**NOVACEF Injection**

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