



## DRUGS USED IN URINARY TRACT INFECTION

**URINARY ANTISEPTICS** Urinary antiseptics are oral agents that exert antibacterial activity in the urine but have little or no systemic antibacterial effects. Their usefulness is limited to lower urinary tract infections.

- **DRUGS USED AS URINARY ANTISEPTICS** Nitrofurantoin Methenamine Nalidixic acid
- **NITROFURANTOIN:** Primarily bacteriostatic Activity limited to E. coli  
Mechanism of Action: Sensitive bacteria reduce the drug to an active agent that inhibits various enzymes damage bacterial DNA. Antibacterial concentration is not attained in blood or tissues. Not to be used with Probenecid, azotemic patients: interferes with tubular secretion of drug.
- **NITROFURANTOIN Adverse Effects:** Gastrointestinal Intolerance: Nausea, epigastric pain, diarrhoea Hypersensitivity: fever, chills Peripheral neuritis and other neurological effects with long term use Hematologic disorders: leukopenia, granulocytopenia, Hemolytic anemia in G6PD deficient patients
- **NITROFURANTOIN: USES** Treatment for uncomplicated lower urinary tract infection. Not associated with prostatitis. Supportive long term therapy. Long term prophylaxis. Following catheterization, instrumentation, in women with recurrent cystitis

**METHENAMINE (HEXAMINE)** Prodrug Mechanism of Action: Decomposes slowly in acidic urine (pH 5.5 or less) to release formaldehyde which inhibits all bacteria. No antimicrobial activity in blood and tissues. Needs to be administered with mandelic acid or hippuric acid

Use As Methenamine mandelate in Chronic and resistant UTI not involving kidneys.

Not Effective for Acute UTI Catheter prophylaxis

Side Effects: Gastritis Chemical cystitis, hematuria Occasional CNS Symptoms

**NALIDIXIC ACID:** Nonfluorinated quinolone

Bactericidal. Mechanism of Action: Inhibit the replication of bacterial by interfering with the action of DNA gyrase during bacterial growth and development. Resistance

Develops rather rapidly

Uses: Second Line Drugs for UTI Recurrent cases- On the basis of Sensitivity Reports

ADR: Infrequent: GI upset, rashes, Headache drowsiness, vertigo, visual disturbances, Seizures in children, Nausea, Vomiting and abdominal pain, Photosensitivity, urticaria and Fever Contraindicated in infants

URINARY TRACT INFECTION: TREATMENT Mostly gram negative organisms  
Acute episode: single organism, Chronic/recurrent: mixed infection Acute Infection: largely self limiting High urine flow rate Frequent bladder voiding Lower UTI: Single Dose Antibiotic or 3 Days Course Suffice Upper UTI: Longer Treatment

URINARY TRACT INFECTION: TREATMENT Bacterial Investigation very important Smaller than usual doses required for treatment of Lower UTI. Upper UTI requires normal doses as for any other infection. Least Toxic and cheaper drugs should be chosen, for proper duration. Drug should not disrupt normal gut and perineal flora Frequent recurrences: chronic suppressive treatment with cotrimoxazole, nitrofurantoin, methenamine, cephalexin,

#### STATUS OF ANTIMICROBIAL AGENTS OTHER THAN URINARY ANTISEPTICS IN UTI

Sulfonamides:

Decreased dependability for acute UTI;

Not used as single drug; employed for suppressive or prophylactic therapy

Cotrimoxazole: Declined responsiveness

Employed for acute UTI (broad spectrum)

Prophylaxis for recurrent cystitis in women, catheterized patients

Quinolones: FQs (norfloxacin and ciprofloxacin)

Ampicillin/Amoxicillin – Frequently used in the past Higher failure and relapse rates

Amoxicillin + Clavulanic Acid used these days Coamoxiclav + Gentamycin: initial treatment for acute pyelonephritis

#### STATUS OF ANTIMICROBIAL AGENTS OTHER THAN URINARY ANTISEPTICS IN UTI

Cephalosporin: Increasing use especially in nosocomial Klebsiella and Proteus infection. Employed on the basis of sensitivity report, employed for community acquired infections as well. Cephalexin: alternative for prophylaxis of recurrent UTI, especially women likely to get pregnant. Gentamycin: Sensitive against Pseudomonas. Narrow margin of safety, parenteral administration: bacterial sensitivity awaited.

URINARY PH AND ANTI MICROBIAL AGENTS □ Acidic urine required for Methenamine □ Inadequate response, in complicated cases: measurement and correction of urinary pH may be attempted □ Urease positive Proteus infections: drugs acting at higher pH should be administered Favourable urinary pH for antimicrobial action Acidic Alkaline pH immaterial Nitrofurantion Cotrimoxazole Chloramphenicol Methenamine Aminoglycosides Ampicillin Cloxacillin Cephalosporin Fluoroquinolone

#### URINARY TRACT INFECTIONS (UTI)

URINARY INFECTION IN PATIENTS WITH RENAL IMPAIRMENT → Difficult to treat

Drugs Contraindicated: Methamine mandelate, Tetracyclines, Cephalosporin (some)

Drugs avoided: Nitrofurantion, Nalidixic acid, Aminoglycosides Potassium salts and acidifying agents contraindicated

PROPHYLAXIS FOR UTI This may be given when: (a) Women of child bearing age have recurrent cystitis. (b) Catheterization or instrumentation inflicting trauma to the lining of the urinary tract is performed; bacteremia frequently occurs and injured lining is especially susceptible. (c) Indwelling catheters are placed. (d) Uncorrectable abnormalities of the urinary tract are present. (e) Inoperable prostate enlargement or other chronic obstruction causes urinary stasis.

#### Methenamine (Hexamine)

It is hexamethylene-tetramine; inactive as such; decomposes slowly in acidic urine to release formaldehyde which inhibits all bacteria. This drug exerts no antimicrobial activity in blood and tissues, including kidney parenchyma. Acidic urine is essential for its action; urinary pH

must be kept below 5.5 by administering some organic acid which is excreted as such, e.g. mandelic acid or ascorbic acid. Methenamine is administered in enteric coated tablets to protect it from decomposing in gastric juice.

**Adverse effects** Gastritis can occur due to release of formaldehyde in stomach-patient compliance is often poor due to this. Chemical cystitis and haematuria may develop with high doses given for long periods. CNS symptoms are produced occasionally. Methenamine mandelate is contraindicated in renal fail