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**COURSE CODE: PHA 306**

**DRUGS USED IN URINARY DISEASE DISORDER**

**ASSIGNMENT QUESTION**

1. A drug used in the treatment of urinary tract infection causes brown coloration of urine. Explain in full detail the pharmacology of the drug under the following headings:

a. Name of the drug

b. Antibacterial activity

c. Mechanism of action

d. Pharmacokinetics

e. Adverse effects

1. **NAME OF DRUG**

**Nitrofurantoin**

Nitrofurantoin is a synthetic derivative of imidazolidinedione, Nitrofurantoin inhibits bacterial DNA, RNA, and cell wall protein synthesis. Activated by bacterial flavoproteins to intermediates that inactivate bacterial ribosomal proteins, Nitrofurantoin is used prophylactically as a urinary anti-infective agent against most gram-positive and gram-negative organisms and for long-term suppression of infections.

Nitrofurantoin is an oral antibiotic widely used either short term to treat acute urinary tract infections or long term as chronic prophylaxis against recurrent infections. Nitrofurantoin is one of the most common causes of drug induced liver disease and can cause either an acute or a chronic hepatitis-like syndrome that can be severe and lead to liver failure or cirrhosis.

Nitrofurantoin appears as odorless lemon yellow crystals or fine yellow powder and has a bitter taste..

Three forms of nitrofurantoin are available:

**Furadantin**, a microcrystalline form

**Macrodantin**, a macrocrystalline, and

**Macrobid**, a sustained release form of macrocrystalline used twice daily.

The macrocrystalline form is more slowly absorbed than the microcrystalline form and is useful for patients who cannot tolerate the microcrystalline form.

1. **ANTIBACTERIAL ACTIVITY**

Nitrofurantoin have good activity against:

• E.coli

•Staphylococcus saprophytic-us

•Coagulase negative staphylococci

•Enterococcus faecalis

•Staphylococcus aureus

•Streptococcus agalactiae

•Citrobacter species

•Klebsiella species

•Bacillus subtilis species

It is used in the treatment of infections caused by these organisms.

Many or all strains of the following are resistant to nitrofurantoin:

Enterobacter

Klebsiella

Proteus

Pseudomonas.

1. **MECHANISM OF ACTION**

Nitrofurantoin is activated inside bacteria by reduction via the flavoprotein nitrofurantoin reductase to unstable metabolites, which disrupt ribosomal RNA, DNA and other

intracellular components. It is bactericidal, especially to bacteria present in acid urine.

1. **PHARMACOKINETIC**

Nitrofurantoin is readily absorbed and quickly distributed into most body fluids. It is rapidly excreted in large amounts in bile and urine. With the exception of the active drug secretion in the kidney tubule and biliary drug transport, nitrofurantoin transfer across body membranes occurs by diffusion. Nitrofurantoin has a short elimination half-life in whole blood or plasma.

1. **ADVERSE EFFECTS**

The more common side effects of Nitrofurantoins can include:

Nausea, vomiting, headache, gas, diarrhea and constipation.

In some cases, Nitrofurantoins can cause serious side effects. These can include:

1. Serious allergic reaction: Symptoms can include:

• Hive or rash

•trouble breathing or swallowing

•swelling of your lips, tongue, or face

• Throat tightness

• A rapid heart rate

1. Liver damage: Symptoms can include:

•Nausea

•Vomiting

•Pain or tenderness in your abdomen

•Fever

•Dark urine

•Yellowing of your skin or the whites of your eyes

1. Other infections: Nitrofurantoins kills only certain types of bacteria, so other types may continue to grow and cause other infections. Symptoms of infections can include:

•Fever

•Body aches

•Tiredness