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DEPARTMENT: PHYSIOLOGY

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COURSE TITLE: SYSTEM PHARMACOLOGY.

### Solution (Answers)

1a. Name of the drug → Nitrofurantoin

Nitrofurantoin, is less commonly employed for treating UTIs because of its narrow antimicrobial spectrum, frequent bacterial resistance and toxicity. Sensitive bacteria reduce the drug to an active agent that inhibits various enzymes and damages DNA. Activity is greater in acidic urine.

b. Antibacterial activity

Nitrofurantoin is bacteriostatic for most susceptible micro-organisms at concentrations of 32 µg/ml or less and is bactericidal at concentrations of 100 µg/ml and more. The antibacterial activity is higher in an acidic urine.

c. Mechanism of action

Nitrofurantoin damages DNA since its reduced form is highly reactive. It is rapidly reduced in bacterial cells by flavoproteins (Nitrofurantoin reductase) to multiple reactive intermediates that attack ribosomal proteins, DNA, respiration, pyruvate metabolism and other macromolecules within the bacterial cell, thereby inhibiting protein synthesis.

d. Pharmacokinetics

- Nitrofurantoin is absorbed rapidly and completely from the GI tract.
- Antibacterial concentrations are not achieved in plasma following ingestion of recommended doses because the drug is rapidly eliminated.
- Nitrofurantoin colors the urine brown.
- It is not used for pregnant women, individuals with impaired renal function,

children younger than one month of age.

- It is not recommended for the treatment of pyelonephritis or prostatitis.

#### e. Adverse effects

- Gastrointestinal disturbances: these side effects include nausea, vomiting and diarrhea.

- Acute pneumonitis.

- Neurological problems such as headache, nystagmus, and polyneuropathies with demyelination may occur.

- Hemolytic anemia.