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QUESTION

1. A drug used in the treatment of urinary tract infection causes brown colouration of urine. Explain in full details the pharmacology of the drug under the following heading;
2. Name of drug
3. Mechanism of action
4. Pharmacokinetics
5. Adverse effect

Answer

1. Nitrofurantoin
2. Nitrofurantoin has broad antibacterial activity but its use in small animals is limited to treatment of lower urinary tract infections.

* Nitrofurantoin has activity against several gram-negative and some gram-positive aerobic bacteria including many isolates of *Escherichia, klebsiella, Enterobacter, Enterococcus, Staphylococcus* and *Salmonella*
* It has little or no activity against most strains of *proteus* and no activity against *pseudomonas.*
* Nitrofurans have moderate activity against anaerobic bacteria and are most active in anaerobic conditions. Some aerobic bacteria that are resistant under aerobic conditions are susceptible under anaerobic conditions.

1. The mechanism of action is unique and complex. The drug works by damaging bacterial DNA, since its reduced form is highly reactive. This is made possible by the rapid reduction of nitrofurantoin inside the bacterial cell by flavoproteins (nitrofuran reductase) to multiple reactive intermediates that attack ribosomal proteins, DNA , respiration, pyruvate metabolism and other macromolecules in the cell. Nitrofurantoin exerts greater effects on bacterial cells than mammalian cells because bacterial cells activates the drug more rapidly. It is not known which of the actions of nitrofurantoin is primarily responsible for bactericidal activity. The broad mechanism of action for this drug is likely responsible for the low development of resistance to its effect, as the drug affect many different processes important to bacterial cell.
2. Nitrofurantoin is absorbed rapidly and completely by the gastrointestinal tract (mainly by the small intestine) presence of food aids dissolution of drug and speeds absorption, the microcrystal form exhibits slower dissolution and absorption; it cause less gastrointestinal distress. Antibacterial concentrations are not achieved in the plasma following ingestion of recommended doses because the drug is rapidly eliminated, it colours urine brown.

* It is not used for pregnant women and people with impaired renal function and children younger than one month. It not recommended for the treatment of pyelonephritis or prostatis.

1. Gastrointestinal: diarrhoea, dyspepsia, abdominal pain, constipation, emesis

* Neurologic: dizziness, drowsiness, amblyopia, neuropathy
* Respiratory: acute pulmonary hypersensitivity reaction
* Allergic: urticaria, pruritus
* Dermatologic: hair loss
* Miscellaneous: fever, chills, malaise