Tetracyclines, chloramphenicol, mitronidazol

QuestionAnswer3 tetracyclines used mainly in clinical practicetetracycline, doxycycline, minocyclinetetracyclines bind thesedivalent and trivalent metal ionstetracycline activity/spectrumBacteriostatic, broad-spectrumgram-positive; gram-negative; Spirochetes; rickettsiae; chlamydiae; mycoplasma; L-form (protoplast); Some protozoatetracycline mechanism of actionihibit protein synthesis; Binds to 30S ribosomes, prevents tRNA binding; Relatively selective to bacteria; uptake system, energy dependentmechanism of tetracycline resistance (3)1) enzymatic inactivation of tetracycline (rarest type) 2) efflux, a resistance gene encodes a membrane protein that actively pumps tetracycline out of the cell (** most important); 3) ribosomal protectiontransport protein important for tetracycline resistanceTetAtetracycline PKsAbsorbed from GI tract; Distributed widely to tissues and body fluid, except CSF; Bound to growing bones and teeth; Excreted in urine or/and bile depends on individual compound. tetracycline SEsBony structures and teeth; GI functional disturbance; Liver and kidney toxicity; Photosensitization; Superinfection (esp yeast); Vestibular disturbance (minocycline)tetracycline drug interactions (4)1) Antacids (impair the oral absorption of tets); 2) Anticonvulsant, Barbiturates, long-term alcohol use; 3) Anticoagulant, due to competition of binding/inhibition on metabolism; 4) oral contraceptives (req normal flora)Tetracycline specificsshort acting; renal elimination; commonly used for acute UTI, anogenital, pharyngeal and pelvic infection. Doxycycline specificslong acting; more lipophilic and better absorption than tetracycline; Hepatic elimination; is the tetracycline of choice for many infection (no UTIs)Minocycline specificssame as doxycycline; has been widely used for the chemoprophylaxis of meningococcal diseaseTigecycline specificsnew class:

glycylcycline, inhibits the bacterial 30S ribosome and is bacteriostatic; activity against MRSA and multi-drug resistant strains of Acinetobacter baumannii. approved for skin, soft-tissue and intrabdominal infectionsChloramphenicol activitybacteria, spirochetes, rickettsia, chlamydiae, mycoplasmasChloramphenicol chemistryvery small; lipophillic; high bioavailability, distribution and absorption; very severe SEs due to mechanismChloramphenicol mechanismReversibly binds 50S subunit of 70S ribosome inhibitting protein synthesis; humans have 70S in mitochondria so dose-related bone marrow suppressionChloramphenicol is bactericidal against these 3 common organisms causing meningitis in childhood. H. influenzae, Streptococcus pneumoniae, and Neisseria meningitidisChloramphenicol usesnot considered first-line, but used in Childhood meningitis; Brain abscess; Richettsial infections; Typhoid fever and invasive salmonellosisdose related adverse events of chloramphenicolGray Baby Syndrome and bone marrow suppressionnon-dose related adverse events of chloramphenicolAplastic anemiaMetronidazole chemistrynitroimidazole that diffuses well into all tissues, including the CNS; hydroxyl metabolite retains activity; acidic metabolite has poor activityMetronidazole spectrumactive against variety of strains of protazoa and obligate anaerobesMetronidazole mechanism of actionprodrug; converted in anaerobic organisms by the redox enzyme; reduced by ferredoxin; products are cytotoxic – disrupts DNA structureMetronidazole resistanceResistance develops rarelyMetronidazole adverse rxnsmetallic taste, dark or red-brown urine; Metabolites may be mutagenic;. avoid first trimester in pregnancy. Metronidazole interactions (3)1) no alcohol; 2)inhibits warfarin; 3) falsely low SGOTMetronidazole clinical useClostridium

species (vancomycin also works for this, but metronidazole pref by some since more narrow spectrum)