

Series Editor: William W. Huang, MD, MPH

Medications in Dermatology, Part 1: Systemic Antibiotics and Antivirals

William W. Huang, MD, MPH

Dr. Huang is Assistant Professor of Dermatology, Wake Forest University School of Medicine, Winston-Salem, North Carolina.
The author reports no conflict of interest.

Medication	Mechanism of Action	Common Side Effects
Penicillins	Blocks the transpeptidation step of cell wall synthesis	Hypersensitivity reactions, AGEP
Cephalosporins	Inhibits penicillin-binding proteins of transpeptidation	Hypersensitivity reactions (10% cross-react with penicillin), rash in patients with infectious mononucleosis
Tetracyclines	Inhibits protein synthesis (30S ribosomal subunit)	Photosensitivity, onycholysis, pigment changes (most common with minocycline; type I: blue-black in inflammatory/scar skin; type II: well-circumscribed blue-gray on extremities; type III: muddy brown on sun-exposed skin), fixed drug eruption, discoloration of teeth (when given to children aged <9 y), GI tract upset, DRESS syndrome (most common with minocycline)
Macrolides	Inhibits protein synthesis (50S ribosomal subunit)	Interacts with cytochrome P450, cholestatic hepatitis, AGEP, GI tract upset
Fluoroquinolones	Inhibits DNA gyrase	Cartilage deposition, Achilles tendon rupture
Rifamycins	Inhibits DNA-dependent RNA polymerase	Orange-red color of urine/tears, hepatotoxicity, can interfere with oral contraceptive effectiveness (most common with rifampin)
Lincosamides	Inhibits protein synthesis (50S ribosomal subunit)	Pseudomembranous colitis (most common with clindamycin)
Sulfonamides	Blocks the production of folic acid from paraaminobenzoic acid (blocks dihydropteroate synthetase)	Allergy to sulfa antibiotics, GI tract upset, SJS and TEN, DRESS syndrome
Glycopeptides	Inhibits cell wall synthesis (binds to the terminal D-alanyl-D-alanine)	Red man syndrome, linear IgA bullous dermatosis (most common with vancomycin)
Nitroimidazoles	Inhibits bacterial DNA synthesis and deactivates critical bacterial enzymes	GI tract upset, disulfiramlike reaction when consumed with alcohol, serotonin syndrome (most common with metronidazole)

continued on next page

Medication	Mechanism of Action	Common Side Effects
Acyclovir, valacyclovir (prodrug of acyclovir)	Guanosine analogue, phosphorylated by viral thymidine kinase, inhibits viral DNA polymerase	Reversible nephropathy (acyclovir); reports of TTP-HUS in AIDS/transplant patients taking high doses (valacyclovir)
Penciclovir, famciclovir (prodrug of penciclovir)	Guanosine analogue, phosphorylated by viral thymidine kinase, inhibits viral DNA polymerase, longer intracellular half-life than acyclovir	GI tract upset
Ganciclovir	Guanosine analogue, phosphorylated by viral thymidine kinase, inhibits viral DNA polymerase, more active against CMV than acyclovir	Bone marrow suppression, neutropenia, thrombocytopenia
Foscarnet	Noncompetitive inhibition of viral DNA polymerase, does not require viral thymidine kinase phosphorylation	Penile ulcers
Cidofovir	Nucleotide analogue, does not require viral thymidine kinase phosphorylation	Proteinuria and elevations of creatinine

Abbreviations: AGEP, acute generalized exanthematous pustulosis; GI, gastrointestinal; DRESS, drug reaction with eosinophilia and systemic symptoms; SJS, Stevens-Johnson syndrome; TEN, toxic epidermal necrolysis; TTP-HUS, thrombotic thrombocytopenic purpura and hemolytic uremic syndrome; CMV, cytomegalovirus.

Practice Questions

- 1. Tetracyclines work via:**
 - a. blocking the transpeptidation step of cell wall synthesis
 - b. inhibiting penicillin-binding proteins of transpeptidation
 - c. inhibiting protein synthesis by binding the 30S ribosomal subunit of messenger RNA
 - d. inhibiting protein synthesis by binding the 50S ribosomal subunit of messenger RNA
 - e. inhibiting DNA gyrase
- 2. Which of the following does *not* require viral thymidine kinase phosphorylation to work?**
 - a. cidofovir
 - b. famciclovir
 - c. ganciclovir
 - d. penciclovir
 - e. valacyclovir
- 3. After taking an antibiotic, a patient notices that his tears are orange-red in color. Which of the following is the most likely cause?**
 - a. cephalosporins
 - b. cidofovir
 - c. fluoroquinolones
 - d. foscarnet
 - e. rifampin
- 4. Which of the following is most commonly associated with pseudomembranous colitis?**
 - a. azithromycin
 - b. cephalixin
 - c. clindamycin
 - d. doxycycline
 - e. rifampin
- 5. Penile ulcers have been reported in patients taking which of the following:**
 - a. acyclovir
 - b. cidofovir
 - c. foscarnet
 - d. ganciclovir
 - e. penciclovir

Fact sheets and practice questions will be posted monthly. Answers are posted separately at www.cutis.com.