Learning objectives

Additional information:

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Chapter 43

1. General structure of beta lactam antibiotics (why are they called beta lactam)
2. Classification of Penicillins
    a. Penicillinase susceptibility
    b. Spectrum of action
3. Metabolism and excretion of penicillins
    a. Which penicillins are excreted in the urine
    b. Which penicillins are excreted via bile
    c. Effects of Probenecid on excretion
4. How are Procaine and Benzathine forms of penicillin G different from penicillin G
5. Condition in which most penicillins cross blood-brain barrier
6. Mechanism of action of Penicillins and resistance
7. Substances that are used in conjunction with penicillins to prevent their inactivation
8. Clinical uses, spectrum of action and resistance profile
    a. Penicillin G
    b. Penicillin V
    c. Methicillin
    d. Nafcillin
    e. Oxacillin
    f. Ampicillin and Amoxacillin
    g. Synergistic use of ampicillin with aminoglycosides
    h. Piperacillin and Ticarcillin
9. Allergy and disturbances associated with penicillins

!!!! Please see the following video: (better to know)
https://www.youtube.com/watch?v=rrFAh5-E00g
If you are interested in drug induced hemolytic anemia generally, check the following video: https://www.youtube.com/watch?v=Pclx-K1k83Q&t=151s

FA2020 – page 187-188 – Must know

10. Classification of Cephalosporins
11. Pharmacokinetics of cephalosporins
    a. Main way of excretion
    b. Which cephalosporins are excreted mainly in the bile
    c. Entrance into the CSF
12. Mechanism of action and Resistance (Cephalosporins)
13. Clinical uses of Cephalosporins (according to generation) – [Ceftaroline is 5th generation)
14. Toxicity and adverse effects of cephalosporins

FA2020 – page 189 – Must know

15. Mechanism of action, Clinical uses and adverse effects of:
    a. Aztreonam (monobactam)
    b. Carbapenems (Imipenem, Doripenem, Meropenem, Ertapenem)
    c. Vancomycin
16. Beta-Lactamase inhibitors
    a. Clavulanate
    b. Sulbactam
    c. Tazobactam

17. Other cell wall or membrane active agents – mechanism of action, clinical uses and adverse effects (if given)
    a. Vancomycin
    b. Fosfomycin
    c. Bacitracin
    d. Cycloserine
    e. Daptomycin

Chapter 44

1. Definition of postantibiotic effect
2. Mechanism of action (MOA) of:
    a. Chloramphenicole
    b. Macrolides
    c. Clindamycin
    d. Telithromycin (not very high yield)
    e. Tetracyclines
    f. Streptogramins
    g. Linezolid
3. How can selective toxicity of protein synthesis inhibitors be explained
4. Tetracyclines
    a. Are they broad spectrum or narrow spectrum
    b. MOA
    c. Divalent cation effects on Tetracycline absorption
    d. Their metabolism (briefly)
    e. Placental penetration
    f. Tetracycline whic can be used in patients with renal failure (is excreted fecally)
    g. Antibacterial activity
    h. Mechanism of resistance
    i. Clinical and selective uses
        i. Doxycycline
        ii. Tetracycline
        iii. Minocycline
        iv. Demeclocycline
    j. Tigecycline
        i. How is it different from tetracyclines
        ii. clinical uses and spectrum of action
        iii. side effects

    k. Toxicity
        i. GI
        ii. Bones and teeth
        iii. Effects on kidney and liver
        iv. Photosensitivity
        v. Vestibular toxicity
5. Macrolides: Azithromycin, Erythromycin, Clarithromycin, Fidaxomicin
    a. MOA
    b. Differences of Azithromycin to other macrolides
    c. Antibacterial activity
    d. Mechanisms of resistance
    e. Cross resistance
    f. Clinical uses and considerations
    g. Toxicity/Side effects
6. Telithromycin
    a. MOA
    b. Main clinical uses
    c. Side effects (briefly)
7. Clindamycin
    a. MOA
    b. Mechanism of resistance, Cross resistance
    c. Clinical use
    d. Toxicity
8. Streptogramins
    a. MOA
    b. Clinical uses
    c. Adverse effects
9. Chloramphenicole
    a. MOA
    b. Metabolism
    c. Mechanism of resistance
    d. Placental/BBB penetration
    e. Antimicrobial activity and clinical uses
    f. Toxicity/ Adverse effects
        i. GI
        ii. Bone marrow (dose dependent, reversible)
        iii. Adverse effects in neonates/infants, causes of these adverse effects
        iv. Drug interactions
10. Oxazolidinone: Linezolid, (Tedizolid – not very high yield)
    a. MOA
    b. Mechanism of resistance
    c. Clinical uses
    d. Adverse effects

Chapter 45

1. Difference between concentration-dependent killing, Time-dependent-killing and Postantibiotic effect (brief examples)

2. Different strength of Amynoglycoside effects with different means of administration (one large dose vs multiple small doses) – Not very high yield
3. Aminoglycosides – Gentamycin, Neomycin, Kanamycin, Amikacin, Tobramycin, Streptomycin
    a. MOA
    b. Methods to enhance entry of Aminoglycosides in cells
    c. Excretion
    d. Mechanisms of resistance
    e. Clinical uses and considerations
    f. Uses of Spectinomycin (not very high yield)
    g. Toxicity/ Adverse effects
        i. Ototoxicity
        ii. Nephrotoxicity
        iii. Effects on neuromuscular junction
        iv. Contraindication in pregnancy, teratogenicity
        v. Skin reactions

⇒ *For both chapters, please skim "summary table" as well.*

Chapter 46

11. Antimetabolites: Sulfonamides and Trimethoprim
    a. Mechanisms of action
    b. Clinical use
    c. Adverse reactions
    d. Resistance
12. Meaning of sequential blockade
13. Fluoroquinolones
    a. Drug names, the list of respiratory fluoroquinolones
    b. Interaction with probenecid
    c. Mechanism of action
    d. Resistance
    e. Clinical use
    f. Toxicity

Chapter 50

1. Metronidazole and Tinidazole (mechanism of action, clinical use, toxicity, drug interactions)
2. Fidaxomicin (mechanism of action, clinical use, the reason of low toxicity)
3. Rifaximin (mechanism of action, clinical use, reason of low toxicity)
4. Mupirocin (mechanism of action, clinical use, toxicity)
5. Polymixins (mechanism of action, clinical use, toxicity)
6. Definition and list of urinary antiseptics

_ Nitrofurantoin (mechanism of action, clinical use, side effects)
_ Nalidixic acid (mechanism of action, clinical use, side effects)

7. Definitions of antiseptic, disinfectant and sterilization
8. Disinfectants and antiseptics

_ Autoclave, alcohols (isopropranol), chlorhexidine, chlorine, ethylene oxide, hydrogen peroxide, iodine and iodophors, quaternary amines.

9. Ectoparasiticides (Lindane, permethrin, malathion)
10. UV radiation (briefly)

Chapter 51

1. Understanding of empiric antimicrobial therapy
2. General principles of antimicrobial therapy
3. General factors influencing antimicrobial drug use
4. Advantage of bactericidal drugs over bacteriostatic ones
5. Concentration dependent vs. time-dependent killing
6. Understanding minimum inhibitory concentration and postantibiotic effect
7. The drugs that should be avoided in patients with renal failure
8. Drugs that should be avoided in pregnancy and neonates
9. Drug interactions
10. The reasons for using antimicrobial drug combinations
11. The conditions that require antimicrobial chemoprophylaxis

Chapter 16

1. Precursor Amino acid of Histamine, Its major metabolite found in urine , enzyme that metabolizes Histamine
2. Definition of Scombroid Poisoning (for additional info look at page 247 of First Aid)
3. Triple response to Histamine aka "wheal and flare" reaction
4. H1 & H2 receptors (High Yield)
    a. Coupled G proteins and second messengers
    b. Their location and Typical responses
5. H3 & H4 receptors, coupled G protein, briefly about their location and effects
6. Prototype drugs and differences between first and second generation Histamine H1 antagonists
    a. Diphenhydramine
    b. Chlorpheniramine
    c. Cyclizine
    d. Cetirizine
    e. Fexofenadine
    f. Loratadine
    g. Promethazine
7. Mechanisms of action and effects of H1 antagonists, clinical uses, toxicity and interactions
8. Doxylamine+Pyridoxine (not that high yield)
9. H2 antagonists : Cimetidine, Ranitidine, Famotidine, Nizatidine
    a. Mechanism and effects
    b. Clinical use
    c. Toxicity
10. Production, storage, metabolism and physiologic effects (briefly) of Serotonin, Its major metabolite found in urine
11. Location of Serotonin receptors
12. 5-HT 1D/1B agonists and their clinical application
13. 5-HT 2C agonists and their clinical application, reason behind being banned
    a. know what fen-phen and dex-phen are
14. 5-HT4 partial agonist, reason for being restricted
15. Hyperthermic syndromes Table 16-2
16. Serotonin antagonists
    a. Mechanisms and clinical effects
    b. Clinical uses

    c. Toxicity
17. Treatment of obesity
18. Ergot alkaloids : Classification and effects on following tissues:
    a. Vessels
    b. Uterus
    c. Brain
19. clinical uses of ergot alkaloids & toxicity:
    a. Ergotamine, Dihydroergotamine, Methysergide
    b. Ergonovine, Ergotamine
    c. Bromocriptine, Pergolide, Cabergoline

Pay attention to drug summary table at the end of the chapter (drug names)

Chapter 54

- Differentiate between characteristics of cycle specific and cycle nonspecific chemotherapeutic drugs
- Recall figure 54-1
- Describe broadly the log-kill hypothesis and distinctive features of solid tumors in humans
- List the mechanisms involved in anticancer resistance with their corresponding drugs (if given)
- Describe and differentiate between Primary induction chemotherapy, Neoadjuvant therapy and Adjuvant therapy
- Describe principles of combination and rescue therapies
    - Know the use and mechanism of Leucovorin, Mesna and Dexrazoxane
- Name alkylating agents, their mechanism of action and adverse effects/distinctive features associated with them/most common clinical application
- Name Antimetabolites, their mechanism of action and adverse effects/distinctive features associated with them/most common clinical application
- Name drugs in “Natural product anticancer drugs” section, their mechanism of action and adverse effects/distinctive features associated with them/most common clinical application
- Name Antitumor antibiotics, their mechanism of action and adverse effects/distinctive features associated with them/most common clinical applications
- Name drugs in “Miscellaneous anticancer agents” section, their mechanism of action and adverse effects/distinctive features associated with them/most common clinical applications
    - NOT high yield: Panitumumab, Ziv-aflibercept, Sorafenib, Sunitinib, Pazopinib
- Name Hormonal anticancer agents, their mechanism of action and adverse effects/distinctive features associated with them/most common clinical applications

Chapter 55

- Describe mechanism of action of Glucocorticoids, pharmacokinetics, their clinical use and toxicity
- Differentiate between mechanisms of action of Immunophilin ligands (Calcineurin,mTOR inhibitors), recall their clinical use, pharmacokinetics and toxicity
- Describe mechanism of action of Mycofenolat mofetil, its clinical use and toxicity
    - Know reason behind highest susceptibility of lymphocytes to Mycofenolate
- Describe mechanism of action of Thalidomide (+Lenalidomide), its possible clinical use and toxicity
- Recall broadly mechanism of action and clinical application of drugs listed in Table 55-2 (Fingolimod is low yield)
- Describe broadly mechanism of action of Antilymphocyte Globulin and Antithymocyte Globulin, their clinical use and toxicity
    - Understand why toxicity might manifest as anaphylaxis and serum sickness
- Describe mechanism of action of IGIV and D immune globulin, their clinical use and toxicity.
    - Know timeframe of administering D immune globulin
    - Understand why maternal Abs to Rh positive cells are not produced for subsequent pregnancy.
- Recall monoclonal antibodies, their targets, mechanism of action, clinical application and toxicities (if listed)
    - From section "Target other" high yield drugs are: Natalizumab, Omalizumab, Ustekinumab, Canakinumab
    - From table 55-3 high yield drugs are : Abatacept, Abciximab, Ipilimumab, Omalizumab, Palivizumab, Rituximab, Trastuzumab
- Name drugs in "Immunomodulation therapy", their clinical use and mechanism of action
- Recall mechanisms of drug allergy and name example drugs (It will be better if students become familiar with them)

Chapter 47

1. Mechanisms of action of the azole, polyene, and echinocandin antifungal drugs.
2. Clinical uses of amphotericin B, flucytosine, individual azoles, caspofungin, griseofulvin, and terbinafine.
3. Pharmacokinetics and toxicities of amphotericin B.
4. Pharmacokinetics, toxicities, and drug interactions of the azoles.
5. Main topical antifungal agents.

Chapter 48

1. Main targets for antiviral action in viral replication.
2. Action of antiherpes drugs and the mechanisms of HSV and CMV resistance.
3. Pharmacokinetic properties and toxic effects of acyclovir, ganciclovir, cidofovir, and foscarnet.

4. Mechanisms of anti-HIV action of zidovudine, indinavir, and enfuvirtide.
   - Match a specific antiretroviral drug with each of the following:
   - to be avoided in pregnancy;
   - hyperpigmentation;
   - neutropenia;
   - pancreatitis;
   - peripheral neuropathy;
   - inhibition of P450;
   - severe hypersensitivity reaction; injection site reactions.
5. Significant properties of 4 drugs active against HBV and HCV.
6. Properties of an anti-influenza drug acting at the stage of viral uncoating and another acting at the stage of viral release.