

## **Chemotherapy Committee**

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<b>Basic Principles Of Antimicrobial Therapy</b>
<b>Recommended Curriculum Equivalent: 1 hr</b>
<b>Learning Objectives</b>
Define the terms: antibiotics, selective toxicity, therapeutic index, bacteriostatic and bactericidal. Understand the MIC and MBC values. Describe the terms synergism and antagonism. Discuss the classification of antimicrobial drugs based upon the mechanism of action. Explain the modes of action of various antimicrobial drugs. Define bacterial resistance and illustrate the mechanisms involved in acquiring bacterial resistance. Describe the basic principles of combination therapy with antimicrobial drugs.

<b>Cell Wall Synthesis Inhibitors</b>	
<b>Recommended Curriculum Equivalent: 2 hr</b>	
<b>Drug Classes and Drugs to consider</b>	
Penicillins	Cephalosporins and vancomycin
amoxicillin AMPICILLIN AZTREONAM carbenicillin clavulanic acid cloxacillin IMIPENEM indanyl carbenicillin meropenem methicillin mezlocillin nafcillin oxacillin PENICILLIN G penicillin V PIPERACILLIN sulbactam tazobactam. ticarcillin	cefaclor cefazolin cefepime cefotaxime cefoxitin cefprozil ceftazidime CEFTRIAXONE CEPHALEXIN VANCOMYCIN
<b>Learning Objectives</b>	
<p><b>Mechanism of action</b></p> <p>Describe the structural relationship of the penicillin molecule with antimicrobial activity.</p> <p>Explain the mechanism of action of <math>\beta</math>-lactam antibiotics</p> <p>Understand the principle of combination of inhibitors of <math>\beta</math>-lactamase with penicillins (List such combinations).</p> <p>Explain the pharmacological basis for combining imipenem with cilastatin.</p> <p>Describe the structural differences between penicillins and cephalosporins.</p> <p>Explain the mechanism of action of cephalosporins.</p> <p>Discuss the mechanism of action of vancomycin.</p>	
<p><b>Pharmacokinetics</b></p> <p>Describe the pharmacokinetic properties of penicillins.</p> <p>Describe the repository penicillins.</p> <p>List the penicillinase-resistant penicillins.</p> <p>Describe the four generations of cephalosporins with specific examples and the differences in their antimicrobial spectrum and pharmacokinetic properties.</p> <p>Describe the pharmacokinetic properties of vancomycin.</p>	
<p><b>Adverse effects and contraindications</b></p> <p>Describe the principal adverse effects of penicillins.</p> <p>Describe the principal contraindication of penicillins.</p> <p>Describe the adverse effects due to cephalosporins and vancomycin.</p> <p>Explain the terms superinfection and cross-hypersensitivity.</p>	

**Therapeutic uses**

Discuss primary therapeutic indications for penicillin G.

Describe the indications for broad-spectrum penicillins.

Describe the antimicrobial activity of monobactams and carbapenems.

Describe the main therapeutic indications of cephalosporins and vancomycin.

<b>Protein Synthesis Inhibitors</b>		
<b>Recommended Curriculum Equivalent: 1 hr</b>		
<b>Drug Classes and Drugs to consider</b>		
<b>Aminoglycosides</b>	<b>Macrolides</b>	<b>Streptogramins</b>
Amikacin GENTAMICIN neomycin Netilmicin streptomycin Tobramycin	AZITHROMYCIN CLARITHROMYCIN ERYTHROMYCIN	quinupristin/dalfopristin
<b>Lincosamides</b>	<b>Oxazolidinones</b>	<b>Tetracyclines</b>
<b>Clindamycin</b>	LINEZOLID	Doxycycline Minocycline TETRACYCLINE
<b>Others</b>		
Chloramphenicol		
<b>Learning Objectives</b>		
<p><b>Mechanism of action</b>            Discuss the mechanism of action of each class of protein synthesis inhibitors.            Explain the mechanism of acquired drug resistance.            Explain the rational basis for combination therapy with an aminoglycoside and a penicillin, cephalosporin, or vancomycin.</p>		
<p><b>Pharmacokinetics</b>            Describe the pharmacokinetic properties of each class of protein synthesis inhibitors.            Explain the importance of peak and trough levels of aminoglycosides.            Discuss the need of and the method of dose adjustment for aminoglycosides in patients with compromised renal function.</p>		
<p><b>Adverse effects and drug interactions</b>            Discuss the main toxicities of each class of protein synthesis inhibitors.            Describe the major drug interactions of macrolides due to inhibition of cytochrome P450 enzymes.</p>		
<p><b>Therapeutic uses</b>            Describe the primary therapeutic indications for each class of protein synthesis inhibitors.</p>		

<b>Inhibitors of Nucleic Acid metabolism and Drugs interfering with intermediary metabolism</b>		
<b>Recommended Curriculum Equivalent: 1 hr</b>		
<b>Drug Classes and Drugs to consider</b>		
Fluoroquinolones		Rifamycins
CIPROFLOXACIN levofloxacin		RIFAMPIN
Nitroimidazole	Dihydrofolate reductase inhibitors	Sulfonamides
METRONIDAZOLE	COTRIMOXAZOLE trimethoprim	COTRIMOXAZOLE sulfamethoxazole
<b>Learning Objectives</b>		
<b>Mechanism of action</b> Explain the mechanism of action of each class of antibiotics. Discuss the synergistic inhibition due to sequential blockade with cotrimoxazole. Learn the adverse effects of ciprofloxacin, including contraindications in children and pregnant women.		
<b>Pharmacokinetics</b> Describe the pharmacokinetics properties of each class of antibiotics.		
<b>Adverse effects</b> Describe the major toxicities of each class of drugs		
<b>Therapeutic uses</b> Describe the therapeutic indications each class of antimicrobial drugs. List the advantages of newer fluoroquinolones over ciprofloxacin. Describe the major therapeutic indications of sulfonamides alone, and in combination with trimethoprim (cotrimoxazole).		

<b>Antimycobacterial Drugs</b>
<b>Recommended Curriculum Equivalent: 1 hr</b>
<b>Drugs to consider</b>
<p>ISONIAZID  RIFAMPIN  PYRAZINAMIDE  Ethambutol  streptomycin  azithromycin  clarithromycin  rifabutin  dapsons  clofazimine  thalidomide</p>
<b>Learning Objectives</b>
<p><b>Mechanism of action</b>  List the first line antitubercular drugs and explain their mechanisms of action.  Define the various phases of actively and slow growing <i>Mycobacterium tuberculosis</i> and compare the relative effectiveness of various drugs.  Describe the drugs used in the treatment of Hansen's disease and their mechanism of action.</p>
<p><b>Pharmacokinetics</b>  Describe the pharmacokinetic profile of isoniazid and rifampin.</p>
<p><b>Adverse effects and drug interactions</b>  Describe the adverse effects of isoniazid, rifampin, ethambutol and pyrazinamide.  Explain the drug interactions of rifampin with anticoagulants and other drugs, such as oral contraceptives.</p>
<p><b>Therapeutic uses</b>  Describe the regimen recommended for preventive therapy and for conventional chemotherapy.  Discuss the use of rifabutin, clarithromycin and azithromycin for treatment of <i>Mycobacterium avium</i> complex.  Describe the drugs used for reversing the lepra reactions and the erythema nodosum leprosum reaction.  Explain the WHO regimen for treatment of leprosy.</p>

<b>Antiparasitic Drugs</b>	
<b>Recommended Curriculum Equivalent: 1 hr</b>	
<b>Drugs to consider</b>	
IVERMECTIN MEBENDAZOLE METRONIDAZOLE PRAZIQUANTAL PYRANTEL PAMOATE	albendazole atovaquone diethylcarbamazine diloxamide iodoquinol nifurtimox paromomycin pentamidine sodium stibogluconate sulfadiazine suramin thiabendazole tinidazole trimetrexate
<b>Learning Objectives</b>	
<b>Mechanism of action</b> Describe the mechanism of action of mebendazole, praziquantel, pentamidine, and atovaquone.	
<b>Therapeutic uses</b> Learn the drugs of choice and alternate drugs available for treatment of diseases due to various helminthes. Learn the broad spectrum antihelminthic drugs and their spectrum of activity. Learn the opportunistic infections commonly known to occur in AIDS patients and the drugs used for their treatment. Learn the drugs of choice for treatment of asymptomatic, mild to moderate and severe intestinal disease and hepatic abscess due to E. histolytica. Learn the drugs used for the treatment of protozoal diseases (giardiasis, trypanosomiasis, and leishmaniasis). Learn the drugs used for toxoplasmosis, an opportunistic infection in AIDS patients.	

<b>Antimalarial drugs</b>
<b>Recommended Curriculum Equivalent: 1 hr</b>
<b>Drugs to consider</b>
<p>ARTEMISININ analogs (artesunate and artemether)  atovaquone/proguanil  CHLOROQUINE  MEFLOQUINE  primaquine  pyrimethamine  QUININE  sulfadoxine</p>
<b>Learning Objectives</b>
<p><b>Mechanism of action</b>  Describe the various locations in the life cycle of malarial parasites where the antimalarial drugs are effective.  Describe the mechanisms of action of chloroquine, primaquine and pyrimethamine.  Discuss the mechanism of resistance to chloroquine.  Learn the mechanism of action of artemisinin derivatives.</p>
<p><b>Pharmacokinetics</b>  Describe the pharmacokinetic properties of chloroquine.  Describe the pharmacokinetic properties of artesunate and artemether.</p>
<p><b>Adverse effects</b>  Explain the mechanism of hemolytic anemia induced by primaquine in African-American males.  Describe cinchonism.  Describe the toxic effects of chloroquine.</p>
<p><b>Therapeutic uses</b>  List the drugs of choice for treatment of uncomplicated illness and severe illness due to <i>P. vivax</i>, <i>P. ovale</i>, <i>P. malariae</i> and <i>P. falciparum</i>.  Describe the regimen for prophylaxis for chloroquine-sensitive and chloroquine-resistant areas.  Discuss the drug combination in Fansidar and its therapeutic use.  Describe the therapeutic indications for artemisinin derivatives.</p>

<b>Antifungal Drugs</b>
<b>Recommended Curriculum Equivalent: 1 hr</b>
<b>Drugs to consider</b>
<p>AMPHOTERICIN B  caspofungin (echinocandins)  FLUCONAZOLE  griseofulvin  ITRACONAZOL  KETOCONAZOLE  nystatin  sulfamethoxazole-trimethoprim (cotrimoxazole)</p>
<b>Learning Objectives</b>
<p><b>Mechanism of action</b>  Discuss the mechanism of action of each class of antifungal drugs.  Discuss the advantages of liposomal preparations of amphotericin B.</p>
<p><b>Pharmacokinetics</b>  Describe the pharmacokinetic properties of the various antifungal drugs.</p>
<p><b>Adverse effects</b>  Describe the important adverse effects of the various antifungal drugs.  Discuss the drug interactions of griseofulvin and warfarin; ketoconazole and warfarin.</p>
<p><b>Therapeutic uses</b>  Describe the major therapeutic indications of the antifungal drugs.</p>

<b>Antiviral Drugs</b>
<b>Recommended Curriculum Equivalent: 1 hr</b>
<b>Drugs to consider</b>
ACYCLOVIR AMANTADINE FOSCARNET GANCICLOVIR idoxuridine interferon alpha oseltamivir ribavirin rimantadine TRIFLURIDINE ZANAMIVIR
<b>Learning Objectives</b>
<b>Mechanism of action</b> Classify antiviral drugs based upon their site of inhibition in the viral replication cycle. Explain the mechanism of action of each antiviral drug.
<b>Pharmacokinetics</b> Compare pharmacokinetic properties of acyclovir and ganciclovir.
<b>Adverse effects</b> List their adverse side effect and therapeutic complications. Describe potential drug interactions.
<b>Therapeutic uses</b> Describe major therapeutic indications for each antiviral drugs.

<b>Antiretroviral Drugs</b>	
<b>Recommended Curriculum Equivalent: 1 hr</b>	
<b>Drugs to consider</b>	
<b>Nucleoside Reverse Transcriptase Inhibitors (NRTI)</b>	<b>Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs)</b>
ABACAVIR didanosine (ddl) LAMIVUDINE (3-TC) stavudine (D4T) zalcitabine (ddC) ZIDOVUDINE (AZT)	delavirdine EFAVIRENZ NEVIRAPINE
<b>HIV-1 protease inhibitors</b>	<b>Fusion Inhibitors</b>
amprenavir ATAZANAVIR INDINAVIR LOPINAVIR nelfinavir RITONAVIR saquinavir	ENFUVIRTIDE maravaroc
<b>Learning Objectives</b>	
<b>Mechanism of action</b> Classify anti-HIV drugs based upon their site of inhibition in the viral replication cycle. Learn the mechanism of action of individual nucleoside reverse transcriptase inhibitors. Explain the mechanisms of action of each class of anti-HIV drugs. Explain the use of combination of different class of anti-HIV drugs.	
<b>Pharmacokinetics</b> Compare pharmacokinetic properties of each class of anti-HIV drugs.	
<b>Adverse effects</b> Learn major side effects of each class of anti-HIV drugs.	
<b>Therapeutic uses</b> Describe the various drug combinations used for the treatment of HIV infections.	

<b>Basic Principles of Cancer Chemotherapy</b>
<b>Recommended Curriculum Equivalent: 1 hr</b>
<b>Learning Objectives</b>
Explain the role of chemotherapy in the management of patients with cancer. Describe the prospects for “cure”, or long term survival in cases of advanced cancer. Describe the various limitations to effective drug treatment. Define and explain the terms: selective toxicity, mass doubling time and growth fraction. Explain the concept of “total cell kill” in cancer patients. Explain the term <i>cell cycle specificity</i> and be able to classify the various anticancer drugs based on the cell cycle specificity. Describe the principles of combination chemotherapy in the treatment of cancer. Explain the mechanisms of resistance to anticancer drugs.

<b>Anticancer Drugs</b>		
<b>Recommended Curriculum Equivalent: 3 hr</b>		
<b>Drugs to consider</b>		
<b>Alkylating agents</b>		<b>Antimetabolites</b>
Busulfan, CYCLOPHOSPHAMIDE dacarbazine ifosfamide MECHLORETHAMINE MELPHALAN NITROSOUREAS (carmustine and lomustine)		CAPECITABINE CYTARABINE 5-FLUOROURACIL GEMCITABINE 6-mercaptopurine METHOTRXATE thioguanine
<b>Natural products</b>		<b>Tyrosine kinase inhibitors</b>
Actinomycin D (Dactinomycin) BLEOMYCIN CAMPTOTHECIN analogs (irinotecan, topotecan) DAUNORUBICIN DOXORUBICIN DOCETAXEL ETOPOSIDE (VP-16) PACLITAXEL VINBLASTINE VINCRISTINE		erlotinib gefitinib IMATINIB lapatinib sunitinib
<b>Monoclonal Antibodies</b>	<b>Hormones</b>	<b>Miscellaneous Agents</b>
cetuximab rituximab TRASTUZUMAB	TAMOXIFEN Flutamide Leuprolide goserelin Aromatase inhibitors (anastrozole) Sex hormone inhibitors and antagonists (Aminoglutethimide) Glucocorticoids (prednisone)	asparaginase BORTEZOMIB carboplatin, CISPLATIN hydroxyurea interferon alpha 2a procarbazine sorafenib vorinostat
<b>Learning Objectives</b>		
<p><b>Mechanism of action</b></p> <p>Describe the mechanism of action of various individual anticancer drugs under each class.</p> <p>Explain the bioactivation pathways required for the action of cyclophosphamide.</p> <p>Describe the intracellular activation pathways of different antimetabolites.</p> <p>Explain the use of antidote in high dose methotrexate therapy.</p>		

**Adverse effects**

Describe the common toxicities for each class of anticancer drugs.

Describe the specific major toxicity of individual anticancer drugs.

Describe the cumulative dose-dependent toxicity of anthracyclines.

**Therapeutic uses**

List the major therapeutic indications of various anticancer drugs.

Describe the drug combinations that have shown activity against specific types of cancer.

Explain the concept of adjuvant chemotherapy and describe various regimens used in the treatment of cancer of different organ systems.

<b>Immunosuppressive Drugs</b>
<b>Recommended Curriculum Equivalent: 1 hr</b>
<b>Drugs to consider</b>
aldesleukin antithymocyte globulin AZATHIOPRINE cyclophosphamide daclizumab etanercept infliximab interferons (alpha, beta & gamma) methotrexate muromonab-cd3 MYCOPHENOATE MOFETIL PREDNISON rho(d) immune globulin sirolimus (rapamycin) tacrolimus thalidomide
<b>Learning Objectives</b>
<b>Mechanism of action</b> Define the general principles of immunosuppression and immunostimulants. Describe the mechanism of action of immunosuppressants and immunostimulants.
<b>Adverse effects</b> Describe the toxicities of antibodies and other agents used as immunosuppressants Describe the different types of allergic reactions to drugs
<b>Therapeutic uses</b> Describe the clinical uses of immunosuppressants.