Foundation in Pharmacology – 1 & 2

Total Credits: 2.5

Credits: 2.0 – Foundation in Pharmacology - 1

(Credits: 0.5 – Foundation in Pharmacology - 2)

Foundation in Pharmacology - 1 (End of Year 2 Semester 2)

Topic & Concepts	Objectives	Time	Dept.	T/L activity	Comments
	At the end of the module, the student should be able,				
3/SBM-1/1					
Introduction to Pharmacology					
a. What is a drug?	1. define the following terms Drug, Pharmacology, Therapeutics, Clinical Pharmacology, Pharmacokinetics, Pharmacodynamics, "Medicines".	1h	Pharmacology	Lecture	Introduction to clinical pharmacology assignment
	2. compare and contrast 'drug' vs 'poison'				
b. The need for the use of drugs in health care	1. identify the broad principles of use of drugs in the management of common illness				
3/SBM-1/2					
Antineoplastic Drugs					
	1. state how neoplastic cells/tissues differ from normal cells/tissues with respect to potential targets for drug therapy in neoplastic disease	2h	Pharmacology	Lecture	
	2. explain the basis of				
	a. combination chemotherapy				
	b. resistance to chemotherapy				
	c. adverse effects of chemotherapy				
	3. classify antineoplasitc drugs				
	4. describe the mechanism of action, pharmacokinetics, clinical uses, adverse effects of commonly used antineoplastic drugs				
3/SBM-1/3					
Drug action - Pharmacodynamics					Students are expected to work on computer assisted leaning package before and after a lecture
a. Modes of action of drugs at different levels :molecular, cellular, tissue/organ & overall individuals	1. list the mechanisms by which drugs exert chemical influences at cellular level to produce a pharmacological response	4h	Pharmacology/ Biochemistry	Lectures	

	2. define and give examples of				
	(I). receptor				
	(ii). drug binding sites				
	(iii). ligand				
	(iv). agonist				
	(v). antagonist				
	(vi). partial agonist				
	(vii). inverse agonist				
	(viii). receptor affinity				
	(ix). receptor occupancy				
	(x). spare receptors				
	(xi). efficacy				
	(xii). potency				
b. Receptor as target for drug action	1. classify receptors based on their structure function	2h	Pharmacology	Lectures	
	2. briefly explain the signalling mechanisms by which receptor activation is coupled to cellular effector systems.				
c. Targets for drug action					
	(I). reversible/irreversible antagonism				
	(ii). competitive/non competitive antagonist				
	(iii). physiological antagonisms				
	(iv). tolerance, tachyphylaxis				
	(v). placebo and placebo effect				
3/SBM-1/4					
Dose-response relationship:		3h	Pharmacology	Lectures	
a. Drug dose-response relationship-variations between individuals	1. draw the concentration-effect curves for the relationship of the effect against				
	(I). (full) agonist concentration				
	(ii). logarithm of agonist concentration				
	(iii). log-partial agonist concentration				
	(iv). log full agonist concentration in the presence of a fixed dose+ increasing doses of competitive reversible antagonist				
	(v). log full agonist concentration in the presence of a competitive irreversible antagonist				
	2. log full agonist concentration in the presence of a partial agonist				
b. Basis of adverse and toxic effects		2h	Pharmacology	Lecture	During hospital based assignment the studnts are expected to observe and record drug effects
	1. define' adverse effects' of drugs				
	2. describe the mechanisms of adverse effects of drugs				
	3. explain how these reactions could be minimised/prevented				

	4. define therapeutic index	1h	Pharmacology	Lecture	
	5. describe the different mechanisms by which drugs may cause cell damage, cell death, mutagenesis,carcinogenicity and teratogenicity				
	6. list drugs that are potentially				
	(I). hepatotoxic				
	(ii). nephrotoxic				
	(iii). carcinogenic				
	(iv), teratogenic				
c. Assessment & monitoring of drug effects	1. list the methods by which the effects of drug therapy could be measured	2h	Pharmacology	Tutorials/ Lectures	During hospital based assignemtn the studnts are expected to observe and record drug effects
	2. describe how the measurement of plasma drug concentrations helps in monitoring drug therapy				
3/SBM-1/5					
Pharmacokinetics					
How does the body handle drugs?		**6h+SGLA-CAL**			
a. Transport across cell membrane:	1. describe the mechanisms of transport of drug molecules across the cell membrane and the factors that influence such mechanisms.		Pharmacology + Biochemistry	Lectures/Tutorials	lipid/water solubility, diffusion, facilitated diffusion, active transport, efflux transporters such as ATP-binding cassette (ABC) proteins, pinocytosis
b. Absorption: routes of administration	1. list different routes of administration of drugs		Pharmacology/ Biochemistry		
	2. list the different types of dosage forms/special drug delivery systems (eg. Metered Dose, Inhalar, Enteric coated formulation, spansules)				Assignment/skills lab activity
c. Distribution in tissues, body compartments and across barriers	1. describe the advantages and disadvantages of the routes mentioned in b.1 and drug dosage forms mentioned in b.2				
	2. list the different compartments of the body into which drugs are distributed				
	3. describe the factors which influence the distribution of drugs into different compartments.				
	4. explain the concept of redistribution of drugs				
	5. explain the concept of barriers across tissues for transport of drugs				
d. Biotransformation	1. explain the basic mechanisms by which drugs undergo biotransformation in the body				Changes in different categories of population (elderly,pediatric and organ faliure)

	2. list the common drugs which induce/inhibit the cytochrome P 450 enzyme system				
e. Elimination	1. define the terms "elimination" and "excretion"		Pharmacology/ Phisiology		
	(I). state the physiological processes of different organ-systems that are involved in drug elimination				
	(ii). explain the basic mechanisms by which drugs are excreted via kidneys.				
f. Analytical pharmacokinetic parameters	1. define the following				
	(I). bioavailability				
	dosage regimen				
	(ii). bioequivalence				
	(iii). first pass effect				
	(iv). Area Under the Concentrate-time curve (AUC)				
	(v). (apparent) volume of distribution				
	(vi). clearance				
	(vii). half life				
	(viii). steady state concentration				
	(ix). loading dose				
	(x). maintenance dose				
	(xi). dosage regimen				
	2. explain the principles of calculating the bioavailability, volume of distribution, clearance, loading dose & maintenance dose.				
g. First-order & Zero-order kinetics	1. explain first order kinetics and zero order kinetics	1h	Pharmacology	Lecture	
h. Drug concentration vs time curve in different dosing regimes	1. draw the concentration-time curves for	2h	Pharmacology	Tutorials	
	(I). single IV bolus injection				
	(ii). intermittent IV bolus injection				
	(iii). continuous IV infusion				
	(iv). single-dose oral administration				
	(v). intermittent oral administration				
	(vi). modified-release formulations				
I. Clinical application of pharmacokinetic parameters	1. explain the clinical significance of pharmacokinetic principles				
3/SBM-1/6					
Autonomic Nervous system					

	1. recall the anatomical and functional organisation of autonomic nervous system	3h	Pharmacology	Lecture/ Tutorial	
	2. recall the anatomy and the physiology of the cholinergic and the noradrenergic 'junctions.				
	3. recall the types of autonomic receptors with examples typical sites.				
	4. describe the mechanism of action, pharmacokinetics clinical effects of :				
	(I). cholinoceptor agonists				
	(ii). acetylcholinesterase inhibitors				
	(iii). acetylcholinesterase re-activators				
	(iv). muscarinic receptor antagonists				
	(v). ganglion-blocking nicotinic antagonists				
	(vi). adrenoceptor activators				
	(vii). adrenoceptor antagonists				
	5. describe the important clinical uses, adverse effects, toxic effects, contra-indications with regard to the drugs acting on the autonomic nervous system.				
3/SBM-1/7					
Pain Control		2h	Pharmacology	Lecture	
a. Physiology of pain					
	1. recall the definition of pain and briefly explain theories of pain				
	2. classify pain				
	3. recall physiology of pain perception (Stimuli, receptors, pathways and central connection)				
	4. list methods of pain relief				
	5. classify pharmacological agents used in pain relief (with main indications)				
	6. explain the basis of neuropathic pain.				
b. Opioid Analgesics					
	1. classify the agents acting on opioid receptors				
	2. describe the mechanism of action of opioid analgesics.				
	3. describe the pharmacokinetics of the drugs acting on opioid receptors				
	4. describe the adverse effects of opioid analgesics.				
	5. list the clinical uses of opioid receptor antagonists				
c. Non-steroidal anti-inflammatory drugs (NSAIDs)					

	1. describe the physiological/pathological roles of Cyclo-oxygenase-1 (COX - 1) and COX - 2 enzymes.				
	2. describe the pharmacokinetics, clinical uses, important adverse effects and drug interactions of NSAIDs (including COX - 2 inhibitors).				
	3. list the commonly used NSAIDs.				