TOPIC	QUESTION	ESSENTIAL KNOWLEDGE	NOTES
Question 1: Volume of Distribution	1. Define the "Volume of Distribution" of a drug	The apparent volume that a drug would occupy if it was evenly distributed according to its measured concentration in blood, plasma or water. Vd = Amount of drug in body / Concentration in plasma or blood	Pass: either definition or formula
	2. Fluoxetine has a volume of distribution of 2500L/70kg. What does this mean?	Has higher concentration in extravascular tissues than in the vascular compartment. high lipid solubility	
	3. Give an example of a drug with a low volume of distribution	aspirin, NSAIDS, warfarin, most antibiotics, tolbutamide	
Question 2: Adrenaline	1. What are the effects of adrenaline on the blood vessels in different tissue? 2. What receptors mediate these effects?	Vascular resistance Cutaneous α Mucous membranes α Skeletal muscle β_2, α Renal α, D Splanchnic α, β Venous tone α, β	Pass: 3 tissues + receptors
	3. Describe the effects of adrenaline on other organs besides the heart.	**Respiratory** Bronchodilation **Eyes** Pupillary dilation, Intraocular pressure – decreases, also decrease production of aqueous humor) Relaxation of **gastric** smooth muscle **Genitourinary** Uterine smooth muscle relaxation, Bladder relaxation, Bladder sphincter contraction, Ejaculation **Apocrine** sweat glands – palm of hands **Salivary** glands leading to dry mouth **Lipolysis** – increased fatty acids and glycerol in circulation **Liver** – enhanced glycogenolysis **Metabolic acidosis** Decreased extracellular **potassium** **Leucocytosis** **Insulin** inhibits or stimulates insulin secretion	3 organs
Question 3: Carbamazepine	1. Describe the mechanism of action of carbamazepine.	Anticonvulsant: a) blocks Na channels b) Inhibits high-frequency repetitive firing of neurones c) Presynaptic blocker of synaptic transmission d) similar action to phenytoin	Pass: (a)
	2. How is carbamazepine metabolised?	a) Metabolised by microsomal enzymes b) enzyme induction occurs c) active metabolites (clinical significance uncertain)	Pass: (a)
	3. What is its effect of the metabolism of other drugs?	If (b) is not volunteered above – Enzyme induction increases the rate of metabolism of other drugs eg primidone, phenytoin, valproate, clonazepam. Some of these drugs also can inhibit carbamazepine metabolism	Pass: Enzyme induction

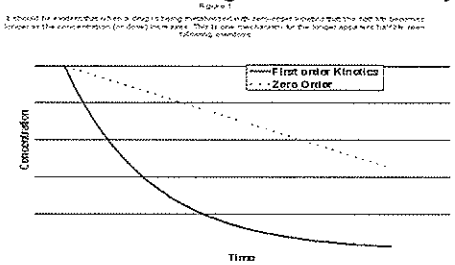
Question 4: Macrolides	1. Name some macrolide antibiotics?	Erythromycin, azithromycin ,clarithromycin, roxithromycin	Pass: 2 examples
	2. What is their mechanism of action?	Inhibits protein synthesis via binding to 50S ribosomal RNA and blocks aminoacyl translocation and the formation of initiation complexes	Pass: Protein synthesis and ribosomes
	3. What organisms are usually sensitive to macrolides?	Gram positive: eg pneumococci, staphylococcus Mycoplasma, legionella, chyamydia and some mycobacteria Gram negative : neisseria, bordatella pertussis, bartonella, campylobacter Treponema pallidum	At least 3
Question 5: Prescribing in the Elderly	1. In the elderly, what factors change with age and alter pharmacokinetics.	**Absorption**: No major change unless additional underlying associated condition with age **Distribution**: Dec lean body mass, Dec body water %, Inc fat body %, Dec serum albumin, Dec apparent Vd and sometimes increased Vd **Metabolism**: Liver metabolism does not decline for all drugs, Dec liver blood flow, Dec phase 1> phase 2 reactions, Liver slower to recover from injury **Elimination**: Dec renal function & Cr clearance, Half life inc of drugs variable, Dec excretion of volatile substances by the lung Associated age related illness affecting any of the above	Pass: renal function, 2 factors that may change Vd,
	2. Give some examples of drugs commonly used in the emergency department that must have their prescribing altered in the elderly?	Benzodiazepines – liver metabolism, renal function; PD sensitivity Opiods –PD sensitivity respiratory effects Antipsychotics –PD sensitivity; lean body mass NSAID – GI, renal Colchicine –renal, narrow therapeutic index Other drugs narrow therapeutic index Drugs primarily excreted renally –gentamicin, acyclovir Digoxin loading dose with dec Vd Amiodarone loading – Vd and PD sensitivity Many drugs as polypharmacy and must check for interactions i.e. Warfarin. So could argue extra precautions with all –polypharmacy, increase risk of error, compliance and administration issues Interactions with age related disease – IHD, COPD (B agonists or B Blockers) Sulphurs/Bactrim –adverse reactions Anticoagulants – falls Drugs which switch to zero order kinetics -phenytoin	Must get 4 relevant and plausible examples with correct associated mechanism & must include benzos and opiods. Prompts: • What about commonly used intravenous agents in the ED? • What about analgesic agents used in the ED? • What about sedative agents used in the ED? • Are there any drugs to be reduced with impaired renal function?

CEM PRIMARY 2009.1 PHARMACOLOGY VIVA Thursday pm *Candidate Number*..... AGREED MARK.....

TOPIC	QUESTION	ESSENTIAL KNOWLEDGE	NOTES
Question 1: Drug Half-life	1. What is the definition of drug half-life?	1. time to change amount of drug in body by one half during elim (or infusion) OR t1/2 = (0.7 x Vd)/clearance	Either definition or formula
	2. What disease states can affect drug half life?	2. Factors affecting Vd: malnutrition, albumin levels, change in muscle mass or fat distribution, oedema, ascites, effusions Factors affecting CL: poor nutrition, renal disease, hepatic disease, heart disease(CO)	Need 2 Vd factors, and renal plus one other for CL
Question 2: Digoxin	1. What are the actions of digoxin on the heart at therapeutic levels?	Mechanical (Na-K ATPase) Electrical: Direct – alters action potential Indirect (autonomic) - parasympathetic effects predominate Sensitisation of baroreceptors Central vagal stimulation Facilitation of muscarinic transmission	Pass: Mechanical and one other.
	2. Are the parasympathetic effects uniform through-out the heart?	No Affect atrial and A – V nodal function more than Purkinje or ventricular function	
Question 3: Chlorpromazine	1. What are the clinical uses of chlorpromazine?	**Antipsychotic** especially for schizophrenia Sedative for agitation Antiemetic	Antipsychotic and one other
	2. What are the phamacodynamic properties responsible for these effects?	Antipsychotic D_2 blockade in mesolimbic & mesofrontal systems Antiemetic dopamine receptor blockade in medullary chemoreceptor trigger zone & peripherally on receptors on stomach Sedation 5HT blockade	Dopamine blockade
	3. What are its adverse effects?	Autonomic loss of accommodation, dry mouth, **urinary retention,** constipation **orthostatic hypotension,** sexual dysfunction CNS **Parkinsonism**, akathisia, dystonia, **Neuroleptic Malignant Syndrome** Tardive Dyskinesia Confusion Seizures **Sedation** Endocrine **Hyperprolactinaemia** – Amenorrhoea, galactorrhoea, infertility, impotence Ocular Corneal deposits	Any 3 adverse effectss

Question 4: Antibiotics for Staphylococcal infections	1. What classes of antibiotics are used in the treatment of **Staphylococcal** infections?	Beta-lactamase negative staph Penicillin 1st Generation Cephalosporins Beta-lactamase positive staph Beta-lactamase resistant penicillins – Methicillin / Naficillin, Isoxazolyl Penicillins (dicloxacillin, flucloxacillin etc) 1st Generation Cephalosporin Beta-lactamase inhibitor with penicillin combination – clavulinic acid, sulbactam, tazobactam Vancomycin Aminogycosides Macrolides	Pass: 3 classes
	2. What is the mechanism of **resistance** in Methicillin Resistant Staph Aureus?	Beta-lactam antibiotics normally bind to PBP's (Penicillin Binding Proteins) causing inhibition of transpeptidation, thus blocking cell wall synthesis and lead to cell wall death MRSA produce PBP's that have a low affinity for binding beta-lactam antibiotics and hence render then ineffective May be overcome if used in high enough concentrations, but not clinically achievable	Must demonstrate understanding of PBP's binding to pass
	3. What are the adverse effects of **Vancomycin**?	Local phlebitis Chills & fever Flushing due to histamine release (Red Man) Ototoxicity / nephrotoxicity if administered with aminoglycoside	Must get 1 to pass
Question 5: Prescribing in Pregnancy	1. List the factors affecting placental drug transfer?	Lipid solubility Molecular size Placental transporters Protein binding Placental and foetal drug metabolism	Pass: 2 of 5
	2. What is meant by foetal therapeutics?	Drug administration to the pregnant woman with the foetus as the target	
	3. Give examples of drugs administered for this purpose?	Corticosteroids (for lung maturation) Phenobarbitone (induce enzymes for glucuronidation of bilirubin) Antiretrovirals (decrease HIV transmission) Antiarrhythmics	

CEM PRIMARY 2009.1 Pharmacology VIVA Friday am *Candidate Number*..... AGREED MARK.....

TOPIC	QUESTION	ESSENTIAL KNOWLEDGE	NOTES
Question 1. Zero and First order kinetics	1. What is "First order elimination kinetics"?	First order: A constant fraction/percentage of the drug is eliminated per unit time. Rate of elimination is proportional to the amount of drug in the body. t½ constant. Most drugs eliminated this way (____) 	Definition to pass
	2. How is it different to zero order kinetics? (prompt – capacity-limited)	Zero order: a constant amount of drug is eliminated per unit time. Rate of elimination is constant and is independent of drug. There is capacity limited clearance or mechanisms have been saturated in overdose.	
	3. Give some examples of drugs with zero order kinetics?	Examples: Ethanol, phenytoin, salicylates, theophylline, and thiopentone (at high doses) (.....)	2 examples to pass
Question 2 Antihypertensives	1. What are the sites of action of antihypertensive drugs (with examples)?	Vasomotor centre – clonidine, methyldopa Sympathetic ganglia - trimethaphan Sympathetic nerve terminals – guanethidine, reserpine **β receptors of heart** – β blockers **Angiotensin receptors of bv** – AT II receptor blockers α receptors of bv - prazosin **Vascular smooth muscle** – hydrallazine, SNP, Ca blockers, GTN **Kidney tubules** - diuretics β cells juxtaglomerular cells – β-blockers **ACE**	Pass 4 of bold.
Question 3 Ondansetron	1. What is the mechanism of action of ondansetron?	selective 5-HT_3 receptor antagonists both peripheral in intestinal vagal afferents and central in chemoreceptor trigger zone and vomiting center in lateral medulla	Pass: serotonin
	2. What are the clinical uses of ondansetron?	a) Chemotherapy –induced nausea and vomiting eg 8 mg every 8 -12 hours b) Postoperative and post radiation nausea and vomiting. c) Other indications: acute or chronic medical conditions or gastroenteritis – not well evaluated	2 out of 3
	3. Name some side-effects of ondansetron?	Headache, dizziness and constipation. Small prolongation of QT interval	Pass: 1

Question 4 Acyclovir	1. Describe the mechanism of action of acyclovir.	a. Converted to monophosphate by virus-specific thymidine kinase (infected cell specific) b. Converted to di- and tri- phosphates by host cell enzymes c. Inhibits viral DNA synthesis by irreversible binding to viral DNA polymerase, and chain termination	Pass: virus-infected cell specificity and inhibition of viral DNA synthesis (without detail)
	2. What are the indications for acyclovir?	Oral: initial or recurrent genital HSV2 infection Varicella-Zoster – within 24 h of varicella and 72 h or zoster (higher doses required) IV: HSV encephalitis, neonatal HSV, serious HSV or VZV	Pass: Use in HSV or VZV, plus encephalitis.
Question 5 Prescribing in children	1. In children, what factors change with age and alter pharmacokinetics?	Body Size and Composition – Growth of child – most doses calculated in mg/kg Adult is 50% water 20% extracellular Term neonate 70-75% water 40% extracellular Pre term neonate 85% water Influences drugs distributed in extra cellular space Fat 15% in adults 1% in pre term infants Plasma proteins Albumin – Decreased levels in neonate Potential for increased toxicity in neonates if drugs are highly protein bound Jaundiced neonates – if drug highly protein bound, will displace bilirubin and cause kernicterus Drug Metabolism Most drugs metabolised in liver Only 50-70% of adult values Slow clearance and prolonged elimination half lives Drug excretion GFR lower in newborns than older infants Neonate 30-40% adult values 3 weeks 50-60 % adult values 6-12 months Adult values	Pass: body size and composition, and drug metabolism and excretion.