**ACEM PRIMARY 2011/1 Pharmacology VIVA Morning Session 1** ***Candidate Number……..*** **AGREEDMARK……**

| TOPIC | QUESTIONS | KNOWLEDGE **(essential in bold)** | NOTES |
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| **Variables of Drug Absorption** | What variables influence the extent & rate which a drug is absorbed? | 1.R**oute of administration- PO; SC; SL; PR**<br>**2. Nature of the absorbing surface**<br>**(a) Cell membrane** – single layer of intestinal epi cells compare to several layers of skin cells.<br>**(b) Surface area** – lung, small intestine, stomach<br>**3.Blood Flow** –blood flow enhances absorption SL v SC<br>**4. Drug Solubility** – lipid soluble drugs -<br>**5. Drug Formulation –** i.e. enteric coatings | Need 3 of main concepts |
| | Explain why aspirin absorption is enhanced by the low pH in the stomach? | Aspirin is an **acidic drug** (pKa 2.98) relatively **un-ionised in the stomach** & more ionised in the small intestine (i.e. absorbed more readily from stomach) | Aspirin is more lipid soluble in stomach & absorption is greater here |
| | Prompt: How does ionisation of a drug affect it's solubility? | Drugs exist as **weak acids or weak bases** & in the body they are either **ionised or un-ionised; Ionised**(charged polar) **water soluble; Un-ionised** (non-polar) **lipid soluble** | Need to correctly state un-ionised drugs lipid soluble |
| **Warfarin-pharmacokinetics and drug interactions** | Describe the mechanisms for drug interactions with warfarin and give examples.<br><br>*Prompts:*<br><br>*Please describe a pharmacokinetic interaction with warfarin*<br><br>*Please describe a pharmacodynamic interaction*<br><br>*What drugs could increase the INR*<br><br>*What drugs could decrease the INR* | **PK - enz inhibition** (majority), **Enz induction**, altered plasma protein binding, altered abs (cholestyramine p 157)<br>**PD** – bioavailability of Vit K, **influencing Vit K dependant clotting factors,** drugs affecting haemostasis (**1 eg**)<br><br>↑ INR: Amiodarone, aspirin, azitrhomycin, cephalosporins, cimetidine, erythromycin, phenytoin, quinidine, SSRI, valproate, metronidazole, hyperthyroid<br><br>↓ INR: AZT, barbs, carbamazepine, haloperidol, rifampicin, Vit K, St Johns Wort p159, hypothyroid, cabbage | Must get bold items<br><br>Must give at least 1 example of each |

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| **Anti-arrhythmics in AF** | What anti arrhythmic drugs can be used in the management of atrial fibrillation | Beta-antagonists (class 2); calcium-antagonists (class 4); flecainide (class 1c); amiodarone (class 3); digoxin (unclassified); magnesium | Pass 3/5 |
| | What are the mechanisms of action of amiodarone?<br><br>Prompt: what are the cellular mechanisms | **Blocks Na, K, Ca channels; blocks beta adrenoreceptors;** prolongs AV conduction; decreases automaticity; decreases automaticity of purkinje fibres<br><br>Has actions on both rate and rhythm! | Bold |
| | What are some important drug interactions with amiodarone? | warfarin (increased anticoagulant effect by inhibiting metabolism); digoxin ( increases plasma concentration leading to toxicity); increased cardiac effects of other antiarrhythmic agents; phenytoin ( increased plasma concentration) | At least 2 |
| **Thiopentone** | Describe the distribution of thiopentone following an IV bolus | To highly vascular tissue and rapidly crosses BBB. **High lipid solubility**. Then **rapidly redistributed** to body fat. | Bold |
| | What are the potential adverse effects of thiopentone?<br><br>Prompts:<br>What are the CNS effects?<br><br>What are the CVS effects | Advantages: Rapid, Controllable, Amnesic, **Reduction of ICP**, anticonvulsant<br><br>Disadvantages: **Hypotension,** Venous irritant, Myocardial depression, minimal muscle relaxation and analgesia, hepatic metabolism (vs inhalational agents) | Bold |
| **Drugs used in Tuberculosis** | a) In treatment of a new case of Tuberculosis, what are the important principles of drug use?<br><br>Prompt: How might the problem of drug resistance influence your therapy? | 1. **Multiple drugs used initially** (usually 4) ensures efficacy<br>2. Prolonged course, usually 6 months<br>3. Close supervision to ensure compliance and detect adverse effects | Suggested pass criteria:<br><br>Bold to pass |
| | b) Describe the pharmacology of Rifampicin | 1. **Well absorbed orally**<br>2. **Highly lipid soluble** - widely distributed in tissues<br>3. **Metabolism in liver,** excreted in faeces<br>4. **Induces P450 enzymes** – many drug interactions<br>**5. Discolouration (orange) of body fluids**<br>**6. Can be used prophylaxis** | 2/6 bold to pass |

**ACEM PRIMARY 2011/1 Pharmacology VIVA Afternoon Session 2** ***Candidate Number……..*** **AGREEDMARK……**

| TOPIC | QUESTIONS | KNOWLEDGE **(essential in bold)** | NOTES |
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| **Drug metabolism** | Describe Phase 1 and Phase 2 reactions in drug metabolism.<br><br>Prompt 1: What are some of the biochemical reactions that characterize phase 1 reactions? (Oxidation, reduction, hydrolysis)<br><br>Prompt 2: How does phase 2 reactions enhance the excretion of a drug? | Process of **chemical modification of a drug leading to more hydrophilic, more polar, readily excreted compound.**<br><br>Phase 1 (Functionalization) reactions: converts parent drug to **more polar often inactive metabolite** – process of oxidation, reduction, hydrolysis where polar functional group (OH, N H2,SH) is introduced- majority reaction via cytochrome P450 enzymes.<br><br>Phase 2 (**Conjugation**) reactions: metabolites combine with endogenous glucuronic a, sulphate, acetylcoenzyme A or glutathione to **form more polar metabolite-** reactions catalysed by different transferase enzymes.<br><br>Note: Phase 1&2 can occur alone, sequentially or simultaneously. Metabolites can be more active or toxic than the parent drugs. | Pass: Need basic understanding of in general "metabolise to more polar and excretable compounds"<br><br>**Phase 1**<br>1 example: (oxidation, reduction, hydrolysis) CYP450<br><br>**Phase 2**<br>1 example: Conjugation to form more polar compound+ one example of the endogenous substances |
| **Lignocaine** | Describe the mechanism of action of lignocaine on the heart.<br><br>Describe the adverse effects of lignocaine | Blocks activated & inactivated Na channels; greater effect on ischaemic tissue; no vagal effects. Class 1 B antiarraythmic action.<br><br>CNS: dizzy, anorexia, N&V, tinnitus, tremor, visual disturbance, paraesthesia, slurred speech seizure, resp depression<br>CVS: bradycardia, CVS collapse, uncommon proarrhythmia; can get SA arrest, impaired conduction may worsen/ precipitate pre existing CCF; ↓BP from myocardial depression<br>Allergy<br>GI as above | Na channel block and Class 1B<br><br>CNS & Cardiac with at least x 3 example total |

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| **Anti-migraine medication** | What drugs can be used in the treatment of an acute attack of migraine? | **simple analgesia** (eg paracetamol, aspirin, codeine); **metoclopramide**, **prochlorperazine**; ergot alkaloids eg ergotamine ( +/- caffeine added); **chlorpromazine**; **triptans** eg sumatriptan (opoids can be used but not choice) | **3 bold** |
| | How do triptans work? | structural analogue of 5-HT; **selective agonists at 5-HT1 receptors; cause vasoconstriction, particularly on cerebral arteries** | **2 bold** |
| | Chlorpromazine can be used to treat acute migraine. What are the major side effects of chlorpromazine? | **hypotension; sedation; anticholinergic (**dry mouth, dry eyes, urinary retention, constipation); **extrapyramidal (eg acute dystonia)**; pain with IM injections, risk of muscle necrosis | **2 bold** |
| **Drugs used in Asthma** | a) What are the effects of corticosteroids on airways in asthma treatment? | Increase in airway calibre by **inhibition of airway inflammation, decrease in bronchial reactivity** and local immune suppression | bold |
| | b) Describe the cellular mechanisms by which corticosteroids are believed to exert their effects acutely. | 1. Decreased activation of lymphoid cells/eosinophils<br>2. Decreased cytokine production and action<br>3. Decreased production vasodilator prostaglandins<br>4. Decreased histamine release<br>5. Decreased production of IgE and IgG | 2/5 to pass |
| **Aciclovir** | What are the indications for acyclovir in the ED? | **HSV** – **encephalitis**; VZV, patients with HIV | Bold |
| | To which class of antiviral drugs does acyclovir belong?<br><br>Prompt: Describe the mechanism of action of acyclovir. | **DNA polymerase inhibitors**<br>**(**Specificity for virus-infected cell (virus-specific thymidine synthase). Inhibition of viral DNA synthesis (irreversible binding to viral DNA polymerase) | Bold |
| | Describe the pharmacokinetics of acyclovir? | **Short half life 2.5 hrs** ( 5times daily dosing oral); low oral bioavailability; **mostly excreted unchanged in urine**; CSF 50% of plasma; wide distribution | Bold |

**ACEM PRIMARY 2011/1 Pharmacology VIVA Morning Session 3** ***Candidate Number……..*** **AGREEDMARK……**

| TOPIC | QUESTIONS | KNOWLEDGE **(essential in bold)** | NOTES |
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| **Volume of Distribution** | Define the "volume of distribution" of a drug. | **Defined as the volume in which the amount of drug in the body would need to be uniformly distributed to produce the observed concentration in the blood.**<br><br>Vd = **Total amount of drug in body/conc in plasma or blood** | Pass: either definition or formula |
| | What factors affect volume of distribution?<br><br>(prompt: consider drug/patient factors) | **Drug properties** – lipid solubility; pKa; pH; protein binding;<br><br>**Patient factors** – age; gender; disease state; body composition (fat distribution); blood flow | Pass: 2 factors from each |
| | Give example of drugs with high and low Vd. | High Vd: diazepam; β blockers; tricyclics; digoxin; morphine; clonidine; fluoxetine; chloroquine; cyclosporin<br><br>Low Vd: warfarin; lithium; phenytoin; aspirin; frusemide; valproic acid; tolbutamide; cephalexin | Pass: two from each group |
| **Digoxin side effects and toxicity** | What are the features of digoxin toxicity? | G-I: anorexia, nausea, vomiting diarrhoea<br>CNS: visual disturbances, confusion, nightmares, agitation, drowsiness<br>Cardiac: features of bradycardia (progressing AV block, slow AF) and increased automaticity (VEBS and bigeminy, SVT with AV block, VT/VF) | Needs to recognise GI/CNS/Cardiac, as well as examples of bradycardia and inc. automaticity to pass |
| | What factors might predispose patients towards digoxin toxicity?<br><br>Prompt: are there any interactions? | **Electrolyte imbalance**<br>Hypokalaemia, hypercalcaemia, hypomagnesaemia<br>**Organ disease**<br>Renal impairment, hypothyroidism,<br>**Other drugs**<br>Amiodarone, calcium channel blockers, potassium depleting drugs | Bold (with at least one example of each) to pass |

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| **Antipsychotic side effects and their treatment** | What are the major side effects of phenothiazine antipsychotics? | **Anti-cholinergic:** dry mouth, dry eyes, urinary retention, constipation**;** Sedation; Weight gain; **Extra-pyramidal:** dystonia**,** Parkinson-like effects, akathisia, tardive dyskinesia**;** Hypotension**;** Neuroleptic malignant syndrome | Bold with 1 example of category |
| | What mechanisms of drug action are responsible for these side effects?<br><br>Prompt: What receptors are involved? | Anti-muscarinic; Alpha blockade; D2 antagonism; Serotonin receptor antagonism; Anti-histamine (H1) | At least 3 |
| | How could the extra-pyramidal side effects be managed?<br><br>Prompt: What about acute EP side effects?<br><br>Prompt if time for additional marks: What about chronic EP side effects | Lower dose; Switch to an atypical drug (lower incidence of extra-pyramidal effects); Administer **benztropine** or diazepam; No effective treatment for tardive dyskinesia: prevention vital; monitor for early signs and reduce or cease anti-psychotic asap | Bold |
| **Adenosine** | What are the principal effects of adenosine on cardiac conduction? | **Inhibits AV nodal conduction** | Bold |
| | Describe the pharmacokinetics of adenosine. | **Rapidly metabolised**. By red cells and endothelial cells **Very short elimination half-life** (seconds) | Bold |
| | What are the clinical implications of this pharmacokinetic profile? | Therefore must be given by **rapid IV bolus.** Side effects are short lived. No prolonged action to keep patient out of the arrhythmia. (Proximal IV site as preference). | Bold |
| | Name some indications and contraindications to its use. | Indication: **supraventricular tachycardia;** diagnostic<br>Contraindications: AV block, sick sinus, acute asthma, lack of consent | SVT and 1 CI. |
| **Drugs used in hypertensive emergencies** | List some drugs used in hypertensive emergencies. | GTN , nifedipine , diazoxide , hydrallazine , nitroprusside , esmolol , labetalol | At least 3 drugs |
| | Tell us about the pharmacokinetics of Na nitroprusside . | IV administration, **onset minutes**, peak effect minutes, **1/2 life 2 minutes** (thiocyanate 3 days), duration of action 1-10 minutes, **elimination-RBC's to cyanide**, **liver to thiocyanate**, renally excreted | 2/4 Bold |
| | What are the potential toxicities of Na nitroprusside? | **Cyanide toxicity** - hypotension , metabolic acidosis , pink skin , tachypnoea decreased reflexes , dilated pupils , coma<br>**Thiocyanate toxicity** - ataxia , blurred vision , headache , nausea , vomiting , tinnitus, SOB, delirium, unconsciousness | Both bolded categories and 1 example of each. |