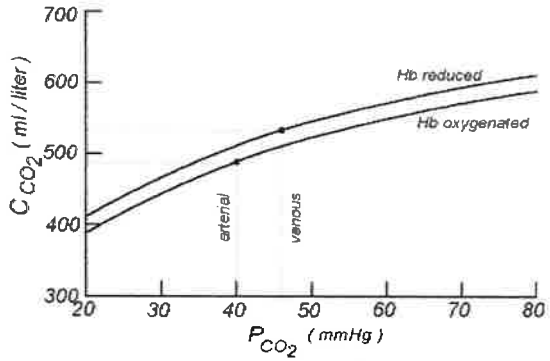
ACEM PRIMARY VIVA D **Thursday Morning Session 1** ***Candidate Number:*** **AGREED MARK:**

Stem: A 70 yo woman undergoes procedural sedation in ED for reduction of a wrist fracture. The first topic is **PHARMACOLOGY**.			
TOPIC	QUESTIONS	KNOWLEDGE **(essential in bold)**	NOTES
Question 1 Clearance Definition, factors affecting, examples **Subject:** Pharmacology LOA: 1	(a) What is drug clearance?	(a) **Clearance:** • Measure of the ability of the body to eliminate a drug • Rate of elimination in relation to drug concentration • CL = rate of elimination / concentration	(a) Reasonable definition to pass
	(b) What factors affect drug clearance?	• Concentration - **Dose & Bioavailability** • Elimination - **specific organ function / blood flow & protein binding** • Major sites of elimination are kidneys and liver – therefore factors that affect these organs' function and blood flow will have most effect	(b) One for each element
	(c) What is the difference between capacity-limited and flow-dependent drug elimination?	(c) **Capacity-limited is saturable (zero order)** Examples: aspirin, phenytoin, ethanol. **Flow-dependent = non-saturable (1st order)** (organ blood flow, protein binding) Examples: Alprenolol / amitriptyline / Imipramine / isoniazid / labetalol / lignocaine / Morphine / propoxyphene / propranonol / verapamil	(c) Bold to pass
Stem: Moving onto **ANATOMY**			
Question 2 Bone – hand / carpal bones **Subject:** Anatomy LOA: 1	(a) Identify the bones in this hand and wrist.	• **Prox row:** Pisiform, triquetrum, lunate, scaphoid • **Distal row:** Hamate, capitate, trapezoid, trapezium • Metacarpals, and phalanges, prox/middle/distal	(a) All carpal bones to pass
	(b) Identify the boundaries of the carpal tunnel on this model.	(b) Tubercle **scaphoid** and **trapezoid** laterally, and **pisiform** and **hook hamate** medially	(b) 4/4 bony landmarks to pass

	(c) This patient develops median nerve paresis as a consequence of her fracture. What deficits will she develop? (Prompt: what does the median nerve supply in the hand?)	• **Sensory supply:** radial 3 ½ digits and adjacent palm, excluding central palm which is by cutaneous palmar branch passing over flexor retinaculum • **Motor supply:** thenar muscles except add pollicis and deep head fpb; and lateral lumbricals for digits 2 and 3	(c) Correctly identify sensory supply and one group of muscles.
Stem: During the reduction she becomes persistently hypoxic. This topic is **PATHOLOGY.**			
Question 3 Pneumonia including aspiration pneumonia **Subject:** Pathology LOA: 1	(a) Describe the pathogenesis of aspiration pneumonia. (Prompt: predisposing features, organisms, outcomes)	• Aspiration of **gastric** contents • Type of **patient** (↓conscious/debilitated/abnormal gag/repeated vomiting) • **Chemical and bacterial** • **>1 organism** (aerobes>anaerobes) • **Necrotizing** • Death / **abscess**	(a) 4 bold to pass
	(b) How are community-acquired pneumonias different?	• **Bacterial or viral** • **Variable** pneumonia dependent on – etiol., host response etc • **Predispose** – extremes age, chr disease etc • **Agents** – strep pneum, haem. Influenza, etc • Clinical course modified by **ABs** • **Low hosp, low death** • **Complications** – empyema, endo/pericarditis, meningitis	(b) 5 bold to pass

Stem: Moving onto **PHYSIOLOGY**			
Question 4 CO2 carriage and dissociation curve **Subject:** Physiology LOA: 1	(a) How is carbon dioxide transported from the tissues to the lungs?	(a) In plasma: • **Dissolved** • **Carbamino compounds with plasma proteins** • **Hydration – H+ buffered – HCO3- in plasma** In RBC: • Dissolved • Formation of carbamino-Hb • Hydration – H+ buffered – 70% of HCO3- enters plasma Each 49ml CO2/dL arterial blood – 5% dissolved, 5% in carbamino compounds, 90% hydrated as HCO3	(a) Bold to pass
	(b) Draw and explain the carbon dioxide dissociation curve		(b) Concept to pass
	(c) What is meant by the term 'chloride shift'?	(c) 70% of HCO3- formed in red cells enters the plasma in exchange for chloride – exchange is the chloride shift	(c) Reasonable definition to pass

ACEM PRIMARY VIVA D **Thursday Afternoon Session 2** ***Candidate Number:*** **AGREED MARK:**

TOPIC	QUESTIONS	KNOWLEDGE **(essential in bold)**	NOTES
Stem: A 30 yo man presents with a suspected dislocated right shoulder. He is given IV opiates. The first topic is **PHARMACOLOGY**.			
Question 1 Potency & efficacy with reference to morphine / fentanyl **Subject:** Pharm LOA: 1	(a) What is drug potency? (b) Draw and explain dose-response curves comparing morphine with fentanyl. (c) What are the pharmacokinetics of fentanyl?	(a) **Dose or concentration to achieve 50% maximal effect** (EC_{50} or ED_{50}) (b) **Must graph dose or log dose (X axis) versus response (Y axis).** (c) Highly lipid soluble, Half-life 5 mins, duration 1-1.5 h, low bioavailability, hepatic metabolism	(a) Bold to pass (b) Display differences and explain on graph (c) 3 of 5 to pass
Stem: Moving onto **ANATOMY**			
Question 2 Shoulder Model **Subject:** Anatomy LOA: 1	(a) Identify the features on this model of a shoulder. (b) What anatomical structures confer stability to the shoulder joint?	(a) Bony: **Humerus** / Humeral head **Scapula – coracoid process / acromion** / spine / body **Clavicle** Joints: **glenohumeral** and **acromioclavicular** Ligaments: **Coracoclavicular** – conoid part and trapezoid part – most important for stability AC joint **Acromioclavicular** –top of clavicle to acromion Glenohumeral ligaments – reinforce anterior part of capsule from glenoid labrum to humerus Tendons: **Long head of biceps tendon** • **Joint capsule** with fusion of the tendons of scapular muscles • Ligamentous: **glenohumeral and coracohumeral ligaments** • **Coracoacromial arch** superiorly created by coracoacromial ligament • **Deepening of glenoid cavity by glenoid labrum** • **Tendons** of long head of biceps and triceps	(a) Bold to pass (b) 3/5 to pass

	(c) What structures can be damaged by shoulder dislocation? (Prompt for ax nerve)	(c) Joint capsule and glenoid labrum damage results in recurrent dislocation **Axillary nerve** lies below joint capsule – palsy Associated fracture of greater tubercle	(c) Bold to pass
Stem: Your intern consults you on a 60 yo lady he suspects has acute cholecystitis. This topic is **PATHOLOGY**.			
Question 3 Cholecystitis **Subject:** Path LOA: 1	(a) Describe the pathogenesis of acute calculous cholecystitis. (b) What are the complications of cholecystitis?	(a) **Chemical irritation of obstructed GB** • Mucosal phospholipases hydrolyse luminal lecithins to toxic lysolecithins • Protective glycoprotein mucus layer disrupted • Allows Bile salts to have detergent action on exposed mucosal epithelium • PGs contribute to inflammation • GB dysmotility develops • Distension and increased intraluminal pressure decreases mucosal blood flow (b) **Bacterial infection - cholangitis / sepsis** • Perforation and localised abscess • Rupture and peritonitis • Biliary fistula • Porcelain gallbladder	(a) Bold + 2/6 (b) Bold + 2/4
Stem: Moving onto **PHYSIOLOGY**			
Question 4 Liver metabolic functions especially bilirubin metabolism. **Subject:** Phys LOA: 1	(a) List the principal functions of the liver	(a) **Bile formation** (500ml/day) • **Synthesis** – protein, coag factors, albumin • **Inactivation** / detoxification – drugs, toxins, active circulating substances • Nutrient vitamin **absorption, metabolism / control** (e.g. glucostat), AAs, lipids, fat sol vitamins • **Immunity** (esp. gut organisms) – Kupffer / macrophages in sinusoid endothelium	(a) 3/5 bold with an example to pass

	(b) Describe the metabolism of bilirubin.	(b) • **Formed by breakdown of haeme, Hb** • Bound to albumin • In liver – actively transported (OATP) as dissociates – binds to cytoplasmic proteins • **Conjugated by gluc-transferase in ER with glucuronic acid to H2O sol bil-digluc** • Bil di gluc active transport (MDRP2) against gdt to bile canaliculi – to gut (<5% bil/bdg reflux to blood) • Intestinal mucosa relatively impermeable • Gut bacteria act / convert most to urobilinogens • **Some bile pigments / urobilinogens/unconj bil reabsorbed in portal circulation – most resecreted = enterohepatic circulation** • Small amounts urobil in blood excreted in urine – urobilinogen and faeces – stercobi	(b) Bold to pass

ACEM PRIMARY VIVA D **Friday Morning Session 3** ***Candidate Number:*** **AGREED MARK:**

Stem: You have a 25 yo man with a painful knee. He has received ibuprofen for analgesia. The first topic is **PHARMACOLOGY.**			
TOPIC	QUESTIONS	KNOWLEDGE **(essential in bold)**	NOTES
Question 1 Bioavailability with particular reference to NSAIDs **Subject:** Pharm LOA: 1	(a) What is bioavailability? (b) What factors affect bioavailability? (c) What is the bioavailability of ibuprofen?	(a) Fraction of **unchanged drug** reaching the **systemic circulation** following administration by any route (b) 3 factors: **Extent of absorption** • Too hydrophilic or too lipophilic – decr. absorption • Reverse transporter associated with p-glycoprotein – pumps drug back to gut lumen – decr. absorption • Gut wall metabolism – decr. absorption **First pass metabolism** • Metabolism by liver before it reaches systemic circulation • Small additional effect if drug has biliary excretion Rate of absorption • Determined by site of administration and drug formulation (c) **High** - Weak organic acid – **well absorbed rapidly. Minimal first pass metabolism**	(a) Bold to pass (b) Bold with reasonable explanation of each (c) Bold to pass
Stem: Moving onto **ANATOMY**			
Question 2 **Subject:** Anatomy LOA: 1	(a) Identify the features on this model of the knee joint.	**Bones: patella, femur, fibula, tibia, and** **Features:** med/lat fem condyles, med/lat tibial condyles, tibial tuberosity, head/neck fibula, lat /med epicondyle femur, menisci, patellar tendon **Ligaments:** medial/lat collateral, ant / post **cruciates**	(a) All bones + 5 features + 4/4 ligaments

	(b) Describe the cruciate ligaments and their actions. (c) What features confer stability on the knee joint?	**Attachment points:** • Ant cruciate - weaker, ant intercondylar area tibia, extends sup, post and laterally to attach to post part of med side of lat condyle femur • Post cruciate - arises from post intercondylar area of tib and passes sup and anteriorly on med side of ant cruciate to attach to ant part of lat surface of med condyle of femur) **Actions:** • Ant cruciate prevents post movement of femur on tibia (or ant movement of tib on femur) and limits hyperextension of knee • Post cruciate limits ant movement of femur on tibia (or post movement of tib on femur) and prevent hyperflexion of knee (c) **Muscles/tendons, and ligaments connecting femur to tibia – no bony contribution. 2/3** of **quadriceps** (esp. inf. fibres of vast med/lat) **Collateral ligaments** and **cruciate ligaments**	(b) 2/4 attachment points 1/2 actions (c) Bold to pass
Stem: The next patient is a 20 yo woman who is dehydrated secondary to poor oral intake from glandular fever. This topic is **PATHOLOGY**.			
Question 3 EBV **Subject:** Path LOA: 2	(a) Describe the pathogenesis of glandular fever.	• **EBV** transmitted by close contact (saliva) • Envelope g/protein binds to B cells • Viral infection begins naso/oropharyngeal **lymphoid** tissues (esp. tonsils) • EBV accesses submucosal lymphoid tissues • B Cell infection 1) **lysis** infected cells and virion release (minority) or 2) **Latent** infection (EBV genes expressed) • Symptoms appear on initiation host immune response (cellular CD8+ cytotoxic T and NK cells) • Atypical lymphocytes (characteristic) • Reactive T cell proliferation lymphoid tissues – lymphandenopathy and splenomegaly. • IgM Ab (viral capsid Ag) and later IgG • Healthy – cease viral shedding with few resting B cells but Acquired defects may → B lymphomas	(a) To pass: EBV Lymphoid tissue Involves B (latent and lysis) and T cells

	b) What are the clinical features of glandular fever?	(b) Classically – Fever, sore throat, lymphadenitis splenomegaly Atypical presentation common – fatigue, lymphadenopathy, hepatitis, rubella-like rash	(b) 4 clinical features to pass
	(c) What are the outcomes of glandular fever?	4-6 weeks **most resolve** - some fatigue longer **Hepatic** dysfunction – j, abn. LFTs, appetite **Splenic** rupture Other systems – nervous, renal, lungs, heart. Transformation – **lymphomas**	(c) 3 outcomes to pass
Stem: Moving onto **PHYSIOLOGY**			
Question 4 Renal response to dehydration **Subject:** Phys LOA: 1	(a) What is the renal response to dehydration?	(a) **Renin release, converts a-gin to AT1** **ACE converts AT1 to AT2** **AT2 increases aldosterone synthesis, vasoconstriction of aff arteriole** **Aldo - Na and water retention**	(a) Need details re secretion i.e. reduced pressure at JG cells of renin and actions of A-2
	(b) What is the role of vasopressin in dehydration?	(b) Promotes **water resorption** in CD via **aquaporins** insertion. **Vasoconstriction**	(b) Bold to pass