Pathology 2011.1

2011.1 SESSION 1 (Thursday morning) Candidate Number_____ Mark_____

Topic	Question	Essential Knowledge	Pass criteria / Comments
Question 1. **Ischaemic cell injury**	1.What are the **stages of ischaemic cell injury?**	• **Initial Reversible** • **Irreversible (prolonged ischaemia injury and necrosis)**	2/2
	2. Describe the **sequence of events that occurs in reversible ischaemic cellular injury**. PROMPTS What occurs in the cell? What happens to pH?	• Due to loss of oxidative phosphorylation → **decreased ATP →failure of sodium pump** → loss of K+; influx of Na+ and H2O → iso-osmotic cell swelling. • **Increase in Ca**++ initially release from intracellular stores then influx of Ca++ across plasma membrane → failure of ATP generation, activation of enzymes, induction of apoptosis → membrane and nuclear damage • **Decreased cellular pH due to increased lactate (increased anaerobic metabolism)** • Loss of glycogen, decreased protein synthesis • Loss of microvilli, formation of cell surface blebs, myelin figures, mitochondria + ER swelling, ribosome detachment clumping of nuclear chromatin fatty change	Bold (3 items)
	3. Describe **the morphological changes of irreversible ischaemic** injury	• Severe swelling of mitochondria • Extensive damage to plasma membrane • Swelling of lysosomes • Cell death by necrosis/apoptosis	2/4
Question 2. **Septic Shock**	1. How do microbial constituents initiate septic shock?	1. Interact with **cells of the innate immune system** (Neutrophils/Macrophages/Others) to release inflammatory mediators (& immunosuppressants) 2. Interact with **humoral elements of innate immunity** to activate complement and coagulation pathways 3. Act on **endothelium**	2 of 3 bold
	2. What is the **effect of endothelial cell activation and injury during septic shock**? PROMPT; What happens in the vessel?	**1. Thrombosis** 2. Increased **vascular permeability** **3. Vasodilation**	2 of 3
	3. **How does endothelial activation result in DIC (disseminated intravascular coagulation)?** **PROMPT; what mechanisms contribute to the coagulapathy in DIC**	1. Sepsis favours coagulation a. Increased tissue factor production b. Decreased fibrinolysis c. Stasis **d.** Decreased washout of activated coagulation factors e. Results in multiple fibrin rich thrombi 2. Increased hypoperfusion **Consumption Coagulopathy = DIC**	Consumptive and some detail

Question 3. **Hypertension**	1. **What factors are thought to contribute to essential hypertension?** 	Multiple genetic polymorphisms and interacting environmental factors**:** **Genetic factors** - familial, multi-gene foci interactions - single gene disorders altering Na reabsorption (rare) **Vasoconstrictive influences** - vasoconstriction/structural change in vessel wall -> increase in peripheral resistance -> primary hypertension **Environmental factors** - stress, obesity, smoking, physical inactivity, high salt intake	**2 of 3 bold**, with detail
	2. What are the long term consequences of essential hypertension?	Major risk factor for atherosclerosis • Coronary artery disease • Cerebrovascular disease) • Aortic dissection • Renal failure • Cardiac hypertrophy • Cardiac failure • Multi infarct dementia • Retinal changes	**4 of 7** consequences
	3. Describe the clinical features of malignant hypertension?	Clinical syndrome characterised by • severe hypertension with SBP > 200, DBP > 120 • renal failure • encephalopathy • CVS abnormalities • retinal haemorrhages +/- papilloedema • often superimposed on previous benign hypertension • < 5% of hypertensive patients • rapidly rising BP • untreated -> death in 1-2 years	**Must mention 3 organ systems.**

Question 4. **Community acquired pneumonia**	**1.What organisms commonly cause community acquired pneumonia**? PROMPTS: What **organisms cause atypical** pneumonia? What **viruses may cause atypical pneumonia?**	**Bacterial** • Strep pneumoniae • Haemophilus influenza • Moraxella catarrhalis • Staph aureus • Legionella pneumophilia • Others eg klebsiella pneumonia, pseudomonas **Atypical pneumonia** • Mycoplasma pneumonia • Chlamydiae spp • Coxielle burnetti (Q fever) **Viral** • RSV, parainfluenza, influenza A+B, adeno virus. SARS virus	Need • Bacteria 3 • Atypical 1 • Viral 1
	2. How do **atypical pneumonias differ from classical (typical) bacterial** pneumonias PROMPT; how do the lung changes differ?	• **Moderate amount sputum** • **No physical findings of consolidation** • **Only moderate elevation of WCC** • **No alveolar infiltrate** • **Patchy inflammatory changes** largely confined to alveolar septa and pulmonary interstitium ie interstitial nature of the inflammation v alveolar exudates in classical pneumomia • **Different clinical presentation**; few localising signs, cough often absent, typical symptoms are fever, headache, myalgia, • **Lower mortality cf bact pneumonia** • (severe disease uncommon)	Lung changes to pass
	3. How is legionella pneumonia contracted?	• Artificial **aquatic environment** eg water cooling tower, water supply tubing • **Inhalation of aerosolised droplets** • Or **aspiration** of contaminated drinking water	• Water related

Question 5. **Osteomyelitis**	1**. Describe the pathogenesis of osteomyelitis** PROMPT; how do organisms reach the bone?	3 basic methods of infection • **blood born** (haematogenous) • **local infection** (extension contiguous site) • **trauma /surgery** (direct implantation)	**2/3**
	3. What Bacterial **organisms cause osteomyelitis?** (good candidates differentiate by age; Neonatal versus adults)	• **S Aureus** • Gp B strep (neonatal) • S Aureus (> 80%) Surgery/open fractures mixed Patient with UTI or IV drug user • E. Coli, Pseudomonas, Klebsiella	**S Aureus and 1 other**
	2. What are the changes in the bone that occur in **osteomyelitis**	• New bone around area of necrosis • Involucrum • Abscesses • Sclerosis • Deformity • Sequestrum • Draining sinus	3 items

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ACEM PRIMARY 2011/1 PATHOLOGY VIVA Thursday (April 7) Afternoon Session ***Candidate Number*****…… AGREED MARK……**

TOPIC	*QUESTION*	*ESSENTIAL KNOWLEDGE*	*PASS CRITERIA / COMMENTS*
Question 1. **Atrophy**	1**. What is atrophy?**	**Shrinkage in the size of an organ or tissue** due to decrease in cell size and number.	Must know
	2. **What are the causes of atrophy?**	• Disuse • Denervation • Diminished blood supply • Inadequate nutrition • Loss of endocrine stimulation • Pressure	At least 4
	3. Give **some examples of atrophy**	• Fracture disuse • damage to nerves causing muscle atrophy • breast/reproductive organs from oestrogen lack	At least 2
Question 2. **Normal Haemostasis**	1. List the **sequence of events in normal haemostasis after vascular injury**	1. **Transient vasoconstriction** [Neurogenic & humoral factors (include endothelin – endothelium derived vasoconstrictor)] 2. **Primary haemostatic plug - platelet.** 3. **Secondary haemostatic plug**: coagulation cascade activated by tissue factor and platelet phospholipids, fibrin polymerization "cementing" platelets 4. **Limit spread**: tissue plasminogen activator & thrombomodulin	3 of 4 bold
	2. Describe the **creation of the Primary Haemostatic Plug?**	**Platelets** bind via 1. glycoprotein Ib (GpIb) receptors to 2. von Willebrand factor (vWF) on 3. exposed extracellular matrix (ECM) are 4. activated undergo 5. shape change and 6. granule release: adenosine diphosphate (ADP) and thromboxane A_2 (TxA_2) 7. additional platelet aggregation through platelet GpIIb-IIIa receptor binding to fibrinogen	3 of 7 (plus must say **platelets**)

Question 3. Tuberculosis	**1. What is secondary tuberculosis?**	Pattern of disease that arises in a previously sensitised host	**previously sensitised host**
	2. How may infection occur in secondary tuberculosis?	1. May follow shortly after primary infection (<5%) **2. Reactivation of latent organisms** • Typically in areas of low disease prevalence **3. Reinfection** • Typical in regions of high prevalence	**Items 2 and 3**
	3. Describe the pathological features in the lung of secondary infection with TB.	• Locale - **apical UL in secondary** • **Area of inflammation / granuloma** / multinucleate giant cells • Central **caseous necrosis** • **cavitation** • **Healing with fibrosis and calcification** • +/- Complications include tissue destruction, **erosion of blood vessels, miliary spread, pleural effusion, empyema, fibrous pleuritis**	**Need 3 of:** • Apical site • Inflammation / granuloma • Caseous necrosis • Cavitation • Fibrosis / calcification
Question 4. **Chronic gastritis**	1. What are the **causes of chronic gastritis?**	• **H Pylori** • Chronic bile reflux • NSAIDS • Autoimmune • Allergic response • Infections • Radiation • Mechanical • Psychological stress • Chronic irritants (coffee, alcohol, caffeine) • Systemic disease • (Crohns, amyloid, graft vs host)	**H pylori +** 2 others
	2. Describe the features of **H pylori induced chronic gastritis**	• Most **common cause** • predominantly **antral** • **High acid** production • **Hypogastrinaemia** • Generates **ammonia** (specific test) • **Disruption normal mucosal defence** mechanisms	2/5
	3. What are the **complications of gastric ulcer?**	• Bleeding (15-20%) o Accounts for 25% of ulcer deaths • Perforation • Obstruction • Gastric adenocarcinoma (complication of chronic H. Pylori pangastritis)	2/3

Question 5. **Subarachnoid Haemorrhage**	1. What is the **most frequent cause of subarachnoid haemorrhage?**	• **Rupture of an aneurysm** • (less common causes include ext of traumatic haem, H/T intracerebral bleed into ventricular system, AVM, bleeding disorders, tumour)	Rupture of aneurysm to pass
	2. **Where are saccular aneurysms commonly located?**	• **Most** near major arterial branch points along the circle of Willis or a major vessel just beyond (= **anterior cerebral circulation**) • 40% ant comm art • 34% middle cerebral art • 20% int carotid/PICA • 4% Basilar/Posterior Cerebral	At least anterior circulation and 1 other to pass

	3. What are the genetic risk factors for saccular aneurysms?	• Generally unknown, not 'congenital'
		• Some genetic risk
		  o Polycystic kidney
		  o Ehlers Danlos type 4
		  o Neurofibromatosis type 1
		  o Marfan's)
		  o Fibromuscular dysplasia
		  o Aortic coarctation
			2/6

	4. What are the pathological **consequences of subarachnoid haemorrhage?** Prompt for "Late"	• **Early** - vasospasm and additional ischemic injury - increased intracranial pressure • **Late** - meningeal fibrosis & scarring - CSF obstruction	Need 2

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ACEM PRIMARY 2011/1 PATHOLOGY VIVA Friday (April 8) Morning Session *Candidate Number*…… AGREED MARK……

TOPIC	QUESTION	ESSENTIAL KNOWLEDGE	PASS CRITERIA / COMMENTS
Question 1. **Cell Death / Necrosis**	**1. Describe the cellular changes in necrosis** PROMPT Start with the cellular features.	• Usually irreversible injury • Often adjacent inflammation • **Swollen cells** • Increased eosinophilia • Myelin figures (whorls of cell membrane bits) • Nucleus fades (karyolysis), may shrink (pyknosis) and then fragments (karyorrhexis) • Organelle disruption → amorphous mass • **Cell membrane disrupted**, contents released	• Swelling • Disruption of cell integrity.
	2. What are the patterns of tissue necrosis? PROMPT What are the different macroscopic appearances of necrotic tissues?	• **Coagulative** (architecture preserved) • **Liquefactive** (digestion → liquid viscous mass) • Caseous (friable white) • *Gangrenous (usually applied to limb. Typically coagulative. Superimposed liquefaction from infection → 'wet gangrene') • *Fat necrosis (focal areas of fat destruction) • Fibrinoid (microscopic feature of Ag-Ab complexes in vessel walls from immune mediated)	• Coagulative • Liquefactive Prompt with names needs to describe difference *these terms clinical not true pathology terms

Question 2.
 	
Cell derived mediators of inflammation
	1. Which mediators of inflammation are derived from cells?	• Preformed
		  ○ **Vasoactive amines**
		  ▪ **Histamines**
		  ▪ Serotonin
		• Newly synthesized
		  ○ **Arachidonic metabolites**
		  ▪ Prostaglandins
		  ▪ Leukotrienes
		  ▪ Lipoxins
		  ○ Reactive Oxygen Species
		  ○ Platelet activating factors
		  ○ Nitric Oxide
		  ○ Cytokines (TNF, IL1)& Chemokines
			Pass = bold + 1 other

	2. Which cells release histamine?	Widely distributed in tissues, richest sources: • **Mast cells** • **Basophils** • **Platelets**	**Pass =/> 2**
	3. What **are the effects of histamines in an inflammatory response?**	• **Dilation of the arterioles** • **Increased vascular permeability of the venules** • Can cause constriction of large arteries	**Pass = bold (2)**

Question 3. **Measles**	1. **Describe the pathogenesis of measles** PROMPTS: What type of virus is measles? What is the mode of transmission?	1. **Paramyxovirus (single stranded RNA)** 2. **Respiratory droplet spread** 3. Multiplies in upper respiratory tract epithelial cells 4. >lymphoid tissue where it replicates in mononuclear cells 5. haematogenous spread 6. Preventable by vaccination as only single strain. 7. Epidemics amongst un-vaccinated individuals	• **Virus** • **Respiratory droplet spread** • **+ 1 other**
	2. What type of immune responses occur in measles?	• **T cell mediated immunity** controls infection + causes rash • **Antibody mediated** protects against re-infection • epidemics in unvaccinated hosts	• cell mediated • antibody mediated
	3. **Describe some of the systemic features of measles virus infection.** Prompt: What are some complications of measles infection?	• **Rash**–blotchy, red/brown. Skin hypersensitivity reaction • Oral mucosal ulceration – **Koplik's spots** • **Croup** • **Interstitial pneumonia** • **Conjunctivitis, Keratitis**, with scarring and visual loss • **Encephalitis**; - plus SSPE, measles inclusion-body encephalitis • **Diarrhoea** with protein losing enteropathy • **Immunosuppression** • **Secondary bacterial infection**	• Rash • + 3 others
Question 4. **Ischaemic bowel disease**	**1. What conditions can lead to infarction of bowel?** **PROMPT; by what mechanisms do these conditions cause injury**	**Acute vascular obstruction** -atherosclerosis (esp. origin major vessels) -aortic aneurysm -hypercoagulable states -OC use -embolism **Intestinal hypoperfusion** -cardiac failure -shock -dehydration -vasoconstrictive drugs Systemic vasculitis -Henoch-Scholein purpura -Wegener's granulomatosis Mesenteric venous thrombosis -hypercoagulable states -invasive neoplasms -cirrhosis -trauma -abdominal masses	Bolded headings with 4 clinical examples to pass
	2. **Describe the intestinal response to an acute ischaemic insult.** Prompt: what is the mechanism by which ischaemic bowel injury occurs?	• Initial hypoxic injury • **Secondary reperfusion injury** - major injury in this phase - free radical production, neutrophil infiltration, inflammatory mediator release • Magnitude of response determined by - vessels affected - timeframe over which ischaemia develops	Must know that it is predominantly a **reperfusion type injury**
	3. **Which parts of the bowel are most susceptible** to acute ischaemic injury and **why**?	**Watershed zones** -splenic flexure, sigmoid colon and rectum -located at end of arterial supply Surface epithelium: Villi more at risk than crypts -intestinal caps run from crypts up villi to surface	Must be able to explain why **watershed zones are most susceptible** to injury.

Question 5. **Hepatic Failure**	1 What are the **causes of acute liver failure?**	• **Drugs and toxins:** Paracetamol, halothane, rifampicin, mushrooms, CCL4 • **Infections**: hepatitis A, B and (rarely) C. Mechanism: direct toxic eg paracetamol,mushrooms Or toxicity and/or immune mediated eg Hepatitis virus	**3 causes -** at least 1 drug and 1 infection
	2. What are the **clinical features of liver failure?**	• Jaundice • Ascites • Hypoalbuminaemia • Hyperammonemia→ encephalopathy • Coagulopathy • Portal hypertension • Foetor hepaticus • Spider naevi • Palmar erythema • Hypogonadadism + gynaecomastia	At least **5 features**
	OPTIONAL (Good candidates) What **do you understand by hepato-renal syndrome?**	• Renal failure in pt with severe chronic liver disease with no obvious cause for the renal failure. Features include: • Na retention • Impaired free water excretion • Decreased renal perfusion and GFR	Any features

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