COLLEGE OF INTENSIVE CARE MEDICINE
OF AUSTRALIA AND NEW ZEALAND

REPORT OF THE
INTENSIVE CARE PRIMARY EXAMINATION

SEPTEMBER / NOVEMBER 2012

This report is prepared to provide candidates, tutors and their supervisors of training with information about the way in which the Examiners assessed the performance of candidates in the Examination. Answers provided are not model answers but guides to what was expected. Candidates should discuss the report with their tutors so that they may prepare appropriately for the future examinations.

The exam included two, 2.5 hour written papers, each comprising of twelve short answer questions and twenty short fact questions. Candidates were required to perform at a satisfactory level in the written before being eligible to sit the oral part of the exam. The oral was comprised of eight, ten-minute Viva stations.

OVERALL STATISTICS

Total number of candidates presenting for the written examination:	22
Number of candidates scoring >50% in the written:	8
Number of candidates scoring 45-50% in the written:	7
Number of candidates carrying a written score:	0
Total number invited to the Oral section based on written marks:	15
Total number of candidates successful at the CICM Primary:	13

Successful candidates:

Dr Jacob Abraham
Dr Shreepad Asundi
Dr Anthony Baird
Dr Ramsy D'Souza
Dr Ahmad Elgendy
Dr Tal Gadish
Dr Ronan McKenna
Dr Matthew Morgan
Dr Swapnil Pawar
Dr Joshua Pillemer
Dr Mahesh Ramanan
Dr Claire Seiffert
Dr Jason Wright

WRITTEN SECTION

SAQ PAPER 1

1. Compare and contrast the carriage of oxygen and carbon dioxide in blood.

Candidates who scored well for this question not only had a good knowledge of the topic but also displayed an organised approach to their answer through the use of a tabular format or some other structured approach. For a good answer, candidates were expected to provide information on the amount (both arterial and venous blood content, partial pressure) and form of carriage (binding to, loading and unloading from haemoglobin, dissolved, as bicarbonate, etc.) of oxygen and carbon dioxide in blood

11 (50 %) of candidates passed.

2. Suxamethonium is a non-competitive partial agonist. Explain what is meant by this statement using definitions of the underlined terms (50% of marks). List the advantages and disadvantages of suxamethonium within Intensive Care practice (50% of marks).

For a good answer candidates were expected to mention that an agonist is a drug that elicits a maximal response on binding to a receptor. A partial agonist has intrinsic affinity with only partial efficacy and hence is unable to elicit a maximal response. A competitive drug acts at the same binding site of a receptor as an endogenous ligand (e.g. acetylcholine at the neuromuscular junction) and its action therefore is surmountable with increasing concentrations of drug and how this concept relates to suxemethonium. For the remainder of the question, Candidates were expected to mention the advantages and disadvantages of suxamethonium within Intensive Care practice. Good answers included a systematic approach and use of tables and/or well organised lists.

13 (59.1%) of candidates passed.

3. Outline the anatomy and physiology of humidification during normal breathing (50% of marks). Describe the mechanisms of humidification used within Intensive Care practice (50% of marks).

For a good answer candidates were expected to provide information on essential facts such as, normal inspired air has low water content, normal humidification provides for saturated water vapour 47mmHg at sea level at the alveolus, which corresponds to an absolute humidity of 44 g/m^3 (or 100% relative humidity) at 37.C. Furthermore, candidates were expected to outline the basics of the anatomical features of the respiratory tract that promotes humidification e.g. lining of nose and hypopharynx dissolving warm water vapour into the dry inhaled air, the fact that the turbinates act to increase surface area and that full saturation is achieved by the time air reaches the upper trachea. For the second part of the question candidates were expected to mention, and briefly describe, the mechanisms of achieving humidification, e.g. bubble systems, heat-moister exchange filters, heated water, ultrasonic, etc. mechanisms. Candidates generally did not have sufficient knowledge of the basic conepts or a structured approach to this topic.

0 (0%) of candidates passed.

4. Define myocardial contractility and briefly describe dP/dT, the end systolic pressure volume (ESPV) relationship and the ejection fraction (EF).

Contractility represents the performance of the heart at a given preload and afterload. It is the change in peak isometric force (isovolumic pressure) at a given initial fibre length (end diastolic volume). All indices of myocardial contractility are dependent on preload or afterload to a varying degree. The dP/dT is the maximum rate of change in left ventricular pressure during isovolumetric contraction, after mitral valve closes and before the aortic valve opens. It is preload dependant and afterload independent. A diagram of a pressure-volume loop is very helpful when describing the ESPV. Absence of a diagram (correctly labelled and scaled) was a weakness in many answers. Candidates were then expected to at least explain that, as preload is increased a new pressure volume loop is generated. Each new PV loop has a new end systolic point that is at a slightly higher pressure and volume than the previous end systolic point. The line connecting the end-systolic points is called the linear ESPVR. The slope of the ESPVR or Emax is used as an index of myocardial contractility. Ejection fraction is the percentage of the ventricular end diastolic volume (EDV) which is ejected with each stroke volume (SV). Ejection fraction = stroke volume/end diastolic volume X 100 (Normal range 55 to 70%). Only a minority of candidates achieved the depth of knowledge required for a Level 1 topic.

3 (13.6%) of candidates passed.

5. How does liver failure affect the pharmacology of drugs?

Good answers were structured using pharmacokinetic and pharmacodynamics headings. They included some mention of changes in absorption, volume of distribution (an increase in Vd in liver failure), altered protein binding, altered metabolism and thus change in clearance, and changes in excretion (decreased biliary excretion of drugs). In respect to pharmacodynamics candidates could have mentioned increased sensitivity and prolonged action of sedative drugs, oral anticoagulants, etc. Good candidates also differentiated for acute (often hepatocellular dysfunction) and chronic liver failure (cirrhosis and changes in liver blood flow). Common problems were not using a logical structure to answer the question and stating an effect but not describing how this affected pharmacology. For example stating decreased albumin production but then not stating the consequence of this on drug distribution. Primary examination questions may often require candidates to integrate knowledge from across different sections of the syllabusor apply basic physiological or pharmacological principles.

13 (59.1%) of candidates passed.

6. Describe the structure of surfactant (25% of marks). Explain the effects of surfactant upon surface tension and lung mechanics (75% of marks).

The answer required a description of surfactant composition (phospholipids 85%, neutral lipids 5%, and proteins 10%). Phospholipid dipalmitoylphosphatidylcholine is the main surface active component. It was expected candidates would provide a description of the arrangement of the phospholipids with the hydrophilic head in the aqueous phase and the hydrophobic tail in the airspace of the alveolus. The effects of surfactant required an explanation of surface tension and how this affects alveoli. One good way to explain this

was describing how La Place's law would affect alveoli with, and without, surfactant. As the alveoli decrease in size, the surfactant molecules are pushed together and exert a greater surface tension lowering effect.
Surfactant is also important in the lung elastic recoil and hysteresis and for alveolar stability preventing collapse and thereby improving lung compliance and decreasing work of breathing. Surfactant also helps oppose the starling forces in the lung and keep fluid from being drawn into the alveoli. Candidates often misunderstood La Place's law and did not explain how surfactant decreases surface tension.

8 (36.4%) of candidates passed.

7. Describe the anatomy of the antecubital fossa and peripheral veins of the upper arm relevant to a peripherally inserted central venous catheter (PICC).

Knowledge of anatomy of the areas of the body where common procedures are performed in the intensive care unit is essential. Defining the question by giving the boundaries and contents of the antecubital fossa along with a diagram illustrating the arrangement of the veins would have constituted a pass. The course of the basilic vein and an explanation of why it is favoured over the cephalic vein (presence of the clavipectoral fascia which provides an acute angle for the catheter to negotiate along with a valve frequently located at the junction) was important applied anatomy relevant to PICC line insertion. Transposition of medial and lateral structures was a common error in answers to this question.

5 (22.7%) of candidates passed.

8. Describe the physiology of gastric emptying (80% of marks). Outline the gastrointestinal effects of erythromycin (20% of marks).

This question was best answered by using a classification system, or systematic approach to gastric emptying. Receptive relaxation (triggered by movement of food through the pharynx and oesophagus), vagally mediated relaxation of fundus and upper body of stomach, the pyloric pump (being intense peristalsis in lower body of the stomach that results in stomach emptying) and the pyloric sphincter (a circular muscle that allows water and fluids to easily pass through but restricts solids until it is mixed in chime to almost fluid consistency). Candidates were also expected to mention regulatory factors e.g. food volume through myenteric reflexes / gastrin stimulatory motor effects and enhanced pyloric pump, acidity and osmolality of chyme in duodenum, presence of breakdown products of protein and fat through enteric nervous system, sympathetic and parasympathetic nervous systems and hormones such as cholecystokinin, secretin and gastric inhibitory peptide. Erythromycin is a commonly used prokinetic and some knowledge of effects was expected (e.g. the fact that it stimulates motilin receptors on GI smooth muscle and promote onset, frequency and duration of migrating motor complex, from stomach and spreading caudally thus increasing gastric emptying).

9 (41%) of candidates passed.

9. Classify the anti-arrhythmic drugs using the Vaughan-Williams classification (30% of marks). Compare and contrast the electrophysiological effects of Class 1 anti-arrhythmic drugs (70% of marks).

Most candidates displayed a basic knowledge of the Vaughan-Williams classification and gave an example of each class. The remainder of the question lent itself very well to a tabular format. Better answers included the effect on the action potential (diagrams were useful here), channel dissociation kinetics (this was frequently omitted) and examples from each class of drug. There is an excellent table in Stoelting which answers this question nicely. Marks were not awarded for clinical effects. Overall, this question was generally well answered.

16 (72.7%) of candidates passed.

10. Describe transport mechanisms across cell membranes. Give an example of each.

Candidates were able to list types of transport across cell membranes but frequently described them incorrectly or gave an incorrect example. In a number of answers, there was confusion between facilitated diffusion and secondary active transport. Though diagrams were not required, several Candidates used a diagram of the cell very effectively to illustrate the mechanisms of transport across the membrane. For a good answer, some mention and description of exocytosis, endocytosis, ion channels, facilitated diffusion, passive diffusion, primary and secondary active transport was expected.

11 (50%) of candidates passed.

11. Discuss the pharmacokinetic factors that affect drug half-life.

Half-life ($t_{½}$) is the time required to change the amount of a drug in the body by one-half during elimination. Candidates were expected to discuss the two main factors which affect drug half-life, namely volume of distribution and clearance. Marks were awarded for the formula ($t_{½} = 0.693 \times V_d / CL$), the factors which affect the volume of distribution and drug clearance but not for a discussion of factors affecting drug absorption.

10 (45.4%) of candidates passed.

12. Describe the blood brain barrier (50% of marks). What characteristics does a drug need to effectively penetrate the blood brain barrier? (50% of marks)

The BBB is the separation of the blood from the brain extracellular fluid and serves to maintain consistent internal environment in the brain and protect the brain from large harmful substances and microorganisms. Most answers displayed some knowledge of the structure of the BBB but many answers did not include its function. Better answers included substances to which the BBB is permeable, how permeability changes with age and a mention of the circumventricular organs and their significance (i.e. are outside the BBB). Most candidates correctly identified the characteristics of drugs that cross the BBB. Marks were also allocated for giving examples.

9 (41%) of candidates passed.

SAQ PAPER 2

13. Describe the effects of obesity on drug pharmacology (70% of marks). Give examples of drugs that illustrate those effects (30% of marks).

This question could be approached by describing the effects of obesity on drug distribution, binding and elimination. Candidates that took this approach generally did better than those with a less structured approach. With obesity, fat body mass increases relative to the increase in lean body mass leading to an increased volume of distribution particularly for highly lipid soluble drugs, e.g. midazolam. However, the dosing of non-lipid soluble drugs, e.g. non-depolarising muscle relaxants, should be based on ideal body weight. An increase in blood volume and cardiac output associated with obesity may require an increased loading dose to achieve a therapeutic effect, e.g. thiopentone. Plasma protein binding of drugs may be decreased due to an increased binding of lipids to plasma proteins, resulting in an increased free fraction of drug. A reduction in plasma protein concentration due to an increase in acute phase proteins may also result in decreased plasma protein drug binding and increased free fraction of drug. Pseudocholinesterase levels are increased in obesity and therefore the dose of suxamethonium should be based on total body weight. Plasma and tissue esterase levels are increased resulting in the increased clearance of drugs by these enzymes e.g. remifentanil. Hepatic clearance is usually normal but may be impaired in liver disease caused by obesity. Renal clearance is usually increased due to increased body weight, increased renal blood flow and increased glomerular filtration rate. Renal clearance may be impaired in renal disease caused by obesity related diseases, e.g. diabetes. Insulin doses may be increased due to peripheral insulin resistance in type 2 diabetes caused by obesity. Most answers were deficient in examples of drugs to illustrate the effects of obesity on drug pharmacology.

8 (36.4%) of candidates passed.

14. Illustrate and describe the Receiver Operator Curve (ROC) and the information gained from it.

For a good answer the following areas should have been addressed. Diagnostic tests may be correct or incorrect. The accuracy of a test is assessed by its sensitivity (true positive rate) and its specificity (true negative rate). The ROC provides a graphical representation of the trade-off between sensitivity on the y axis and specificity or 1-specificity (false positive rate) on the x axis. Any increase in sensitivity will be accompanied by a decrease in specificity. It accounts for an arbitrary cut off level made for a test or comparing two or more diagnostic tests. A gradient of 1 (area under the curve of 0.5) suggests that the test has no predictive ability. A steeper gradient has increased area under the curve (ideally > 0.75) and improved predictive ability. The best point on the curve is dependent on the consequences of a false positive compared with a false negative of the test and is usually the L elbow of the curve. The ROC is not affected by changes in prevalence as sensitivity and specificity are not dependant on prevalence. An illustration of the ROC, with correctly labelled axis and features was essential to answer this question. Few candidates scored well in this question, but of those that did they generally achieved a good score. This area is well covered in the recommended text Statistical Methods for Anaesthesia and Intensive Care by P Myles and T Gin pages 98 to 99.

3 (13.6%) of candidates passed.

15. Outline the respiratory and cardiovascular consequences of an acute complete spinal cord transection at C6.

The main respiratory consequences of an acute C6 transection include the effects on the inspiratory muscles, the expiratory muscles, lung volumes, effects of changes in posture and effects on gas exchange. Sparing of the phrenic nerve, the main muscle of inspiration (C3 - 5), but paralysis of the external intercostal muscles innervated by thoracic nerve roots results in paradoxical inward movement of the chest wall on inspiration. Paralysis of all the expiratory muscles including the internal intercostal muscles innervated by thoracic nerve roots and the abdominal wall muscles, which are innervated by lower thoric and lumbar nerves. Many candidates did not mention these muscles or their innervation in their answers. While expiration is normally passive these muscles are required for manoeuvres involving forced exhalation like coughing. Forced expiratory lung volumes (FEV1 and FVC) are reduced. Work of breathing is increased. Static lung volumes reveal a restrictive lung defect with most lung volumes decreased but in particular expiratory reserve volume (ERV) is significantly reduced. The reduction in FRC leads to airway closure, atelectasis and pathologic low V/Q and shunt and hence hypoxemia. These mechanisms can result in significant hypoxemia but were not described by many candidates. The second part of the question concerning the cardiovascular consequences of C6 transection was better answered. Areas that required mention in this section included the early massive sympathetic outflow and hypertension via the release of catecholamines from the adrenal medulla. Neurogenic shock is also seen due to interruption of the sympathetic outflow and impaired reflex vasoconstriction secondary to hypotension of any cause. Finally the loss of sympathetic innervation of the heart (T1-T4) results in unopposed parasympathetic cardiac stimulation and bradycardia and bradyarrthymias.

9 (41%) of candidates passed.

16. List the constituents of plasma and the functions of plasma proteins.

This question was generally well answered. The constituents of plasma include water, electrolytes, glucose, liver enzymes, urea, creatinine, uric acid, dissolved gases and proteins. Plasma does not contain any cells. The proteins in plasma are albumin, globulins and fibrinogen. The globulins include alpha 1 and 2 and beta globulins and gamma globulins. Examples of α1- Globulins are: α1-fetoprotein, α1-protease inhibitor and prothrombin. Examples of α2-Globulins include: ceruloplasmin, haptoglobin, α2-macroglobulin and thyroxin-binding globulin. Examples of β-Globulins are: C-reactive protein, β2-microglobulin and transferrin. Examples of δ-Globulins are the immunoglobulins , IgG, IgA, IgM, etc. There are many more other globulins including the coagulation factors, the complement system and lipoproteins. The functions of plasma proteins include oncotic pressure, transport/carrier function, role in acid base balance (buffering, CO2 transport) and proteolytic systems such as complement, kinins, coagulation and fibrinolysis. More functions include the immune response, enzyme activity eg pseudocholinesterase, metabolism i.e. plasma proteins can be broken down and contribute amino acids to the amino acid pool and a role in thermoregulation. Many answers were deficient in details on the plasma proteins and their functions. The question asked to “list” the constituents, so the level of detail required to score marks reflected this and should have been achievable in the allocated timeframe.

15 (68.2%) of candidates passed.

17. Classify the 5HT receptors and give examples of pharmacological agents that affect them (60% of marks). Outline the pharmacology of ondansetron (40% of marks).

The 5HT (5 Hydroxytryptamine or serotonin) receptor is a monoamine neurotransmitter synthesized from tryptophan, and is an important receptor in the body.. It is found in the CNS, gastrointestinal tract, platelets and mast cells. There are 7 main receptor subtypes (G-Protein coupled are 5HT1, 5HT2, 5HT4 and 5HT7 and ligand-gated ion channel 5HT3). Drugs may affect them by acting on serotonergic transmission (degradation inhibitors - MAOI e.g. selegiline, storage inhibitors- amphetamine, reuptake inhibitors - SSRI's or tricyclic antidepressants), serotonin agonists (selective-5HT1B, 5HT1D e.g. triptans for migraine, non-selective, e.g. ergotamine), serotonin antagonists (ketanserin, clozapine, ondansetron). Ondansetron is a commonly used anti-emetic. Candidates were expected to mention, that it is a selective antagonist at the 5HT3 receptor centrally and peripherally. To outline "pharmacology" it was also expected that answers would mention that it comes in a variety of formulations and to outline its fundamental pharmacokinetic properties.

10 (45.4%) of candidates passed.

18. List the properties of the ideal inotrope (50% of marks). How does adrenaline compare with respect to these ideal properties? (50% of marks).

Inotropes are drugs that increase the force and velocity of myocardial contraction resulting in increased contractility and stroke volume and hence cardiac output. Good answers were those that adopted a systematic approach, such as providing a coherent list of ideal properties that included pharmaceutical, pharmacokinetic and pharmacodynamics characteristics, and then contrasted adrenaline against that list. The area less well covered was that of those aspects of adrenaline that made it less than an ideal inotrope, e.g. it increases myocardial oxygen consumption, causes tachyarrhythmias, tolerance may develop, hyperglycaemia, lactic acid production, etc.

19 (86.4%) of candidates passed.

19. Describe the changes that occur in the plasma with renal dysfunction.

A good answer required an integrated knowledge of various aspects of basic physiology. Most often there was a lack of breadth and/or depth of knowledge (e.g. mention that plasma creatinine increases, but failure to mention that it only increases after substantial (>75%) loss of nephron function). It was expected that some mention of changes in electrolytes (e.g. Na+, K+, Ca_2+), HCO3, PO4, hormones (1, 25 vitamin D, erythropoietin), proteins, etc. be included.

9 (41%) of candidates passed.

20. What are drug enantiomers? (20% of marks). Explain the clinical relevance of enantiomerism (60% of marks). Give a clinically relevant example (20% of marks).

Enantiomers refer to isomeric molecules with centres of asymmetry in 3 dimensions that are mirror images of each other but not superimposable. Enantiomers may be distinguished by the direction in which polarised light is rotated.

Interactions involving weak drug-receptor bonds feature a dependence upon recognition of shape, i.e. stereochemical structure is often important. Frequently one enantiomer may bind to a given receptor more avidly than the other, thus pharmacodynamics, pharmacokinetics and toxicity may vary between enantiomers.
Many drugs are supplied as racemic mixtures, the components of which have different activity. Clinically relevant examples that candidates could have mentioned, included bupivacaine, ropivacaine, ketamine and carvedilol.

9 (41%) of candidates passed.

21. Describe the physiological consequences of a progressive rise in blood carbon dioxide levels.

Candidates were expected to present a mechanistic description the neuro-cellular events following a rise in P_aCO_2 such as changes in H^+ in CSF, stimulation of central and peripheral chemoreceptors and neural pathways that lead to stimulation of respiratory centre. A systematic approach to the question with in-depth details of direction and magnitude of physiologic changes were required. Most candidates presented graphs of cerebral blood flow and tidal volume changes with increasing P_aCO_2. Common omissions included other important points, such as the cardiovascular and respiratory effects of rising CO_2 and the rightward shift of oxygen haemoglobin curve.

5 (22.7%) of candidates passed.

22. Describe the factors that increase the risk of systemic toxicity of the amide local anaesthetics.

The amide group of local anaesthetics consist of lignocaine, prilocaine, ropivacaine and bupivacaine. The systemic toxicity primarily relates to toxic plasma levels and the factors that influence this. The main factors expected can be categorized under drug factors (including kinetics), patient factors, site of injection and external factors. Many candidates omitted important details such as pK_A, lipid solubility and addition of vasoconstrictors. For example, absorption is affected by drug pK_A, (the closer to physiological pH the more rapid the absorption), use of vasoconstrictors and the drugs own vasoactive properties, site of injection (intercostal>epidural>brachial plexus>subcutaneous infiltration). Distribution is dependent on physicochemical properties of the amide. The rate of metabolism, mechanism of action (bupivacaine, in comparison to lignocaine has stronger binding to inactivated resting sodium channels and a slower rate of dissociation) and external factors (e.g. systemic acidosis) are other factors that should have been mentioned, and expanded upon with relevant detail.

4 (18.2%) of candidates passed.

23. Outline the mechanisms that control regional skeletal muscle blood flow.

Candidates were expected to present the cellular mechanisms underlying the control of skeletal muscle blood flow. Many candidates correctly identified a role for sympathetic nervous system, metabolic (e.g. vasodilator metabolites such as CO2, H+, K+, lactate and adenosine), vasoactive substances released by endothelium (nitric oxide, prostacyclin, endothelin 1, etc.) and autoregulatory control but failed to present any details of direction and magnitude of control. Better answers also mentioned humeral (e.g. catecholamines, vasopressin, ANP, angiotensin II, histamine, serotonin, etc.) or myogenic control (i.e. when the pressure within a smooth muscle blood vessel is suddenly increased, the vascular smooth muscle is stretched.

4 (18.2%) of candidates passed.

24. Compare and contrast peptide and steroid hormones. Give four examples of each.

Most candidates used a table format to present their answer. Most also were able to give examples of peptides and steroids hormone. A common omission was an explanation of the differences in mechanism of action and different mediators. Better answers were able to compare and contrast aspects such as structure, synthesis, precursor, storage, transport and kinetics. Examples of peptide hormones include the anterior and posterior pituitary hormones, Parathyroid hormone, calcitonin, etc. Examples of steroid hormones are the adrenocortical hormones (e.g. glucocorticoid, mineralocorticoids, androgens), sex hormones and 1, 25 di OH vitamin D.

3 (13.7%) of candidates passed.

PAPER 1 and 2 CLOZE QUESTIONS

22 (100%) of candidates passed.

PAPER 1 and 2 RANK QUESTIONS

17 (77.3%) of candidates passed.

PAPER 1 and 2 MATCH QUESTIONS

22 (100%) of candidates passed.

ORAL SECTION

15 candidates were invited to attend the oral section based upon their written marks.

Candidates were presented with the following information (shown in *Italics*) during the two-minute reading time.

VIVA 1

This Viva will explore knowledge of the measurement and interpretation of Blood Gases and respiratory pharmacology.

Subsequent discussion involved understanding differences between hypoxia and hypoxaemia, the Clark electrode, physiological mechanisms of hypoxaemia, asthma and bronchodilators

VIVA 2

This viva will examine knowledge of evidence based medicine and clinical trial design
Describe a Classification of levels of evidence.

Subsequent discussion involved research design, types of bias, randomisation, end-points and drug development studies.

VIVA 3

This Viva will examine maternal physiology and pharmacology.
Write down the expected values in an Arterial Blood Gas for a pregnant woman at term.

Subsequent discussion involved respiratory changes with pregnancy, including spirometry, pharmacology of drug transfer across the placenta, pharmacology of syntocinon and ergotamine.

VIVA 4

This viva will examine knowledge of Calcium.
Consider the normal levels of calcium in blood and factors which affect it.

Subsequent discussion focused on calcium physiology and pharmacology of verapamil.

VIVA 5

This Viva will examine knowledge of the liver.

Candidates were given a picture of a portal triad in the centre of an acinus, and asked
"What are the functional relationships and why is this arrangement important?"

Subsequent discussion focused on liver blood flow, and its regulation, as well as how the liver handles ammonia, the urea cycle and laxatives.

VIVA 6

This Viva will examine knowledge of Cerebral Blood Flow.
What are the determinants of Cerebral Blood Flow?

Subsequent discussion involved physiology of Cerebral Blood Flow, its regulation and the pharmacology of propofol.

VIVA 7

This Viva will examine knowledge of blood products and blood transfusion.
How is blood processed after it is collected?

Subsequent discussion focused on other aspects of transfusion such as additives in a bag of blood, blood components, blood groups, storage lesions and haemostatic agents, in particular tranexamic acid.

VIVA 8

This Viva will examine knowledge of the pharmacology of commonly used sedatives and their effects on Respiratory and CNS physiology.
List the properties of an ideal sedative drug in Intensive Care?

Subsequent discussion involved pharmacology of midazolam, how it compares to haloperidol, an understanding of the term “neuroleptic”, respiratory physiological response to sedation and the principles of the EEG.

Summary of the Examination

The CICM Primary Examination explores the knowledge of the basic sciences that forms the basis to Intensive Care practice. A detailed syllabus has been developed and forms the foundation for the knowledge required for this examination. The Syllabus reflects the basic sciences as they apply to Intensive Care practice. It is important that Candidates follow the Syllabus closely, and in its entirety. All questions are sourced directly from that syllabus. Following each examination a detailed report, such as this one, is produced which outlines the level of understanding that is expected.

To succeed Candidates must read widely, beyond any one textbook, and develop a level of knowledge that allows them to accurately discuss, explain, translate and illustrate essential aspects of the basic sciences. It is also necessary for candidates to be able to collate and synthesize knowledge across many topics, and from more than one source. This remains an area of weakness for most candidates. Candidates will not only be asked to provide information that may be directly retrieved from any one section of a listed textbook e.g. drug half-life, oxygen carriage in blood, surfactant, but to also integrate knowledge, as often would be necessary within Intensive Care practice, e.g. obesity and liver failure and drug pharmacology, hypoxia, physiological consequences of spinal cord injury, etc. Candidates may find it useful to relate the basic sciences to their everyday clinical practice (e.g. humidification, insertion of a PICC, physiology of gastric empting, pharmacology of adrenaline, odansetron, erythromycin, etc.).

Although there are well prepared Candidates presenting to the Primary Examination, there are still Candidates who are inadequately prepared, and lack sufficient knowledge even for Level 1 topics. It is important that Candidates allow sufficient time to prepare. This will require time. As a guide, candidates should plan for approximately 12 months to study, and to prepare, for this examination. Candidates are strongly encouraged to discuss their level of preparedness, and to trial written and oral questions, with their Supervisor of Training and other CICM Fellows, prior to undertaking the CICM Primary Examination.

On behalf of the Examination Panel, I would like to once again congratulate the successful candidates at this CICM Primary Examination and wish them every success in their future training in Intensive Care, and preparation for the College of Intensive Care Medicine Fellowship examination.

A/Prof Arthas Flabouris
Chair, Primary Examination Committee
Nov 2012

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