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Advice on answering short answer questions

Postgraduate examinations evolve in mysterious ways, and so when puzzled candidates for the Final FRCA query the rationale for a twelve-question short answer paper they may find the answer opaque. The 'educationalists', they are told, believe that the paper should contain not just twelve questions, but should have as many as twenty, if not more. It is as if the invocation of this higher educational authority is meant to explain everything about the science of examinations: despairing candidates meanwhile have to count themselves lucky that they only have to answer a mere 12 questions in 3 hours. You may be surprised to know that at least some of the Final examiners share this unease about the current format. There are concerns that the pressure imposed by having to complete an answer in less than 15 minutes militates against the original purpose of this part of the examination, which was '*to assess the understanding of facts, and judgement, understanding and communication skills.*' Examiners are aware that you face a significant challenge and you may even start this part of the examination with their sympathy.

The composition of the paper

The Final FRCA in its current format dates from November 1996 and the initial information from the College about the short answer section stated that, in this new part of the examination '*…questions will tend to follow the pattern of including a question which relates to the following areas: paediatric, neurosurgical, obstetric, cardiothoracic, trauma and emergency, acute and chronic pain, medicine and surgery, clinical measurement, regional and local anaesthesia, dental and maxillo-facial anaesthesia, ENT and ophthalmic anaesthesia, and intensive care medicine.*' This rubric no longer appears in College documents and a review of the papers since that time shows that the questions do not necessarily follow this topic list. The list does however form a broad template for the construction of each successive paper and these tend to comprise a mixture of questions that are newly set and some that have appeared previously. A new question is an unknown quantity: whether it is a good discriminator will not become clear until a large number of candidates have attempted it. Questions that appear more than once have proved themselves to be satisfactory. They allow a degree of quality control and audit and they also permit some comparison of standards of performance. It would be most unusual, therefore, were a paper to contain 12 entirely new questions, and so it makes sense for you to review the past papers because it is certain that some of the questions will reappear. An important source of new questions is the review articles that will have been published in the last 6–12 months in the major anaesthesia journals.

As far as possible the examination aims to test both knowledge and judgement which, broadly speaking, is the way that an individual uses that knowledge. The first may be more readily acquired than the second, but it is judgement which is the more important. It is vital, therefore, for you to have confidence in your clinical experience. If, for example, the question asks about the immediate management of status asthmaticus, carbon monoxide poisoning, head injury or some other condition which recently you have encountered, then be confident in describing what you actually did. It is much better to take this approach rather than struggle to recall the small print theory or the minutiae of drug doses with which you are unfamiliar. Remember that you are aiming to persuade the examiners that your clinical practice is credible.

Because examiners are aware of the difficulty in condensing into two or three sides your knowledge about large topics such as 'anaesthesia for aortic aneurysm repair', the recent tendency is for some questions to have a more narrow focus. A question, for instance, will ask not about the general difficulties of *anaesthetising* patients in a magnetic resonance scanner but about the specific problems of *monitoring* patients in such a unit.

The marking system

All parts of the FRCA examination employ what is known as 'close marking'. This means that instead of being given a numerical mark a candidate is awarded one of four grades which range from '1' to '2+'. A '1' represents a poor fail and '1+' a fail; a '2' is a pass and a '2+' is an outstanding pass. Each of the 12 separate written answers receives one of these marks, which then, unusually for the FRCA examination, is converted into a numerical value. A '1' grade is given 1 mark, a '1+' receives 1.5 marks, a '2' receives 2 marks and a '2+' receives 2.5 marks. The total achieved determines into which final band the candidate will fall. A total of 18 or less results in an overall '1' mark for the paper, 18.5–20.5 converts to a '1+' mark, 21–24.5 marks converts to a '2' and 25 or more will receive a '2+'. You will see, therefore, that this section of the examination can be passed if a candidate gets '2's for six questions and only '1+'s for the remaining six. In other words you can pass even if you fail half of the questions. Given this marking system it is even possible to pass, in theory at least, by receiving a '2+' on three answers and by failing the remaining nine (75% of the paper) with a '1+'. This information is important because it means that the short answer paper is the only part of the Final FRCA examination in which a '2+' in one section of the test can redeem a poor performance in another. It is important to stress, however, that candidates should not aim to pass by concentrating so hard on those questions that they believe they can answer well that they omit some others. The omission of a question, or failure to make a genuine attempt to answer the question will result in an automatic '0' mark for the paper and overall failure. A candidate with a '0' (veto) mark cannot proceed to the vivas.

How the questions are marked

The FRCA is a structured examination. This means, for example, that during the oral part of the examination all the candidates during a particular session are asked the same question. It is obvious that each candidate receives the same written papers but in order to standardise the marking the examiners also use guidance answers which outline the major points which a candidate is expected to have covered. This approach certainly makes the FRCA fairer and more objective, but it would be unrealistic to assume that all subjective opinion is removed. At each sitting of the examination every examiner marks a set of the same anonymous papers and the results are audited. There is always a spread of marks around the mode which demonstrates simply that some examiners are less severe than others. This is inevitable in any system in which human judgements are involved, but your consolation is that the number of examiners who are harsh is matched by the number

who are lenient and you will never encounter the same examiners twice. The system does not allow those who marked your short answer paper to examine you in any other part of the examination.

Presentation, layout and legibility

Each examiner will receive between 180 and 200 answers to mark and will have 10 days or less in which to complete the task. If each answer is given 5 minutes' consideration then the examiner, who by the way has to be a full-time clinician, will have to find over 15 hours during their normal working week in which to mark the papers. Given the number of questions and the time constraints it is obvious that judicious presentation of your answers will help.

You do not have very long, so unless it helps you to focus on the question do not waste time by writing it out at the top of the answer. Some candidates abbreviate the full question to, for example, '*Paediatric resus.*', '*Awareness*' or '*Day case*'. This may help the examiner to identify the question but it is not necessary for your success.

These are not essays but are short answers, and some of the questions suggest their own layout by asking you, for example, to '*List the common causes of, or the predisposing factors for.…*' a particular condition, or to '*classify the types of…*'. Such questions clearly invite you to produce a bulleted list. Similarly it is appropriate to deal with questions which ask you to outline the advantages and disadvantages of a technique, or its indications and contraindications, by constructing two lists. This approach is also appropriate for all the questions which require you to present discrete pieces of information; when you are asked for instance '*What are the problems of…*', '*What is the differential diagnosis of…*', '*What are the risks of…*', '*What factors contribute to…*'. A list should not, however, comprise one-word answers. If the question asks you to classify the types of heart block, the examiner will expect to read more than bullet points with '1st degree', '2nd degree', and '3rd degree'. Some expansion will be required. It is helpful to fill out your answers with brief examples. If a drug has cardiac side-effects and you simply write '….*may be associated with arrhythmias*', an examiner may think that you are simply guessing and overall your answer is likely to lack depth and focus. If, on the other hand, you were to write '*…may be associated with a number of different cardiac arrhythmias of which the most important is supraventricular tachycardia*', your answer will appear more considered and more impressive, even though it may not actually contain that much more information.

If a question asks you to describe your anaesthetic management of a specific condition the use of lists is less appropriate, but your answer will appear more lucid if it is broken down into headings such as '*Preoperative assessment, investigation and preparation; Intra-operative management; Recovery and Postoperative Care.*' If you are considering a particular anaesthetic technique remember to consider all the possible alternatives: general anaesthesia, regional anaesthesia, sedation plus analgesia and so on. Do not list all the alternatives when some are wholly inappropriate. It is, however, worth discussing potential techniques even if subsequently you discard them after reasoned consideration.

You can create your own structured templates for a variety of possible questions, and this is useful for two reasons. Not only does it allow you to produce a clear and thorough answer to a question about which you are confident, but also it can help you with those questions in which you feel your knowledge is limited.

Many of the questions can be answered using headings and subheadings. This works well if you have a good grasp of the topic. It is worth spacing the headings out so that you can incorporate extra information should it occur to you. If you are struggling then your list will be a short one and the deficiencies will be very obvious. If you revert to blocks of written text your answer may appear more substantial and may even persuade the examiner that you know more than actually is the case. Some candidates may have been advised to present their headings in a different colour, and to underline key points. This is all very decorative but it can be overdone: when the

underlining is excessive the identification of key points appears haphazard. It may indeed emphasise the fact that a candidate has no sense of priority. If you are asked a question which begins with '*What are the main factors in…*', you should outline the important or common details first. The examiner is likely to doubt your clinical judgement if your first heading in response to the question '*What are the significant complications of lumbar extradural analgesia…*' is '*Horner's syndrome*'.

Some candidates take too literally the advice that these are short answer questions rather than essays by filling their answers with abbreviations. Given the time constraints it is certainly acceptable to use common abbreviations such as 'ICP' (intracranial pressure), 'BP' (blood pressure), 'HR' (heart rate) or 'PCWP' (pulmonary capillary wedge pressure). The use of ambiguous or uncommon abbreviations will do you no favours, particularly if they are incorporated into a sentence such as this one: '*The eff on pt = pred. Thio idem as steroids. Pt may c/o CP*'. You will not pass a question if you are unable to make your meaning clear. This will also apply if your answers are illegible. Examiners do make every effort to allow for the fact that some candidates have poor handwriting, but it is obvious that some of their points may be missed. You will be unable to change your writing style very much, but if you do have this problem then it is at least worth spacing out your answers and putting some of your main headings in block capitals. You may not be a calligrapher but you may be an artist, in which case diagrams may be useful. Drawings are sometimes requested in questions about anatomy, but this is to prevent you from spending a lot of time in laborious description. A broad outline is usually all that is required and not a detailed line drawing that will take up excessive time.

Some general points

Given the time pressure that you are under it is worth developing some structured approaches to questions. You may be asked, for example, about '*problems associated with….*', which may include anything from hypercapnia to obesity. Rather than launch into the first thing that occurs to you, start with a definition:

- **Hypercapnia:** 'The normal partial pressure of carbon dioxide in arterial blood is between 4.5 and 6.0 kPa depending on the reference laboratory, and so hypercapnia may be defined as a $PaCO_2$ of greater than 6.0 kPa. It may further be classified into 'moderate' and 'severe' hypercapnia with clinical features which vary accordingly.'

- **Obesity:** 'Obesity, typically, is defined by the body mass index (kg m^{-2}) which allows classification of patients as being overweight", obese" and morbidly obese". It is the morbidly obese, as defined by a BMI (body mass index) of over 35 in whom anaesthesia is most problematic.'

Chronic medical problems are a popular topic in the examination and this approach can work equally well:

- **Rheumatoid arthritis:** 'Rheumatoid arthritis is a chronic autoimmune disease characterised by a destructive polyarthritis and which has systemic features of importance to the anaesthetist which can be outlined as follows….'

- **Diabetes mellitus:** 'Diabetes mellitus is a heterogeneous group of endocrine disorders in which the common feature is a relative or absolute absence of insulin. The resulting disorder of glucose metabolism affects all body systems, the most important of which from the anaesthetist's point of view are the cardiovascular, renal….'

Starting a written, or indeed an oral answer in this way, gives it a degree of authority which is more likely to impress the examiner that a candidate is orderly, well informed and clear thinking.

Some structured responses can be wide ranging. If, for instance, you are asked about the contraindications to a particular procedure you could begin with the statement that:

- 'There are relative and absolute contraindications to this procedure, but arguably' – (the use of this word suggests that you are well read enough to know that it may be controversial) – 'the only absolute contraindication is patient refusal. Other contraindications require a risk–benefit analysis which should almost certainly involve discussion with the patient, and which include…'

You will see, therefore, that you can construct some set responses which are accurate and appropriate but which can apply to a fairly wide range of questions and which will allow you further time to order your thoughts.

But beware. Although it is very useful to use a structured approach to questions you should be careful lest this leads you into the production of what can be called 'generic' answers. If, for example, a question asks about the relief of acute pain following a particular surgical procedure, it is very easy to produce a standard answer which includes methods of pain assessment and treatment using the WHO analgesic ladder. This, of course, could apply to all forms of acute pain after any injury or surgical operation. These are certainly valid points which might form part of a short introduction, but the examiners will expect the answer to be much more sharply focussed on the particular patient and the specific surgical procedure. Another example comes from the advanced life support courses which have encouraged the 'Airway', 'Breathing', 'Circulation' approach to a variety of acute emergencies. Some candidates have been known to extend this approach to the management, for instance, of chronic pain problems for which it is ludicrously inappropriate. Non-specific answers will fail.

At the examination

The advice that follows may seem banal but the evidence from candidates' papers confirms, unfortunately, that it is still required.

Read the instructions carefully. There is no choice of questions and at present the examination requires that you answer all 12 questions within 3 hours. This allows you only 15 minutes per question and conventional advice has it that you should give each one approximately the same time. If you plan to spend longer on those questions with which you are familiar at the expense of some others then you do need to remember how the marking system operates. You may well achieve a '2+' in a subject about which you know a good deal, but unless you cover all the major points and most of the minor ones you may just fall short despite your best efforts and end up with a creditable '2'. The nature of the marking system, however, means that a half page answer which is almost totally inaccurate will still receive a '1', because there is no lower mark for an examiner to give. So with some thought, when faced with a question about which you feel you know little, it may be possible for you to raise the '1' to a '1+' with much less effort than you expended in trying to achieve that '2+'. In the end you must choose your own strategy, but keep these thoughts in mind.

When you read some questions it may occur to you that you know little or nothing about the subject that is asked. You almost certainly know more than you think. Take, for example, the anaesthetic management of a patient undergoing correction of kyphoscoliosis. You may never have seen major spinal surgery, but you would probably realise that these operations are prolonged, may involve substantial blood loss, will be undertaken in the prone position, and may well need high dependency care

in the immediate postoperative period. Thereafter you may have to think a bit more laterally, by considering, for instance, why scoliosis requires correction. If the answer is not obvious to you then consider what problems beset any adult patients who you may have seen with this condition. Typically the adult with longstanding uncorrected spinal deformity will have pulmonary function tests which demonstrate a restrictive pattern. You can surmise, therefore, that corrective surgery is aimed both at reducing skeletal deformity and preventing any deterioration in respiratory function. Preoperative assessment should include pulmonary function tests and their result may determine where the patient should be nursed postoperatively. Ask yourself what is the typical age of these patients (they are usually teenagers) and are there any problems associated with this age group. Ask yourself whether or not this condition is usually associated with other diseases or congenital abnormalities. Consider the worst case scenario: this suggests to the examiner that you are prepared for every eventuality and it may prevent you from missing something important. With kyphoscoliosis what is the worst that could happen preoperatively? (Respiratory failure and possible cardiac problems.) What is the worst intraoperatively? (Prolonged surgery, hypothermia, massive blood loss, pneumothorax, problems with spinal distraction.) What is the worst case scenario in the postoperative period? (Respiratory compromise, severe pain, spinal cord ischaemia.)

Read the question properly. If it asks for the indications for a regional technique then the examiner will neither expect nor wish to read a detailed account of how to perform the block. Examiners can be irked by the answer which is cluttered with details such as the need for trained assistance, venous access after full explanation, a thorough machine and equipment check, full monitoring, all resuscitation drugs to hand, the cardiac arrest team primed and the intensive care bed booked. Similarly, if, to take the example already cited, the question asks about the problems of monitoring patients in the magnetic resonance scanner you cannot pass if you devote your answer to the problems of *anaesthetising* patients in that environment. Most of the questions have been worded carefully, not in any attempt to trick, but so as to ensure that they are not ambiguous or do not tempt candidates into a much fuller answer than is necessary. Some topics require a fuller account than others, but you are not expected to fill more than two or three pages of the examination booklet on any one question. Some answers can be completed satisfactorily in less.

Do not give a list of complications and side effects unless the question specifically asks you so to do. You may end up writing copiously in the belief that you are doing well, whereas the reality is that you will just be wasting time.

Each paper usually contains one question on equipment or clinical measurement. In these questions there is no substitute for knowledge, but even if the scientific details elude you, it may be possible to salvage something by reverting to your clinical experience of the matter in question. The same applies to questions about anatomy. There are usually two parts to the question: anatomical details and their application. A question may ask you, for example, to describe the anatomy of the coeliac plexus and to list the indications for its block. If the anatomy is unfamiliar then a broad, if sketchy, description of the anatomy accompanied by a reasonable account of the clinical application may get you a 1+ mark for an answer which you might have given up as hopeless.

People have different strategies for the short answer paper and those who run the various FRCA preparation courses may offer conflicting advice. Some recommend that first you should scan all the questions, identify the topics on which you feel confident and allocate your time accordingly. They may suggest that you make rough notes for all the questions on a blank sheet of paper, to which you can add further points if and when they occur to you. Others believe that it is better to open the paper and to look at only one question at a time. You then answer this question within the allocated time before moving on to look at the next. Those who advocate this approach believe that the candidate is able to focus directly on the topic, easy or

difficult, without being distracted by worries about some or all of the remaining questions. None of these methods is either right or wrong. What is important is that one is successful for you. The only way of identifying which of them is the best is to try them all and see which works. Practice is vital, not only to identify your best tactic, but to familiarise yourself with a format of examination which previously you may never have encountered.

What the words in examination questions mean

Traditional examination essay questions invited candidates to '*Discuss*…' or to '*Describe*…' a particular topic. The meaning of these words is actually very straightforward: but they seemed always to cause disproportionate confusion. Their use was supposed to have been abandoned, but in a recent paper the word 'describe' appeared twice and the word 'discuss' once. The glossary below aims to define within the context of this examination what is meant by the various terms that may appear.

'***Outline*** the advantages and disadvantages of…'
As in: 'Outline the advantages and disadvantages of intrathecal block in...'
To 'outline' is to give the main features of, or general principles about a subject. A large amount of detail is not required. In this example you would be expected to list each factor and give a small amount of additional information.

'***List*** the…..'
As in: 'List the predisposing factors for gastric aspiration in…'
To 'list' is to write down a number of connected items. In some respects this is similar to 'outline', but less detail is required.

'*What* ***factors*** contribute…'
As in: 'What factors contribute to postoperative cognitive defects in the elderly...'
A 'factor' is a circumstance, fact or influence which contributes to an end result. In the above example factors could therefore be social, pharmacological, surgical, etc.

'***Classify*** the…'
As in: 'Classify the types of heart block...'
To 'classify' is to arrange in, or to assign to, classes or categories. This kind of question is only asked about topics which have already been formally classified in this way. You will not be expected to construct your own classification.

'*What are the* ***problems*** of…'
As in: 'What are the problems of monitoring a patient in the MRI (magnetic resonance imaging) unit…'
A 'problem' is a difficult matter requiring a solution. In this example and others it is almost a synonym for the word 'difficulty'.

'***Describe*** the…'
As in: 'Describe your procedure for cardiac life support of a child...'
To 'describe' is to state the characteristic(s) of, or the appearance of, a particular subject. In most questions the word is used to mean the same as to 'state'.

'***Discuss*** the…'
As in: 'Discuss the factors which...'
To 'discuss' is to examine by argument. If, therefore, you were asked to discuss a particular technique, you would be expected to consider the risks and benefits in comparison with others and to come to a considered conclusion.

*'What is the **aetiology** of…'*
As in: 'What is the aetiology of the systemic inflammatory response syndrome.'
The 'aetiology' is the assignment of a cause or reason for a particular condition or event.

*'What is the **significance** of…'*
As in: 'What is the significance of a raised preoperative creatinine and urea?'
'Significance' is in effect a synonym for 'importance'. In this example the question is asking 'what are the important reasons for..' impaired renal function preoperatively.

*'Outline your **management** of…'*
As in: 'Outline your management of a head injury prior to transfer…'
'Management' is the technique of treating a disease or condition. In this example you would be expected to include aspects of all medical treatment, including anaesthetic, as appropriate.

*'Describe the **anaesthetic management** of…'*
As in: 'Describe the anaesthetic management of pyloric stenosis…'
'Anaesthetic management' means all the anaesthetic aspects of treating a particular condition. In the above example, therefore, you would not be expected to give details about the initial resuscitation and rehydration of the baby. Remember, however, that anaesthetic management should always include immediate preoperative and post-operative care.

*'Describe the **principles** of…'*
As in: 'What are the principles involved in pulse oximetry…'
A 'principle' (in this context a physical principle) is a natural law which forms the basis of the working of a machine. In other words you are being asked to explain how a particular piece of apparatus works.

*'How would you **determine**…?'*
As in: 'How would you determine a patient's fitness for anaesthesia?'
To 'determine' means to find out or to establish precisely. In this example the word implies that there are some precise physical indices that should be identified.

*'How would you **assess**…?'*
As in: 'How would you assess a patient's fitness for anaesthesia?'
To 'assess' means to estimate the size or the quality of a particular subject. The use of 'assess' rather than 'determine' implies that there may be qualitative as well as quantitative indices involved.

The outline answers

All examinations include some questions which by common agreement are idiotic. This even may be your view of some of the examples which are found in this book. If such is the case then the examples should still provide useful practice for the real thing. Each is prefaced with a comment about the topic which attempts to place it in context, to suggest the underlying rationale and to indicate its importance. When you encounter the short answer paper itself it may help focus your answer if you ask yourself what you believe to be the aim of any particular question.

There follows an 'introduction' to the answer. These are not intended to be right or wrong. They are simply examples to indicate how you might engage the examiner's interest by offering, for instance, an overview of the importance of the subject, or by giving a succinct definition of the topic to focus attention on the answer that is to follow.

The notes in this book are not intended to represent complete and perfect answers. Well-informed readers may take issue with some of the statements and will doubtless identify omissions. This should come as no surprise because this is not a textbook of anaesthesia, but is an exam-orientated aid. Most of the answers are presented in the form of bulleted lists with explanations; a format whose purpose is to make the information clear and more accessible. Your answers need not necessarily follow this format although in many cases it would be appropriate for them so to do. Many of the specimen answers do, however, contain substantially more detail than is required for a short written answer. Were you to reproduce them faithfully without further embellishment then you would pass comfortably. In many instances the key points alone would prove sufficient to gain you a '2'. The additional information is also intended to provide a structure on which to base your answers were the question, or a variation of it, to appear in the oral part of the examination, and to allow you to discuss the topic with some confidence.

The 'Marking points' which appear at the bottom of each question clarify the overall objective of the question and emphasise particular aspects that you should expect to cover.

Pharmacology topics

A chapter on pharmacology has been included, although you are more likely to encounter direct questions about anaesthetic drugs in the applied science part of the oral examination. The subject lends itself well to a structured answer which will help to ensure that you do not omit important information. One such template is outlined below. It is offered as one example of several ways in which pharmacology questions can be approached.

Introduction

Definition of the essential nature of the agent in question. For example:

> Propofol is a substituted phenol which is used primarily for the induction of anaesthesia in both adults and children.

Chemistry

More information (if you know it) about the chemistry of the drug. For example:

> Propofol is a substituted stable phenolic compound: 2,6 di-isopropylphenol. It is highly lipid soluble and water insoluble and is presented as either a 1% or 2% emulsion in soya bean oil. Other constituents include egg phosphatide and glycerol. It is a weak organic acid with a pK_a of 11.

Mechanism of action

Outline the main action of the agent. For example:

> In common with many other drugs which produce general anaesthesia the mechanism of action is not wholly clear. It may enhance inhibitory synaptic transmission by activation the Cl^- channel on the ß$_1$ subunit of the GABA receptor. It also inhibits the NMDA subtype of glutamate receptor.

Uses

Describe the main uses of the drug. For example:

> Propofol is used for the induction of anaesthesia, for the maintenance of anaesthesia, for sedation in intensive care, and for sedation during procedures under local or regional anaesthesia. It has an anti-emetic action and is sometimes given by very low dose infusion to chemotherapy patients.

Dose and routes of administration

Give a brief account. For example:

> The drug is only used intravenously. A dose of 1–2 mg kg^{-1} will usually induce anaesthesia in adults. Children may require twice as much.

Onset and duration of action

Make a brief comment. Quote the half-life if you know it. For example:

> An induction dose of propofol will lead to rapid loss of consciousness (within a minute). Rapid redistribution to peripheral tissues (distribution half-life is 1–2 minutes) leads to rapid awakening. The elimination half-life is quoted at between 5 and 12 hours.

Main effects and side effects

Use a systems approach, but begin with the main system which the drug affects. Do not begin a description of a neuromuscular blocker with an account of its effect on the gravid uterus. List important side effects before trivial ones. To do otherwise may persuade the examiner that you have simply learned everything by rote without applying any sense of priority to the information. For example:

> Propofol has the following effects: CNS – depression and induction of anaesthesia. May be associated with excitatory effects and dystonic movements, particularly in children. The EEG displays initial activation followed by dose-related depression. The data sheet states that it is contraindicated in patients with epilepsy, although this has been disputed. CVS – systemic vascular resistance falls and it is unusual to see compensatory tachycardia. A relative bradycardia is common and the blood pressure will fall. Propofol is a myocardial depressant. RS – propofol is a respiratory depressant which also suppresses laryngeal reflexes. GIT – the drug is anti-emetic. Other specific problems include pain on injection and the risk of hyperlipidaemia in intensive care patients on prolonged infusions.

Pharmacokinetics

Large quantities of pharmacokinetic information relating to clearance and volume of distribution and so on are not strictly necessary. Moreover it is unlikely to be information which most examiners themselves will have readily to mind. It is, however, worth citing a particular detail if it has clinical relevance. The pK_a of local anaesthetic drugs is one example. In respect of metabolism and elimination, lipid-soluble drugs will cross lipid membranes such as the blood–brain barrier and the placenta, and will undergo metabolism in the liver. Water-soluble drugs do not cross such membranes and are eliminated renally. Details of metabolites are important only if they are potentially toxic (halothane) or pharmacologically active (morphine). For example:

> Propofol is highly protein bound (98%) and has a large volume of distribution (4 L kg^{-1}). Distribution half-life is 1–2 minutes and elimination half-life 5–12 hours. Metabolism is mainly hepatic with the production of inactive metabolites and conjugates which are excreted in urine.

Miscellaneous

For completeness it is worth citing information that is of specific relevance to anaesthetic practice. For example:

> Propofol is not a trigger for malignant hyperpyrexia and it may also be used safely in patients with porphyria. It does not release histamine and adverse reactions are very rare.