# UNIVERSITY COLLEGE LONDON

University of London

## EXAMINATION FOR INTERNAL STUDENTS

For The Following Qualification:-

*M.B.,B.S.*

**MBBS: Written Paper (year 2)**

| | | |
|---|---|---|
| COURSE CODE | : | **MBBS2003** |
| DATE | : | **16-MAY-05** |
| TIME | : | **14.30** |
| TIME ALLOWED | : | **3 Hours** |

05-N0157-3-350



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Royal Free and University College Medical School

# Phase 1, Year 2: May 2005



## Modified Essay Question paper

**3 hours are allowed for this paper.**

- **You should attempt all 20 questions, answering each one on the page for that question** – if you need more space, continue on the reverse of the page for that question only. Pages will be separated and given to different people to mark.
- **You are provided with a sheet of bar-code labels. Place one label in the space marked on the page for each question.**
- **You should read through all parts of each question before you begin to answer it – the number of marks for each part question is shown.**
- **Most questions are linked to clinical scenarios. Information about the patient is shown at the top of each question; this may differ from one question to another, as additional information is relevant to the question being asked. Some questions do not refer to any specific patient.**
- **You should allow no more than about 8 minutes for each question.**

**This question paper must not be removed from the examination room.**

Place your bar code label here

**Question 1**

Ms D aged 15 presents with a severe headache and double vision. On attempting to look straight ahead her right eye deviates towards her nose. She is unable to move her right eye to the right.

a) Name the extraocular muscle and nerve responsible for moving the eye medially (2 marks)

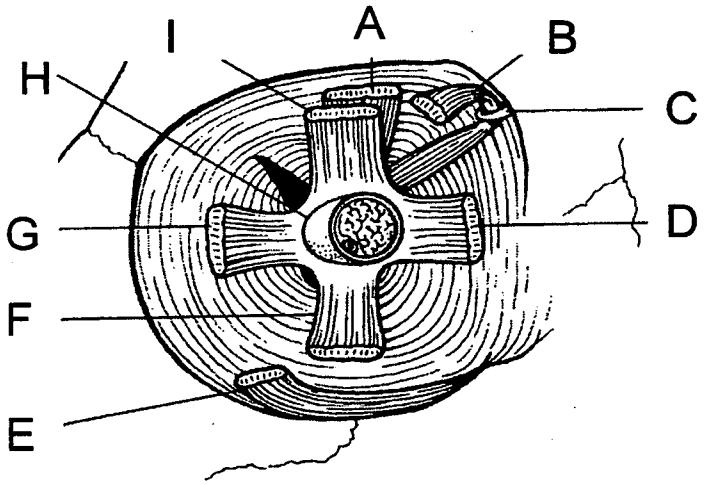
b) Name the extraocular muscle and nerve responsible for moving the eye laterally (2 marks)

Ms D has been vomiting, has a temperature of 39°C and has an angry infected spot on her right cheek. You suspect that bacteria have travelled via a venous route from the spot to produce an intracranial infection.

c) Describe the venous route linking the anterior region of the face with the cranial cavity. (3 marks)

d) How could Ms D's ocular signs be explained by an intracranial venous infection? (2 marks)

e) Label this diagram of the right orbit and the extraocular muscles by writing the appropriate labels in the table below. (9 marks)




| | |
|---|---|
| A | |
| B | |
| C | |
| D | |
| E | |
| F | |
| G | |
| H | |
| I | |

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## Question 2

Mr X is elderly and has suffered from hearing loss for several years. He wears a hearing aid and is able to lip read a little.

a) List five tactics you might use to improve communication with him in light of his hearing impairment. (10 marks)

b) In general, what things can you do to ensure he understands? List five ways you can check understanding. (10 marks)

Place your bar code label here

**Question 3**

A patient goes to his GP with diarrhoea and abdominal pain. A stool sample was taken and an organism isolated and identified. 6 weeks later the patient developed progressive ascending paralysis.

a) What is the likely neurological diagnosis? (4 marks)

b) Infection with which organisms can give rise to this condition? (6 marks)

c) In this particular case, what bacterial organism is the likely cause of the gastrointesinal symptoms? (4 marks)

d) What is thought to be the pathogenic mechanism for the neurological disorder? (4 marks)



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**Question 4**

Mr DT is a 63 year old man who has recently been diagnosed with colon cancer.

a) How might he have presented to his GP? (4 marks)

b) What histological type of tumour is this cancer likely to be? (1 mark)

c) Outline the two possible pathogenetic mechanisms that lead to the development of colon cancer. (6 marks)

d) List 3 dietary risk factors for the development of colonic carcinoma. (3 marks)

e) Give the key macroscopical and microscopical features that help distinguish a benign from a malignant tumour. (4 marks)

f) What do the terms 'grade' and 'stage' mean when applied to a malignant tumour? (2 marks)

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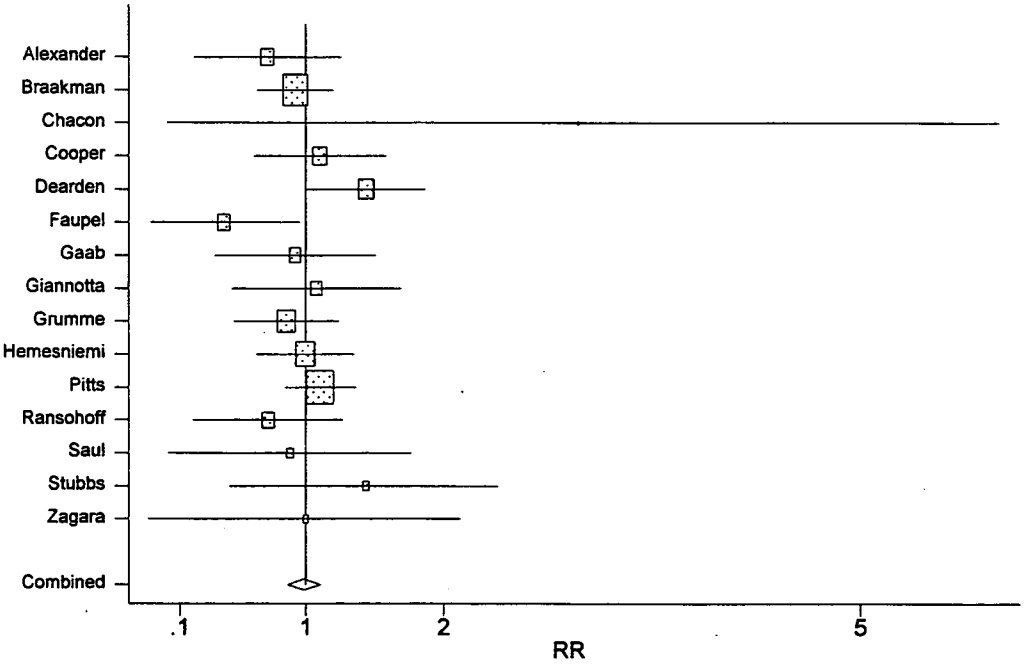
**Question 5**

The graph below shows a "Forest plot", displaying results of a meta-analysis for the effects of corticosteroids in preventing death in people with acute traumatic brain injury. The lines represent estimates of Relative Risk (RR) with their 95% confidence intervals.




a) Explain why meta-analysis is carried out when several studies have been conducted on a given research topic. (6 marks)

b) Explain what the diamond labelled "Combined" is telling us. (8 marks)

c) What is meant by "heterogeneity" in a systematic review? Does the Forest plot suggest any evidence of this? (6 marks)



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**Question 6**

Mrs C is a 76 year old woman who was diagnosed with Parkinson's disease when she was 67. Her doctor prescribed her benzatropine. This helped initially, but as her condition and mobility deteriorated she was switched to capsules containing a combination of L-DOPA and carbidopa. This treatment made a big difference and allowed Mrs C to lead a normal life for a further 5 years.

a) What receptors does benzatropine block and why is it effective? (4 marks)

b) Why is L-DOPA a useful treatment for Parkinson's disease? (8 marks)

c) Why is L-DOPA given together with carbidopa? (4 marks)

d) Why are dopamine receptor agonists e.g. bromocriptine and apomorphine used when L-DOPA action is lost? (4 marks)

Place your bar code label here

**Question 7**
An individual suffering from epilepsy has taken an overdose of paracetamol.

a) What is the important toxic action of paracetamol? What visible symptoms are likely? (5 marks)

b) Is this toxicity simply proportional to the dose taken? How soon will this action become evident? (5 marks)

c) How might the situation impact on the immediate and continuing control of the epilepsy? (2 marks)

d) What steps can be taken to minimize the toxicity? (5 marks)

e) How might drugs taken for epilepsy affect the toxicity? (3 marks)



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**Question 8**

Paul is a 55 year-old man who suddenly develops difficulties speaking – he can emit only grunts and he has paralysis of his right side of the lower face and right arm. Three days later, he regains some speech and he is alert and attentive and he has normal vision. His speech is now slow (less than a dozen words per minute) and requires much effort. The words are poorly articulated and are mostly nouns and verbs. Speech comprehension is good when tested with simple commands or with yes/no answers. On the right side, arm weakness remains but the biceps muscle stretch reflex is increased.

a) Name and briefly describe which speech function is impaired and which is intact? (4 marks)

b) Name and briefly describe the locations of the damaged brain speech region and the intact brain speech region. (4 marks)

c) Damage to which brain region is responsible for the right arm weakness? (2 marks)

d) What mechanism is thought to underlie the increased biceps muscle stretch reflex ? (4 marks)

e) These symptoms are usually the result of a cerebrovascular incident. Where is this likely to have occurred and why are vision and leg movements unaffected? (6 marks)

Place your bar code label here

**Question 9**

This question does not concern any particular patient

a) State the two main classes of genes associated with cancer and describe how they differ. (4 marks)

b) Explain what is meant by each of the following terms and give one example of each (2 marks each)

haploinsufficiency,

dominant negative protein

familial cancer

c) Describe the molecular mechanisms that may give rise to clinical diversity in histologically similar tumours. (4 marks)

d) Which genomic technology can be used for more informative and reliable classification? (2 marks)

e) What does this technology measure? (2 marks)

Place your bar code label here

**Question 10**

Following orchidectomy (removal of testicle) a patient with stage 3 testicular cancer is administered 3 courses of BEP. BEP is a combination of 3 chemotherapeutic agents Bleomycin, Etoposide & Cisplatin which has proved to be highly beneficial for the prognosis of late stage testicular cancer.

a) What are the basic principles behind the combination of chemotherapeutic drugs to treat cancers? (10 marks)

b) Explain the mode of action of each of these drugs: (3 marks each)

Bleomycin

Etoposide

Cisplatin.

Place your bar code label here

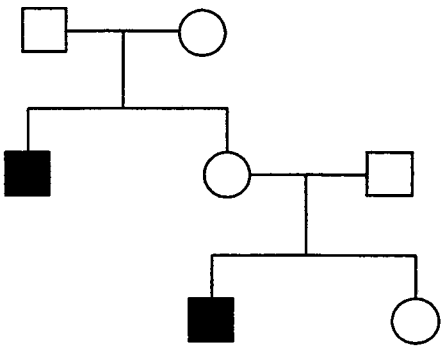
**Question 11**

The disease X linked ichthyosis is caused by mutation in the gene STS (steroid sulphatase). More than 90% of new mutations in this gene are caused by deletions.

a) What types of mutations other than deletions are possible in human genes? (4 marks)

b) In almost all cases, the same large deletion of the gene and its flanking sequences has occurred. Why might this be? (4 marks)

The diagram below shows a family with two members affected with this disease.



c) If individuals $II_2$ and $II_3$ were to have another child, what would be the risk that this child might have the disease? (4 marks)

d) If individual $III_2$ were to have a child, what is the risk that it might be affected with this genetic disease? (4 marks)

e) Describe how you would design a molecular test which would be of benefit to this family. (4 marks)

**Question 12**

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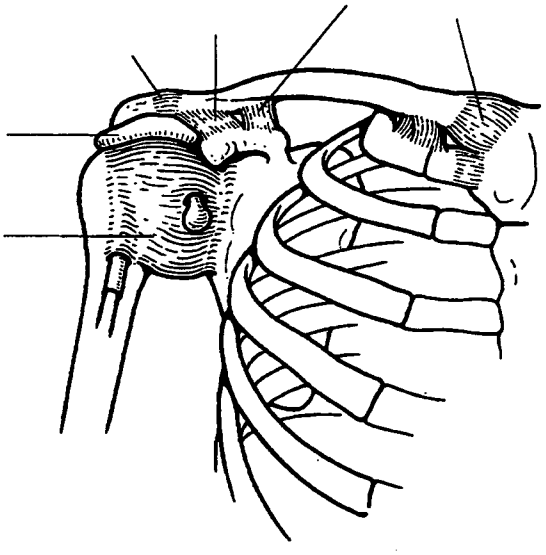
Mr Jones aged 24 has fallen on his outstretched hand. He complains of shoulder pain and an inability to move his shoulder.

a) Label this diagram of the shoulder (6 marks)



b) Name the major source of arterial blood to the surgical neck of the humerus (1 mark)

c) Give the name and site of insertion on the humerus of the muscle responsible for internal (medial) rotation of the glenohumeral joint (2 marks)

d) In which direction does the humerus most commonly dislocate (1 mark)

e) Name the nerve at risk with dislocation of the shoulder. Where would you test sensation if you suspected damage to this nerve? (2 marks)

f) Which tendon can exert sufficient force to tear the superior part of the glenoidal labrum ? (1 mark)

g) Name the most lateral bony point palpable in a normal shoulder (1 mark)

h) Under which structures does the supraspinatus pass just before it inserts on the humerus? (3 marks)



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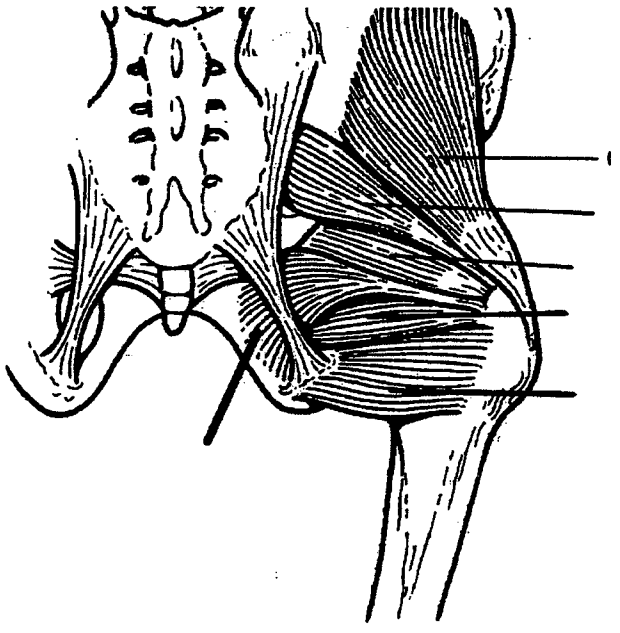
**Question 13**

Ms. Jones aged 12 is given an injection into her left buttock. She immediately begins to limp and complains of a sharp pain that shoots down her leg to the lateral aspect of her foot.

a) Which structure has been accidentally damaged? (1 mark)

b) Where is the 'safe area' of the buttock where injections are usually placed to avoid damage to this structure? (2 marks)

c) Label this diagram of the muscles of the buttock (6 marks)



d) Which of the muscles in the above diagram is responsible for stabilising the pelvis during the swing phase of gait? (1 mark)

e) Name the clinical sign that indicates paralysis of the above muscle and briefly describe how gait is affected (3 marks)

f) Name 4 arteries that contribute to the cruciate anastomosis of the gluteal region (4 marks)

**Question 14**

Place your bar code label here

Mrs B, aged 30, complains of low abdominal ache associated with a vaginal discharge.

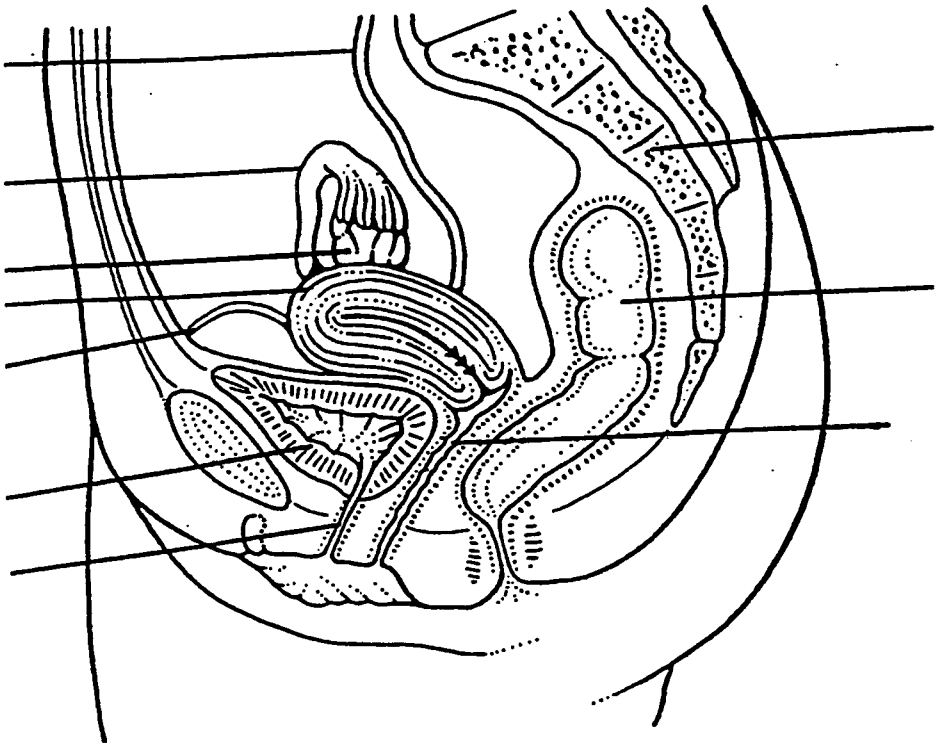
a) At what point is the female peritoneal cavity potentially in contact with the exterior? (2 marks)

b) Via which nerves is the sensation of pain from the pelvic viscera transmitted? (3 marks)

c) Into which lymph nodes does lymph drain from the uterine fundus? (1 mark)

d) Into which lymph nodes does lymph drain from the uterine cervix? (1 mark)

Label this diagram of the female pelvis (10 marks)





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**Question 15**

Mrs JA is a 68 year old retired catering manager who lives in a fifth floor council flat with her husband, who has walking difficulties following a stroke. She has recently been diagnosed with type 2 diabetes and is considerably overweight.

a) Outline the range of professionals and agencies that could be involved in the treatment, care and support of Mrs JA. (10 marks)

b) Describe the important self care and management practices Mrs JA needs to follow to control her diabetes. (10 marks).

Place your bar code label here

**Question 16**

Peter C is 10; he has recently been diagnosed with diabetes. Type 1 diabetes mellitus results from defects in the structure and/or function of the endocrine pancreas.

a) Complete the following table to define the 3 major hormonal products of the islets of Langerhans and the specific cell types in which each of these 3 hormones is synthesised (2 marks for each complete, correct row)

| Cell type | Major hormonal product |
|---|---|
| | |
| | |
| | |

b) Approximately what proportion (by mass) of the normal, healthy pancreas is endocrine tissue? (2 marks)

c) Sketch the structure of insulin (4 marks)

d) List 3 factors, *other than* an increase in the plasma glucose concentration, that can stimulate the synthesis and secretion of insulin in the normal, healthy pancreas (3 marks)

e) Explain briefly how sulphonylureas can be used to stimulate pancreatic insulin secretion (5 marks)

Place your bar code label here

**Question 17**

**This question does not concern any particular patient**

Comment on psychological considerations underlying medical decision making
(20 marks)

Place your bar code label here

**Question 18**

**This question does not concern any particular patient**

Outline at least one of the psychological factors in the perception of pain
(20 marks)

**Question 19**

Place your bar code label here

**This question does not concern any particular patient**

Explain the difference between impairment, disability and handicap as defined by the International Classification of Impairments, Disabilities or Handicaps (ICIDH). In what way has this classification been criticised? (20 marks)

Place your bar code label here

**Question 20**

A 36 year-old man is referred to the endocrine clinic of the local DGH by his GP. The patient has an increased blood pressure (170/120), muscle weakness, and reports that he doesn't seem to be peeing as much as he did several months ago. A blood sample obtained at the endocrine clinic show that the patient's plasma sodium concentration is within the normal range, but the plasma potassium concentration is suppressed (2.8 mmol/L). The patient is admitted for 24 hours observation. During that time, the patient only drinks 160 mL of fluid and produces 130 mL of urine.

a) How would you expect the plasma concentrations of AVP in this patient to compare to those in a healthy, 36-year old man? Justify your answer. (3 marks)

b) What is the most likely endocrine cause of the hypokalemia and anti-natriuresis in this patient? (2 marks)

c) Subsequent blood tests find that the patient's plasma renin activity is decreased, as is the concentration of aldosterone. Suggest an alternative cause of the hypokalemia and hypervolemic hypertension? (2 marks)

d) Which enzyme is likely to be defective in this patient? (2 marks)

e) What is the normal function of this enzyme? (2 marks)

f) In view of the patient's age, it seems unlikely that he would have inherited a mutation in this enzyme. (This is confirmed by sequencing the candidate gene from one of the patient's blood samples). Suggest how the enzyme might have become inhibited in this patient. (1 mark)

g) Give another clinically relevant example of an enzyme involved in target cell metabolism of steroid hormones, identifying a clinical condition in which your example has been implicated. (3 marks)



**END OF PAPER**