The Hong Kong College of Anaesthesiologists

Intermediate Fellowship Examination

Written Paper in Pharmacology

21 July 2023 (Friday)

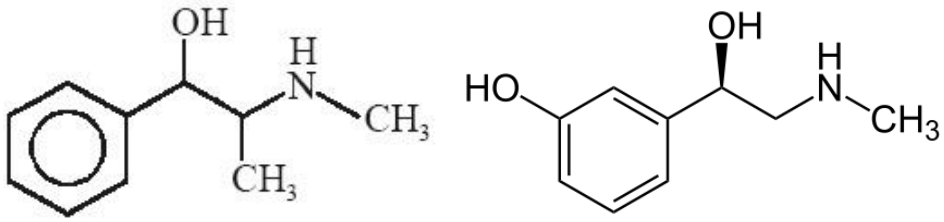
14:00 - 16:00 hours

Instructions:

a. There are twelve pre-labelled answer books. Please make sure you answer the questions in the respective answer book.
b. Write your candidate number on the cover of each answer book.
c. Use ink or ball-point pen.
d. Answer ALL questions. They are worth equal marks and you should spend approximately **ten minutes** for each question. For questions with multiple parts, allocation of marks is indicated in the brackets.

1. The structures for ephedrine (left) and drug X (right) are given below:

Ephedrine **Drug X**



(a) Explain the term structure activity relationship (10%).

(b) Based on the structure-activity relationships, describe the similarities and differences in pharmacokinetic and pharmacodynamic properties of drug X compared with ephedrine (90%).

2. Describe the pharmacology of suxamethonium under the following headings:

(a) mechanism of action, including a description of the appropriate receptor (40%);

(b) pharmacokinetic properties (30%); and

(c) adverse effects (30%).

3. Empagliflozin and rosiglitazone are drugs used for the treatment of diabetes mellitus. For each drug, describe the mechanism(s) of action (40%), and important adverse effects (40%). Explain the potential mechanism for adverse cardiovascular effect for rosiglitazone (20%).

4. Compare and contrast the pharmacodynamic properties of dexmedetomidine and propofol.

5. Classify, with example, the drugs that affect uterine tone (40%). Outline the adverse effect of these agents (60%).

6. **Describe the dose and mechanisms leading to paracetamol toxicity (75%). Outline the conditions that predispose to paracetamol toxicity (25%).**
   (Note: treatment for paracetamol toxicity is not required)

7. **(a) Outline the mechanism of action of corticosteroid in the management of asthma (40%).**
   (b) List four side effects associated with long term use of corticosteroid and outline their underlying mechanisms (60%).

8. **(a) Define drug tolerance (20%).**
   (b) Draw a dose-response curve to illustrate the phenomenon of drug tolerance (20%).
   (c) Describe THREE possible pharmacodynamic mechanisms by which drug tolerance may develop (60%).

9. **Describe and use examples to illustrate the clinical uses of opioids.**

10. **Outline the chemistry of soda lime and its use in anaesthesia (50%). Describe the interaction of soda lime with sevoflurane and desflurane (50%).**

11. **A new "Aspiration Risk Test" is used to predict the risk of aspiration with a sensitivity of 86% and specificity of 70%.**
    (a) Define the terms "sensitivity", "specificity", "positive predictive value" and "negative predictive value". Explain how they can be obtained in a 2x2 table (50%).
    (b) How will the incidence of aspiration affect performance of this test in terms of predicting the aspiration risk of an individual (50%)?

12. **Describe the factors that may influence the plasma concentration of local anaesthetics after a single bolus of local anaesthetics for a peripheral nerve block (50%). How would term pregnancy affect the plasma concentration (50%)?**

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