KENYATTA UNIVERSITY

SUPPLEMENTARY/SPECIAL EXAMINATION 2020/2021

EXAMINATION FOR THE DEGREE OF BACHELOR OF PHARMACY

PPB 310: PHARMACOLOGY 1

August –September 2021 **TIME: 3Hours**

INSTRUCTIONS:

This examination consists of THREE sections; A, B and C.

Answer ALL questions.

Answer each section in a separate answer booklet.

SECTION A PPB 311 BASIC CONCEPTS IN PHARMACOLOGY

1. A patient is brought to the emergency department due to drug overdose causing severe nausea and vomiting. Which of the following routes of administration for administering the antidote will offer fastest relief for the drug overdose?

A. Intramuscular.

B. Subcutaneous.

C. Transdermal.

D. Oral.

E. Intravenous.

2. Which one of the following processes is best suited for permeation of very large protein molecules into cells?

A. Aqueous diffusion

B. Paracellular diffusion

C. Endocytosis

D. Lipid diffusion

E. Special carrier transport

3. Which one best describes a drug's potency?

A. Capacity to induce a functional change in the receptor

B. Ability to induce a conformational change in a receptor

C. Measure of how much of a drug is required to elicit a given response

D. Maximal response produced by a drug once it has bound to its receptor

E. Measure of how much of a drug is required to elicit a maximal response

4. Which statement about the distribution of drugs to specific tissues is CORRECT?

A. Distribution is independent of blood flow

B. Distribution is independent of the solubility of the drug in that tissue

C. Distribution depends on free drug concentration gradient between blood and tissue

D. Distribution is increased for drugs that are strongly bound to plasma proteins

E Distribution has no effect on the half-life of the drug

5. Which one is not a phase II drug metabolizing enzyme?

A. N-acetyl transferase 2 (NAT-2)

B. Uridine 5'-diphospho- (UDP) glucuronosyltransferase 1A1 (UGT1A1)

C. Thiopurine S-Methyltransferase

D. Sulfotransferase (SULT)

E. Dihydropyrimidine dehydrogenase (DPD)

6. The following receptor has an intrinsic ion channel:

A. Histamine H_1 receptor

B. Histamine H_2 receptor

C. Adrenergic alfa receptor

D. Adrenergic beta receptor

E. GABA-benzodiazepine receptor

7. The therapeutic index of a drug is a measure of its:

A. Safety

B. Potency

C. Efficacy

D. Dose variability

E. Toxicity

8. Which of the following factors is likely to increase the duration of action of a drug that is metabolized by CYP3A4 in the liver?

A. Chronic administration of phenobarbital

B. Chronic therapy with cimetidine

C. Displacement from protein binding sites by warfarin

D. Increased cardiac output

E.Chronic administration of rifampicin

9. Which one best describes drug specificity?

A. The range of actions produced by a drug

B. Ability to bind with the receptor

C. Capacity to induce a functional change in the receptor

D. Capacity to occupy a receptor and block it

E. Conformational change in a receptor

10. Which drug has a low volume of distribution?

A. Digoxin

B. Heparin

C. Gentamicin

D. Morphine

E. Streptomycin

11. Define the following terms:

A. LD_{50} (1 mark)

B. Bioequivalence (1 mark)

C. Pharmacodynamics (1 mark)

D. Therapeutic Index (1 mark)

11. List the constituents of the blood-brain barrier (BBB) (1.5 marks)

12. Outline the metabolism pathways by which acetaminophen is metabolized in an adult

i) if normal doses are taken (2 marks)

ii) if an overdose is taken. (3 marks)

13. Outline THREE factorsthat determine the bioavailability of a drug (3 marks)

14. A 30-year-old man is brought to the emergency department in a deep coma and his friends state that he self-administered a large dose of morphine 6 h earlier. An immediate blood analysis shows a morphine blood level of 0.25 mg/L. Assuming that the volume of distribution, Vd of morphine in this patient is 200 L and the half-life is 3 hours, how much morphine did the patient inject 6 hours earlier?

(3 marks)

15. Regarding zero-order kinetics:

i) Using a diagram, describe zero-order kinetics of metabolism (4 marks)

ii) List THREE drugs that follow zero-order kinetics (1.5 marks)

16. Explain FOUR transmembrane signalling methods by which drug-receptor interactions exert their effects. (8 marks)

SECTION B PPB 312 DRUG DEVELOPMENT AND DISCOVERY

1. The correct sequence in the stepsinvolved in drug reaching the consumers is:-
   A. Drug discovery-clinical trial-preclinical animal testing
   B. Drug discovery- preclinical animal testing-clinical trial
   C. Clinical trial- preclinical animal testing-drug discovery
   D. Clinical trial-drug discovery- preclinical animal testing
   E. Preclinical trials-drug discovery-commercialization.
2. The primary purpose of phase I clinical trial is to….
   A. select a lead compound from a lead series
   B. identify target population
   C. establish safety in human
   D. test whether the proposed drug work
   E. establish efficacy

3. Which of the following is not deemed essential for a company taking forward a candidate drug for a clinical trial?

A. Ability to manufacture the candidate drug on a large scale
B. Clear patent position on chemical series
C. Defined biomarkers readout for clinical evaluation
D. Discernible efficacy in an appropriate *in vivo* model
E. Obtaining regulatory approval by Pharmacy and Poisons Board.

4. Which of the following areas of study is not part of preclinical trials?

A. Toxicology
B. Drug metabolism
C. Pharmacology
D. Structure-activity relationships
E. Efficacy

5). Which of the following terms is used to describe the dose of a drug required to produce a measurable effect in 50% of the animals tested?

A. LD_{50}
B. LD_1
C. ED_{50}
D. ED_{99}
E. $ED_{100/50}$

6. What term is applied to a drug that is effective against a relatively rare medical problem?

A. New chemical entity
B. Orphan drug
C. Lead compound
D. Parent drug
E. Active drug

7. What do you mean by a randomized design?

A. The subjects do not know which study treatment they receive
B. Patients injected with placebo and active doses
C. assigning subjects either for placebo or active dose
D. Signed document of the recruited patient for the clinical trial procedures

E. everybody in the research knows what is going on

8. What is meant by a blind subject?

A. The subjects do not know which study treatment they receive

B. Patients injected with placebo and active doses

C. Fake treatment

D. Signed document of the recruited patient for the clinical trial procedures

E. The patients are all made not to see the administration of the drugs

9). Which one of the following is the last step of a clinical trial process?

A. Investigator selection

B. Patient recruitment

C. Statistical Analysis

D. Data filed and registration

E. Announcement by the cabinet secretary for health.

10.) How many people will be selected for the phase I trial?

A. The whole market will be under surveillance

B. 300-3000 people

C. 20-300 people

D. 20-50 people

E. under 10 people

11.Discuss the pharmaceutical value chain under the following heading

A) Drug discovery (10 marks)

B) Animal studies (10 marks)

C) Clinical trials (10 marks)

SECTION C PPB 313 AUTOCOIDS, PAIN AND INFLAMMATION

1. A patient presents with a history of frequent and severe migraineheadaches. When we give sumatriptan forabortive therapy which of the following chemical mediators is it acting on?

A. Histamine

B. PGF_2

C. Prostacyclin

D. Serotonin

E. Thromboxane A_2

2. Which of the following drugs is useful in NSAID-induced gastrointestinal ulcerations?

   A. Celecoxib

   B. Cimetidine

   C. Diclofenac

   D. Misoprostol

   E. Diphenhydramine

3. Which of the following enzymes or processes is the main target of corticosteroids when they are given at pharmacologic doses?

   A. Cyclooxygenases (COX-1 and -2)

   B. Histidine decarboxylase

   C. 5'-lipoxygenase

   D. Phospholipase A_2

   E. Xanthine oxidase

4. DMARDs are often turned to for managing rheumatoid arthritis that is not controlled adequately with NSAIDs. Which of the following statements best summarizes how those drugs differ from a typical NSAID?

   A. Activate the immune system to neutralize inflammatory mediators

   B. Are primary therapies for gouty arthritis

   C. Are remarkably free from serious toxicities

   D. Provide much quicker relief of arthritis signs, symptoms

   E. Slow and stop symptoms in rheumatoid arthritis

5. We have a patient with drug-induced hyperuricemia. Our pharmacologic approach for managing this will be to inhibit uric acid synthesis. Which of the following enzymes do we want to target?

   A. 5'-Lipoxygenase

   B. Cyclooxygenase 1

   C. Cyclooxygenase 2

   D. Phospholipase A_2

   E. Xanthine oxidase

6. A new born has blood gas and hemodynamic problems because of a patent ductus arteriosus. Which of the following drugs would be administered in an attempt to close the ductus?
   A. Cimetidine
   B. Diphenhydramine
   C. Indomethacin
   D. Misoprostol
   E. Prostaglandin E_1

7. Which one of the following lacks anti-inflammatory action:
   A. Paracetamol
   B. Ibuprofen
   C. Diclofenac
   D. Meloxicam
   E. Piroxicam

8. The drug that can directly release histamine from mast cells without involving antigen-antibody reaction is:
   A. Aspirin
   B. Procaine
   C. Morphine
   D. Cetrizine
   E. Sulfadiazine

9. Which one of the following is **NOT** a G protein coupled receptor:
   A. 5-HT_{1A}
   B. 5-HT_{1B}
   C. 5-HT_2
   D. 5-HT_3
   E. 5-HT_4

10. Which of the following drugs is a leukotriene D4 receptor (LTD4) blocker?
   A. Ibuprofen
   B. Zileuton
   C. Zafirleukast
   D. Diclofenac
   E. Meloxicam

11. Contrast the pharmacological properties of the following (6 marks)

i) Chlorpheniramine and Loratidine

ii) Celecoxib and Indomethacin

iii) Meloxicam and Aspirin

12. Describe the mechanism of action of the following drugs: (10 marks)

i) Probenecid

ii) Methotrexate

iii) Paracetamol

iv) Colchicine

v) Allopurinol

13. List the following drugs in order of duration of action. (1 mark)

Prednisolone, Dexamethasone, Hydrocortisone

14. List THREE adverse effects of prolonged corticosteroid use. (3 marks)

15. List TWO clinical indications for antihistamines. (2 marks)

16. List TWO adverse of prostaglandins. (2 marks)

17. Discuss THREE major adverse effects associated with the use of NSAIDs (6 marks)