جامعة طنطا
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Tanta University
Faculty Of Pharmacy
Department Of Pharmaceutical Technology

Examination For Second Year Pharmacy Students

Course Title: Biopharmaceutics

Date: 19/6/2014	**Term : Second**	**Total Marks: 150** **Total pages: 10**	**Time allowed:** **2 hours**

You are provided with **100 MCQs** (150 marks) together with answers for each question. You need to select the best answer for each question and blacken the corresponding square in the provided answer sheet.

Answer sheet

No	A	B	C	D	E	No	A	B	C	D	E	No	A	B	C	D	E
1						35						69					
2						36						70					
3						37						71					
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32						66						100					
33						67											
34						68											

Questions 1-4 can be answered after reading the following case:
A pharmaceutical company is planning to formulate 4 drugs in the form of oral controlled release formulations. The drugs included drug I which is weakly acidic with a pKa = 3, drug II is subject to first pass effect and is non ionized throughout the GIT, drug III is absorbed by active transport mechanism and drug IV is mainly non-ionized throughout the GIT and is not substrate for liver enzymes.

1- Drug I can be formulated as .....
a- non floating matrix tablet b- floating matrix tablet c- pulsetile system
d- all of them are suitable

2- Drug II can be formulated as .....
a- non floating matrix tablet b- floating matrix tablet c- pulsetile system
d- all of them are suitable

3- Drug III can be formulated as .....
a- non floating matrix tablet b- floating matrix tablet c- pulsetile system
d- all of them are suitable

4- Drug IV can be formulated as .....
a- non floating matrix tablet b- floating matrix tablet c- pulsetile system
d- all of them are suitable

5- In persons with normal liver and kidney functions, the body fluid distribution favors drug transfer from the plasma to the intracellular compartment
a- true b- false

6- knowing that felodipine is subject to extensive first pass metabolism. The bioavailability of such drug can be ..... if taken with food.
a- increased b- decreased c- unaffected
d- dependent on the type of food

Questions 7-9 can be answered after reading the following case:
Carbamazepine has high partition coefficient with good diffusivity through the cell membrane. It is metabolized by the liver.

7- The main factor affecting its distribution is half life of carbamazepine is ...
(a) blood flow (b) membrane permeability (c) both a and b

8- In patient with congestive heart failure, the distribution half life of carbamazepine will decrease.
(a) True (b) False

9- The elimination rate of carbamazepine is expected to be increased in the patient in question 8.
(a) True (b) False

10- The factors affecting drug transfer from the plasma to tissues include .....
(a) pH of GIT (b) dissolution rate. (c) Molecular size. (d) Both a and b.

11- The transfer of penicillin from the plasma to brain is limited by.....
(a) cardiac output (b) molecular size
(c) dissolution rate. (d) membrane permeability.

12- Penicillin can be transferred through the BBB at higher rate in case of .....
a- exercise b- liver disease c- meningitis d- renal disease.

13- The reason of your answer in question 12 is that case can lead to .....
a- increased permeability of the BBB b- increased blood flow
c- reduced metabolism d- reduced elimination rate

14- The rate limiting factor in transfer of iodine from the plasma to thyroid is .....
(a) Concentration gradient. (b) Blood flow
(c) membrane permeability d- non of them and the answer is .....

Questions 15-19 can be answered after reading the following case:

Drug A is very lipophilic small molecular weight drug. It is classified as general anesthetic.

15- The onset of action of drug A is expected to be .....
a- slow b- rapid

16- The reason of your answer in question 15 is .....
a- poor membrane permeability of the drug b- low tissue affinity
c- high blood flow to the brain d- non of them

17- The duration of action of drug is expected to be very short.
a- true b- false

18- The elimination half life of drug A is expected to be very short
a- true b- false

19- The reason for your answer in question 18 can be due to .....
a- high renal blood flow b- high affinity to the brain
c- low affinity to the brain d- low blood flow to fatty tissues

20- Accidental intake of large dose of acetaminophen can lead to severe hepatotoxicity. This can be due to .....
a- increased hepatic metabolism b- increased blood flow to the liver
c- irreversible binding of the metabolite to liver protein
d- reversible protein binding

Questions 21-24 can be answered after reading the following case:

Drugs A, B and C are reversibly bound to plasma protein. Drug A is excreted by glomerular filtration after oxidation. Drug B is excreted unchanged by active tubular secretion. Drug C is excreted unchanged in the urine and is known to have nephrotoxic effect.

21- Drug A will be characterized by reduced clearance
a- true b- false

22- Drug B will be expected to have long duration of action.
a- true b- false

23- The reason for your answer in question 22 is based on .....
a- protein binding which maintain the drug for long period of time.
b- slow metabolism c- rapid metabolism
d- easy availability of the drug for carrier mediated secretion

24- Administration of drug C with furosemide (diuretic) was associated with acute nephrotoxicity. This can be due to .....
a- forced diuresis b- displacement from plasma protein binding
c- increased hepatic metabolism d- both a and b

Questions 25-31 can be answered after reading the following case:

A patient with advanced liver disease is suffering from hypoalbuminemia and portal hypertension

25- If the above patient was treated with phenytoin, the patient would suffer from the toxic effects of the drug.
a- True b- False

26- The reason for your answer in the above question is .....
a- due to increased concentration of free drug
b- Because the drug is mainly excreted by the kidney.
c- Because the drug will be distributed more to the kidney.
d- None of the above and the reason is .....

27- Assuming that the patient will suffer from the toxic effects of phenytoin the most affected organ(s) is ……..
a- The eye b- The brain c- The skin d- both a and b

28- If the above patient was treated with felodipine. The bioavailability of the drug will be
a- reduced b- increased c- unaffected

29- The reason for the answer in question 28 is based on ……
a- reduced renal clearance b- reduced plasma protein binding
c- reduced presystemic metabolism d- both a and c

30- After eating high amounts of red meat, the above patient is expected to suffer from coma.
a- true b- false

31- The reason for the answer in the above question is based on ……..
a- poor absorption of protein b- male digestion of protein
c- increased permeability of the BBB d- non of them and the answer is ….

32- If felodipine was administered by intravenous route while drinking grape fruit juice its bioavailability is expected to be ……
a- decreased b- increased c- not changed

33- The reason of the answer of question 32 is based on ……. by grape fruit juice
a- inhibition of biotransformation b- killing the intestinal microbial flora
c- inhibition of CYP 3A4 in the intestinal cells d- non of them

34- Unlike most organs the liver receives blood from both venous and arterial sides.
a- true b- false

35- The main aim of phase I biotransformation reaction is to decrease the molecular weight of drugs.
a- true b- false

36- Conjugation is the main reaction that takes place in phase I.
a- true b- false

37- The hydrolysis of suxamethonium by cholinesterase is a biotransformation reaction which takes place in the ……
a- Liver b- Enterocytes c- Kidney d- Plasma

38- Egyptians requires lower doses of isoniazide compared to the Chinese. The reason for this is ……..
a- Egyptians have poor absorption of this drug.
b- The Chinese have better membrane permeability to drugs
c- Egyptians are rapid acetylators d- Egyptians are slow acetylators

Questions 39- 42can be answered using the following options:
(a) Substrate (b) Inducer (c) Inhibitor (d) Blocker

39- Inhibits non-microsomal enzyme
40- Metabolized by microsomal enzymes.
41- Increases the synthesis of CYP 3A4
42- Can exert its action by competition

43- Epileptic patients taking phenobarbitone as treatment are expected to have prolonged half life of any nifedipine which is a substrate to CYP3A4.
a- true b- false

44- Oral administration of antibiotics should be prescribed with multivitamins
a- true b- false

45- The reason for the answer in question 44 is based on .....
a- increased metabolism of vitamins b- increased absorption of vitamins
c- killing of intestinal flora d- reduced consumption of vitamins

46- Glomerular filtration is selective with acidic drugs being filtered faster than basic drugs.
a- True b- False

47- Knowing that the urinary excretion of a given drug is equal to glomerular filtration rate, this means that excretion process of this drug includes .....
a- Glomerular filtration followed by reabsorption.
b- Active secretion c- Glomerular filtration with no reabsorption
(d) None of the above.

48- For penicillin G the urinary excretion is higher than the glomerular filtration rate, this means that excretion process of this drug includes .....
a- Glomerular filtration followed by reabsorption.
b- Active secretion c- Glomerular filtration with no reabsorption
(d) None of the above.

49- In a drug therapy monitoring of penicillin G, its clearance was found to decrease after coadministration with probenicid. The reason for this is .....
a- Probenicid competes with the drug for the transport protein.
b- Probenicid changes the pH of the urine.
c- Probenicid displaces the drug from the plasma protein
d- None of the above.

50- If an acidic drug which has an excretion rate lower than the glomerular filtration was administered with ascorbic acid, this would result in ....
a- increased clearance b- increased metabolism
c- reduced protein binding d- increased elimination half life

51 Drugs having extensive first pass metabolism are those:
a- Extensively metabolized in the liver
b- Go directly to the liver after absorption from GIT
c- Enter hepatic portal blood
d- None of them

52 The formulation design of conventional dosage forms affects mainly:
a- Drug distribution b- Drug absorption
c- Drug elimination d- All of them

53 The output processes in LADME system are the following except:
a- Liberation b- Distribution c- Metabolism d- Excretion

54 The rate of drug absorption affects the following pharmacological parameters:
a- The duration and intensity of action
b- The intensity and onset of action
c- The duration and onset of action
d- The onset, intensity and duration of action

55 The rate-limiting step for absorption of a drug in controlled release products is:
a- The drug solubility b- The product dissolution rate
c- The drug absorption rate d- The gastric emptying rate

56 The bimolecular lipid film of the physiological membranes:
a- Is 5 nm thick
b- Separates intercellular and extracellular fluids
c- Contains saturated and unsaturated amino-acids
d- All of them

57 The proteins in the cell membrane:
a- Form carriers, channels and pumps
b- Control membrane tension
c- Enable polar molecules to cross the membrane
d- All of them

58 Paracellular absorption takes place through:
a- Cell membrane b- Protien channels
c- Tight junctions d- None of them

59 In passive diffusion, the drug is going to be absorbed:
a- Until equilibrium is attained in vivo b- Qualitatively
c- According to concentration gradient d- All of them

60 In Fick's law, *K* means:
a- Surface area of drug particles b- Thickness of the membrane
c- Partition coefficient d- Rate of drug diffusion

61 The driving force for active transport is:
a- The energy b- The carrier
c- The concentration gradient d- None of them

62 Villi and microvilli are abundant largely in:
a- Duodenum b- Jejunum c- Ileum d- Stomach

63 Including large proportion of acacia in a tablet formulation may cause the following:
a- Sustained release effect
b- Decreased drug diffusion coefficient
c- Increased viscosity of the dissolution medium
d- All of them

64 The rate of passive absorption of a poorly soluble weak acid from GIT is enhanced in:
a- Acidic pH of the stomach b- Alkaline pH of the intestine
c- Presence of food d- None of them

65 Chlordane insecticide is highly toxic due to:
a- Rapid absorption b- High concentration gradient
c- Accumulation in the body d- All of them

66 The concentration gradient of drugs may be decreased by:
a- Complexation with tissue components
b- Specific uptake by the tissues
c- Plasma protein binding d- Both (a) and (c)

67 Active transport is involved in:
a- Drug absorption b- Drug renal secretion
c- Drug biliary secretion d- All of them

68 Facilitated diffusion is the following except:
a- Needs energy b- Needs carrier
c- Saturable d- Has competition kinetics

69 P-Glycoprotein (P-Gp) is:
a- At the intestinal brush border b- Efflux transporter
c- Has competition kinetics d- All of them

70 Carrier mediated intestinal transporters are:
a- Responsible for absorption of certain nutrients
b- Influx and efflux transporters
c- Apical and baso-lateral proteins d- All of them

71 Absorption by pinocytosis is the following except:
a- Endocytosis b- Cell drinking
c- Cell eating d- Vesicular transport

72 The cut-off point of partition coefficient (P) corresponding to an optimal trans-epithelial passage of drugs is:
a- 100 b- 300 c- 3000 d- 3500

73 Virtual membrane pH of intestinal mucosa is responsible for:
a- Enhanced absorption of poorly soluble weak acids
b- Enhanced absorption of poorly permeable weak acids
c- Enhanced absorption of poorly permeable weak bases
d- Inhibited absorption of poorly soluble weak bases

74 Thiopentone is more absorbed than barbitone from the stomach due to difference in:
a- pKa b- Log P c- Degree of ionization d- Solubility

75 Ionized drugs may be absorbed by:
a- Convective diffusion b- Active transport
c- Pinocytosis d- All of them

76 The size of drug molecule affects its absorption by:
a- Passive diffusion, convective and paracellular transport
b- Passive diffusion, facilitated diffusion and paracellular transport
c- Passive and facilitated diffusions
d- Carrier mediated transports and paracellular transports

77 The type of charge of drug molecules affect the following mechanisms except:
a- Active transport b- Passive diffusion
c- Facilitated diffusion d- Intestinal transporters

78 Drug solubility and dissolution affect drug bioavailability by changing:
a- The effective drug concentration b- The concentration gradient
c- The drug stability d- All of them

79 The thickness (h) of the diffusion layer in Noyes -Whitney equation depends on:
a- The presence of food in GIT b- The size of the drug molecule
c- The degree of agitation d- The viscosity of GI fluids

80 Particle size reduction may improve the bioavailability of:
a- Penicillin G b- Erythromycin
c- Digoxin d- Class III drugs

81 The (Cs- C) in Noyes-Whitney equation is affected by:
a- Rate of absorption b- Crystal form of the drug
c- Volume of GI fluids d- All of them

82 The hypoglycemic effect of tolbutamide is:
a- Very rapid with dramatic reduction in blood glucose to about 65% to 70% of control levels.
b- Gradual decrease in blood sugar to about 80% of control levels, which is observed about 5 hours after administration
c- Undesirable d- None of them

83 The dissolution of aspirin in gastric fluids is enhanced by:
a- The use of its strong basic salt
b- Particle size reduction
c- The use of its strong acid salt
d- None of the above

84 The bioavailability of the following drugs is improved by the use of their basic salt except:
a- Penicillin V b- Penicillin G c- Barbiturates d- Sulfonamides

85 The bioavailability of chloramphenicol palmitate is enhanced mostly by the following mixture:
a- Polymorphs *A* and *B* (1:2) b- Polymorphs *B* and *C* (1:1)
c- Polymorphs *A* and *C* (2:1) d- Polymorphs *A* and *C* (1:2)

86 The crystalline form of the antibiotic novobiocin is:
a- Highly bioavailable b- Rapidly dissolving
c- Rapidly absorbed d- Therapeutically ineffective

87 The bioavailability of erythromycin is dependent on:
a- Gastric emptying rate b- Its crystal form
c- Dissolution rate d- All of them

88 Liberation of free erythromycin from pro-drug is the rate limiting step in bioavailability of:
a- Erythromycin stearate b- Erythromycin estolate
c- Enteric coated tablets d- Both (a) and (b)

89 Streptomycin form well absorbed complex with:
a- Mucin b- Carboxyl methyl cellulose
c- PEG4000 d- None of them

90 Prednisone interacts with dialkylamides to form:
a- Well absorbed water soluble complex
b- Poorly absorbed water soluble complex
c- Well absorbed lipid soluble complex d- None of them

91 The adsorption of cyanocobolamine on talc:
a- Affects both the rate and extent of drug absorption
b- Affects the rate of drug absorption only
c- Affects the extent of drug absorption only
d- Has no effects on either the rate or extent of drug absorption

92 Diurnal cycle of gastric acidity is:
a- Decreased pH in the evening b-Increased pH in the evening
c- Increased acidity in the morning d- None of them

93 Inter-subject and intra-subject variations in oral drug bioavailability is maximum for:
a- Oral solutions b- Oral suspensions
c- Sustained release tablets d- Conventional tablets

94 A drug substance is considered HIGHLY PERMEABLE when the extent of oral absorption in humans is determined to be:
a- $\geq$ 90% of the dose b- $\geq$ 85% of the dose
c- $\geq$ 95% of the dose d- $\geq$ 80% of the dose

95 The rate limiting step in absorption of class I drugs may be:
a- Drug Dissolution b- Drug permeability
c- Gastric emptying rate d- Both (a) and (c)

Questions 96-100:

a- Class I b- Class II c- Class III d- Class IV

Assign one of the previous drug classes according to BCS to each of the following:

96 The formulation approaches include control of release rate

97 Nanotechnology is the most efficient technique in product development

98 Peptides and proteins

99 Exhibit high variations in the rate and extent of drug absorption

100 Lyophilization and complexation are used for product development

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With Best Wishes