

ENTRANCE EXAMINATION FOR ADMISSION, MAY 2012.

M.Sc. (MEDICAL PHARMACHOLOGY)

COURSE CODE : 504

Register Number :

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Signature of the Invigilator  
(with date)

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COURSE CODE : 504

Time : 2 Hours

Max : 400 Marks

*Instructions to Candidates :*

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each of the question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you -1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. The Vaughan Williams classification for antiarrhythmic agents:
  - (A) is based on His-bundle recording in patients
  - (B) has amiodarone as a Class V drug
  - (C) has metoprolol as a Class IV drug
  - (D) has lignocaine as a Class I drug
2. Lignocaine:
  - (A) blocks fast sodium current activity
  - (B) prolongs the duration of the action potential
  - (C) functions best if hypokalaemia is avoided
  - (D) has a greater negative inotropic effect than disopyramide
3. Flecainide:
  - (A) has a wider antiarrhythmic spectrum than lignocaine
  - (B) must be administered parenterally to produce its therapeutic effect
  - (C) administration itself can give rise to serious ventricular arrhythmias
  - (D) exerts no effects on the duration of the QRS complex
4. Amiodarone:
  - (A) is the only agent to possess Vaughan Williams Class III activity
  - (B) has minimal negative inotropic effects
  - (C) has a volume of distribution greater than 3000 litres in an average adult
  - (D) therapy is associated with resistance and increased requirements of warfarin
5. Bretylium:
  - (A) is an adrenergic neurone blocker
  - (B) is best given orally
  - (C) has the major side-effect of hypotension
  - (D) increases the efficacy of pressor amines
6. Propafenone:
  - (A) is predominantly a Vaughan Williams Class I antiarrhythmic
  - (B) is of no use in the treatment of ventricular ectopic beats
  - (C) has negative inotropic effects
  - (D) is relatively free from extracardiac side-effects



7. Phenytoin:
  - (A) is a Vaughan Williams Class I antiarrhythmic
  - (B) may be used in the treatment of digitalis-induced arrhythmias
  - (C) does not alter the duration of the action potential of atrial tissue
  - (D) all of the above
8. Quinidine:
  - (A) has no action on atrial arrhythmias
  - (B) should be co-prescribed with amiodarone in resistant arrhythmias
  - (C) prolongs the QT interval
  - (D) has vagolytic properties
9. Torsades de Pointes:
  - (A) may be treated with amiodarone
  - (B) may be treated with disopyramide
  - (C) may be treated with isoprenaline
  - (D) none of the above
10. The following drugs are useful for rapid conversion of acute atrial fibrillation to sinus rhythm:
  - (A) Digoxin
  - (B) Flecainide
  - (C) Sotalol
  - (D) None of the above
11. Verapamil:
  - (A) is often associated with rebound hypertension on withdrawal after acute intravenous use
  - (B) exerts its effects on heart rate in man via action at the sinoatrial node
  - (C) has no effect on platelet aggregation
  - (D) is antiatherosclerotic
12. Calcium chloride
  - (A) provides protection against ischaemic brain damage
  - (B) increases the duration of the effective refractory period
  - (C) shortens ventricular systole
  - (D) improves survival in cardiac asystole
13. Verapamil:
  - (A) is useful in the treatment of the arrhythmias of digoxin toxicity
  - (B) is the agent of Choice in controlling the tachycardia associated with the sick sinus syndrome
  - (C) may be usefully combined with prazosin
  - (D) and disopyramide are an ideal combination for the treatment of cardiac arrhythmias

14. Diltiazem:
  - (A) is a more potent vasodilator than verapamil
  - (B) has a greater negative chronotropic effect than nifedipine
  - (C) is free from effects on the atrioventricular node
  - (D) has a greater negative inotropic effect than verapamil
  
15. Use of calcium channel blockers may be associated with:
  - (A) Diarrhoea
  - (B) Peripheral oedema
  - (C) Bronchospasm
  - (D) All of the above
  
16. Nifedipine:
  - (A) may precipitate congestive heart failure
  - (B) as opposed to nitrates suffers from the disadvantage of a shorter duration of action
  - (C) (A) & (B)
  - (D) none of the above
  
17. Verapamil:
  - (A) induces less cardiovascular depression during anaesthesia with enflurane than with isoflurane
  - (B) is of no value in obtunding the haemodynamic response to tracheal intubation in anaesthetized patients
  - (C) reduces the MAC of halothane
  - (D) all of the above
  
18. Verapamil:
  - (A) and theophylline show a significant interaction
  - (B) interacts with digoxin by increasing its renal tubular secretion
  - (C) and cyclosporine show no significant interaction
  - (D) all of the above
  
19. Enoximone:
  - (A) raises arterial pressure at the expense of splanchnic and renal vasoconstriction
  - (B) may induce hypotension
  - (C) is a direct cardiac beta-adrenoceptor stimulant
  - (D) may lead to bronchoconstriction

20. Enoximone:
- (A) is effective only when given intravenously
  - (B) is the inotrope of choice in renal failure
  - (C) is a pulmonary artery vasodilator
  - (D) must be administered in 5 per cent dextrose
21. Noradrenaline
- (A) is a pure alpha-adrenoceptor agonist
  - (B) has potent bronchodilator activity
  - (C) increases skeletal muscle blood flow
  - (D) elevates pulmonary capillary wedge pressure
22. Dopexamine:
- (A) is a selective phosphodiesterase inhibitor
  - (B) produces splanchnic and renal vasoconstriction
  - (C) may be given orally
  - (D) none of the above
23. Dobutamine:
- (A) is a less potent inotropic agent than isoprenaline
  - (B) causes a reduction in pulmonary capillary wedge pressure
  - (C) is active at D<sub>1</sub> and not D<sub>2</sub> receptors
  - (D) all of the above
24. Dopexamine:
- (A) is a less potent beta<sub>1</sub> adrenergic receptor agonist than dopamine
  - (B) is primarily active at D<sub>2</sub> receptors
  - (C) is a more potent renal vasodilator than dopamine
  - (D) unlike dopamine, does not induce nausea
25. Digoxin
- (A) shortens the PR interval
  - (B) flattens the ST segment
  - (C) causes peaking of the T wave
  - (D) increases the resting membrane potential



26. Digoxin toxicity is commonly manifested as:  
 (A) Muscular hyperexcitability (B) Psychosis  
 (C) Premature ventricular ectopic beats (D) All of the above
27. Digoxin toxicity is likely in the presence of:  
 (A) Hyperkalaemia (B) Hypomagnesaemia  
 (C) Hyperthyroidism (D) None of the above
28. Milrinone:  
 (A) is a  $\text{Na}^+/\text{K}^+$  ATPase inhibitor  
 (B) is an inotrope whose use is limited by vasoconstriction  
 (C) use may be complicated by thrombocytopenia  
 (D) shows no inotropic effect in a fully digitalized patient
29. Xamoterol:  
 (A) is a new synthetic cardiac glycoside  
 (B) is indicated in the treatment of severe congestive heart failure  
 (C) has no vasodilating effect  
 (D) does not usually cause an increase in heart rate
30. Digoxin is contraindicated in:  
 (A) heart failure in acute myocardial infarction  
 (B) in children with high output states due to left to right shunts  
 (C) the treatment of congestive heart failure in the presence of atrial fibrillation  
 (D) all of the above
31. Methoxamine:  
 (A) is not metabolized by monoamine oxidase  
 (B) increases cardiac output by a direct action  
 (C) is more likely to show tachyphylaxis than ephedrine  
 (D) all of the above
32. Phenylephrine:  
 (A) is predominantly a direct beta-adrenoceptor agonist  
 (B) causes miosis while ephedrine causes mydriasis  
 (C) increases the cardiac output  
 (D) decreases the renal blood flow while increasing the arterial pressure

33. Metaraminol:
- (A) has both alpha-and beta-adrenoceptor agonist effects
  - (B) has a sedative effect
  - (C) is useful in treatment of anorexia
  - (D) is the safest vasopressor to use in the presence of monoamine oxidase inhibitors
34. Isoprenaline:
- (A) like methoxamine results in reflex bradycardia
  - (B) unlike adrenaline has no effect on histamine release
  - (C) unlike sotalol is useful in the treatment of Torsades de Pointes
  - (D) unlike adrenaline results in hypoglycaemia
35. Dopamine:
- (A) induced renal vasodilatation is antagonized by propranolol
  - (B) depletes presynaptic stores of noradrenaline
  - (C) is as potent a beta<sub>2</sub> receptor agonist as dopexamine
  - (D) none of the above
36. Beta-adrenoceptor blocking agents:
- (A) benefit the ischaemic myocardium if the preload rises substantially in the course of the therapy
  - (B) benefit the myocardium in all types of angina
  - (C) are of value in Raynaud's disease
  - (D) are of value in migraine
37. In myocardial ischaemia, beta-adrenoceptor blockade:
- (A) decreases the risk of ventricular fibrillation
  - (B) decreases the size of the infarct due to coronary occlusion
  - (C) if withdrawn, leads abruptly to an increased risk of infarction
  - (D) all of the above
38. Treatment with beta-adrenoceptor blocking drugs
- (A) decreases the hypermetabolic state of thyrotoxicosis
  - (B) has no influence on the vascularity of a hyperactive thyroid gland
  - (C) with intrinsic sympathomimetic activity is useful during a thyroid storm
  - (D) paradoxically raises free thyroxine levels



39. Cardiosensitivity in beta-adrenoceptor blocking agents:
- (A) is well maintained only at relatively low doses
  - (B) makes these drugs more effective anti-anginal agents than non-selective drugs
  - (C) limits their usefulness in the treatment of migraine
  - (D) is of special value in the patient with glaucoma
40. Sotalol:
- (A) is useful in the treatment of QT interval prolongation
  - (B) is useful in hypertension with symptomatic arrhythmias
  - (C) possesses Class I and Class IV effects according to Vaughan Williams classification
  - (D) none of the above
41. Prazosin:
- (A) is a presynaptic  $\alpha_2$  receptor agonist
  - (B) is limited in usefulness by troublesome tachycardia
  - (C) therapy may be associated with both tachyphylaxis and tolerance
  - (D) may produce urinary retention
42. Phenoxybenzamine:
- (A) is of therapeutic value in benign prostatic obstruction
  - (B) inhibits the release of noradrenaline from adrenergic nerves
  - (C) can be used as a nasal decongestant
  - (D) produces a reduction in arterial pressure by reduction of peripheral resistance and cardiac output
43. Phentolamine:
- (A) is a specific competitive  $\alpha_1$  adrenergic antagonist
  - (B) acts within minutes of administration
  - (C) is contraindicated in the presence of monoamine oxidase inhibitors
  - (D) unlike phenoxybenzamine does not cause reflex tachycardia
44. Guanethidine:
- (A) has a reserpine-like action
  - (B) can be used intravenously for rapid control of hypertension in phaeochromocytoma
  - (C) administration may be complicated by constipation
  - (D) all of the above



45. Trimetaphan:
- (A) is a postsynaptic  $\alpha_1$  adrenergic antagonist
  - (B) has a rapid onset of effect
  - (C) is primarily a smooth muscle relaxant
  - (D) is metabolized by acetylcholinesterase and may thus affect the duration of action of suxamethonium
46. Clonidine:
- (A) is a presynaptic  $\alpha_2$ -adrenoceptor blocking agent
  - (B) has relatively little effect on peripheral resistance
  - (C) may frequently cause postural hypotension
  - (D) therapy is complicated by reflex tachycardia
47. Clonidine:
- (A) administration on a chronic basis may result in diarrhea
  - (B) withdrawal does not cause rebound hypertension unless treatment has been continued for more than 4 weeks
  - (C) therapy is complicated by mouth dryness
  - (D) all of the above
48. Methyldopa:
- (A) is a directly acting vasodilator
  - (B) is useful in the treatment of pheochromocytoma
  - (C) administration may be complicated by sedation
  - (D) has the advantage of not causing postural hypotension
49. In the eye:
- (A) Pheyleprine is a miotic
  - (B) Pilocarpine is a miotic
  - (C) Ecothiopate is a mydriatic
  - (D) Timolol is a miotic
50. Sodium nitroprusside:
- (A) produces nitric oxide, which results in vasodilatation
  - (B) relaxes arteriolar smooth muscle selectively
  - (C) has no effect on bleeding time
  - (D) none of the above

51. Sodium nitroprusside:
- (A) administration results in an increase in pulmonary artery pressure in patients with cardiac failure
  - (B) decreases plasma rennin activity
  - (C) increases intrapulmonary shunting
  - (D) toxicity is characterized by metabolic acidosis without an increase in plasma lactate concentrations
52. Nitroglycerine;
- (A) is contraindicated in hypertrophic obstructive cardiomyopathy
  - (B) is predominantly an arteriolar dilator
  - (C) unlike nitroprusside raises intracranial pressure
  - (D) is ideally administered from rigid polyvinyl chloride containers as it is incompatible with polyethylene
53. Diazoxide:
- (A) has diuretic activity
  - (B) is associated with hyperglycaemia
  - (C) is not usually associated with tachycardia because of its weak betaadrenergic blocking action
  - (D) all of the above
54. Hydralazine:
- (A) toxicity is more likely in fast acetylators due to formation of the acetylated metabolite
  - (B) although a vasodilator acts predominantly by an alpha-adrenoceptor blocking action
  - (C) therapy is complicated by severe postural hypotension
  - (D) may lead to peripheral neuropathy
55. Hypotension induced by adenosine:
- (A) is due to reduction in cardiac output
  - (B) is associated with a compensatory tachycardia
  - (C) is rapid in onset
  - (D) is accompanied by uric acid accumulation

56. Minoxidil:
- (A) is a selective dilator of capacitance vessels
  - (B) administration may result in alopecia
  - (C) is preferably given along with a beta-adrenoceptor blocking drug
  - (D) is useful for its uricosuric effect
57. Ketanserin:
- (A) is a serotonin agonist
  - (B) increases blood viscosity
  - (C) is a useful treatment for congenital prolonged QT interval
  - (D) has useful alpha-adrenoceptor antagonist properties
58. Doxazosin:
- (A) is a directly acting vasodilator
  - (B) is frequently associated with 'first-dose' hypotension within an hour of administration
  - (C) has the disadvantage of causing postural hypotension
  - (D) all of the above
59. Esmolol:
- (A) is cardioselective in its effects
  - (B) has significant intrinsic sympathomimetic activity
  - (C) shows a prolonged duration of action in those with atypical plasma cholinesterases
  - (D) treatment should be limited to 2 hours due to the risk of methanol intoxication
60. Enalapril:
- (A) is shorter acting than captopril
  - (B) is half as potent as captopril
  - (C) decreases renal vascular resistance without changing glomerular filtration
  - (D) none of the above
61. Captopril:
- (A) has no influence on the dose requirement of sodium nitroprusside-induced hypotension
  - (B) is ineffective in hypertension with a high-renin state
  - (C) induces glucose intolerance
  - (D) is a mixed vasodilator



62. Captopril:
- (A) may induce proteinuria
  - (B) has the same incidence of neutropenia as enalapril
  - (C) is ineffective in normotensive subjects
  - (D) unlike enalapril, is free from the risk of angioedema
63. Quinapril:
- (A) results in raised catecholamine levels
  - (B) results in raised aldosterone levels
  - (C) frequently results in impotence
  - (D) may result in a chronic cough
64. Sodium reabsorption following filtration in the glomerulus is reduced by about:
- (A) 20 per cent by bendrofluzide
  - (B) 5 per cent by amiloride
  - (C) 60 per cent by frusemide
  - (D) 20 per cent by mannitol
65. Acetazolamide:
- (A) causes papillary dilatation, to accelerate drainage of the aqueous humour
  - (B) has anticonvulsant properties
  - (C) is contraindicated in the presence of cysteine renal stones
  - (D) is extensively metabolized into sulphanilamide
66. Thiazides:
- (A) cause an alkaline diuresis
  - (B) accelerate calcium loss from the body
  - (C) induce hyperuricaemia
  - (D) all of the above
67. Bumetanide:
- (A) causes less potassium loss than thiazide diuretics
  - (B) is less potent on a weight for weight basis than frusemide
  - (C) has aldosterone antagonist properties
  - (D) has a shorter duration of action than chlorthalidone

68. Ethacrynic acid:
- (A) acts primarily at the proximal tubule of the loop of Henle
  - (B) accelerates calcium loss from the body
  - (C) is less likely to cause gastrointestinal bleeding than frusemide
  - (D) does not exacerbate diabetes
69. Mannitol:
- (A) is metabolized to sorbitol which itself has a diuretic action
  - (B) undergoes active tubular secretion with minimal reabsorption
  - (C) is hypotonic as a 25 per cent solution and may induce haemolysis if administered at a rate greater than 3 g/minute
  - (D) has been used in the treatment of the unconscious eclamptic patient
70. Frusemide
- (A) like bumetanide may produce hyperuricaemia
  - (B) is less likely to induce hyperglycaemia than bumetanide
  - (C) has no effect on plasma rennin
  - (D) is synergistic with bumetanide in cases of resistant oedema
71. Amiloride:
- (A) administration may give rise to hyperglycaemia in much the same way as thiazides
  - (B) may give rise to some degree of azotaemia
  - (C) accelerates the loss of magnesium from the body
  - (D) all of the above
72. Poor response to diuretic therapy
- (A) occurs if the glomerular filtration rate (GFR) is below 15 ml/minute
  - (B) may occur in hypokalaemia
  - (C) may occur during lithium therapy
  - (D) all of the above
73. Urinary retention may result from
- (A) Ephedrine
  - (B) Distigmine
  - (C) Indoramin
  - (D) None of the above

74. Ketotifen:
- (A) protects against exercise-induced bronchoconstriction
  - (B) is useful in the treatment of atopic dermatitis
  - (C) has bronchodilating properties roughly equivalent to ipratropium bromide
  - (D) can lead to agitation especially in small children
75. Salmeterol:
- (A) is a salbutamol prodrug
  - (B) has the advantage of being free from producing muscle tremor
  - (C) is more lipid soluble than salbutamol
  - (D) all of the above
76. Exogenous lung surfactant (colfoscerilpalmitate):
- (A) rapidly improves pulmonary gas exchange in premature infants
  - (B) impedes oedema formation in the lung
  - (C) stabilizes small airways
  - (D) all of the above
77. Racemic adrenaline:
- (A) consists of L-adrenaline
  - (B) is useful in controlling bronchial congestion because of its beta-adrenoceptor stimulating effects
  - (C) is a potent mast cell stabilizer
  - (D) has the advantage of being effective by the oral route
78. Salbutamol:
- (A) is as like as isoprenaline to produce tachycardia
  - (B) is associated with hyperkalaemia
  - (C) unlike ritodrine has no effect on the uterus
  - (D) induced bronchodilatation may show tachyphylaxis
79. Terfenadine:
- (A) is as sedative as chlorpheniramine
  - (B) has no affinity for H<sub>2</sub>-receptors
  - (C) has significant anticholinergic activity
  - (D) potentiates the effects of alcohol



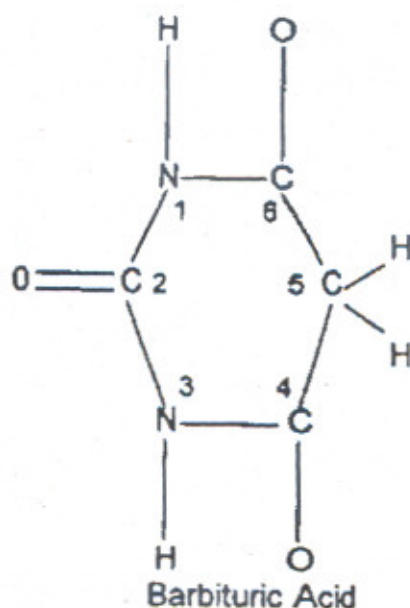
80. Methlxanthines:
- (A) Exert all their effects due to phosphodiesterase inhibition
  - (B) Stimulate the medullary respiratory centre
  - (C) Have significant antihistaminic effects
  - (D) Have no effect on the sensitivity of the medullary centres to the stimulant effects of carbon dioxide
81. Theophylline toxicity:
- (A) is manifest at plasma levels 20-40 mg/litre
  - (B) may result in hypotonia
  - (C) can be avoided in congestive heart failure by decreasing the loading dose
  - (D) none of the above
82. Sodium cromoglycate:
- (A) antagonises the effects of the chemical mediators in asthma
  - (B) has useful bronchodilating properties
  - (C) is of little benefit in late onset asthma
  - (D) is not effective in the prevention of exercise-induced asthma
83. Ipratropium bromide:
- (A) is a more lipid soluble derivative of atropine
  - (B) unlike atropine does not inhibit mucociliary clearance
  - (C) acts more rapidly than beta-adrenoceptor agonists in the relief of asthmatic symptoms
  - (D) is contraindicated in patients with glaucoma
84. Nedocromil sodium:
- (A) shows greater anti-inflammatory effects than cromoglycate
  - (B) is ineffective against exercise-induced asthma
  - (C) is as potent as inhaled steroids in the treatment of asthma
  - (D) causes sedation
85. Thiopentone:
- (A) offers significant cerebral protection if used in resuscitation from cardiac arrest
  - (B) is useful for cerebral protection for valvular surgery using extracorporeal circulation
  - (C) in clinically used anaesthetic doses produces the same degree of reduction in cerebral metabolic oxygen requirement as cooling to 28°C.
  - (D) administration over a prolonged period of time is beneficial in controlling intracranial pressure after head injury

86. The following may be associated with convulsant activity in susceptible individuals:
- (A) Etomidate
  - (B) Fentanyl
  - (C) Propofol
  - (D) All of the above
87. Among the barbiturate anaesthetic agents:
- (A) Thiopentone has been linked to convulsions in non-epileptic patients
  - (B) Thiopentone will induce seizure activity in temporal lobe epilepsy
  - (C) Thiopentone infusions have been used for days to control status epilepticus
  - (D) None of the above
88. Thiopentone:
- (A) has a terminal elimination half-life, which is approximately three times its distribution half-life
  - (B) will show zero order kinetics at high doses
  - (C) crosses the blood-brain barrier in much reduced quantities in acidosis
  - (D) shows a prolonged elimination half-life in renal failure
89. Ketamine:
- (A) is solubilized in ethylene glycol
  - (B) decreases the pulmonary artery pressure in spite of increasing the systemic arterial pressure
  - (C) exists as enantiomers which differ in anaesthetic potency
  - (D) is not effective when given orally because of extensive first-pass metabolism
90. Ketamine:
- (A) has no analgesic effects at subanaesthetic doses
  - (B) has no effect on intrathecal administration
  - (C) causes sialorrhoea
  - (D) all of the above
91. Propofol:
- (A) has a similar initial distribution half-life as thiopentone
  - (B) has a rate of clearance twice that of thiopentone
  - (C) has no antianalgesic effect
  - (D) none of the above

92. Propofol:
- (A) is contraindicated in porphyria
  - (B) is approximately half as potent as thiopentone
  - (C) produces retrograde amnesia
  - (D) causes more cardiovascular depression than thiopentone
93. Propofol:
- (A) is 98 per cent protein bound in the blood stream
  - (B) clearance is markedly reduced in cirrhosis of liver
  - (C) has a markedly prolonged elimination half-life in the elderly
  - (D) none of the above
94. Etomidate:
- (A) is a carboxylated ether derivative
  - (B) is not water soluble
  - (C) administration is complicated by significant thrombophlebitis
  - (D) is not highly protein bound
95. Etomidate:
- (A) administration results in an increase of intracranial pressure secondary to myoclonus
  - (B) administration produces an increase in intraocular pressure secondary to myoclonus
  - (C) causes a decrease in heart rate
  - (D) causes minimal changes in systemic vascular resistance
96. Etomidate:
- (A) myoclonus is not decreased by pretreatment with benzodiazepines
  - (B) causes less respiratory depression than methohexitone
  - (C) causes an irreversible inhibition of 11 beta-hydroxylation reactions leading to an inhibition of 11 beta-hydroxylation reactions leading to an inhibition of steroidogenesis
  - (D) kinetics are unaltered during high-dose fentanyl anaesthesia



97. The following are true about the structure-activity relationship of barbiturates:



- (A) adding a phenyl group to barbituric acid at C5 confers anticonvulsant activity  
 (B) an alkyl side chain at C is unrelated to hypnotic activity  
 (C) methylation at position C1 and replacing oxygen with sulphur at position C2 results in thiopentone  
 (D) all of the above
98. The following drugs can prolong non-depolarizing neuromuscular blockade:
- (A) Neomycin (B) Theophylline  
 (C) Azathioprine (D) None of the above
99. The effect of tubocurarine is potentiated by:
- (A) Alkalosis (B) Mild hypothermia  
 (C) Hypokalaemia (D) All of the above
100. Suxamethonium
- (A) will trigger malignant hyperthermia only in humans  
 (B) has no effect on autonomic ganglia  
 (C) induced myalgia has no relation to the degree of fasciculations  
 (D) has no active metabolites