**Question 1**

Labetalol has the following pharmacodynamic effect

A Alpha 1 + B1 Antagonism

B Alpha 1+ Alpha 2 + B1 + B2 Antagonism

C B1 + B2 Antagonism

D Alpha 1 + B1 + B2 Antagonism

Explanation D

Labetalol is a competitive selective alpha 1 antagonist and a competitive non selective beta 1 (B1) and 2 (B2) antagonist.

Note: in one of the tables in the prescribed TB, Labetalol seems to have some alpha 2 antagonism. However, in the section describing labetalol it reports that it is sea selective alpha 1 antagonist and a potent beta blocker .

**Question 2**

Which is the correct property of the beta blocker?

A Atenolol: B1-B2 antagonsit

B Pindolol: B2 selective antagonist

C Labetalol: B1-B2-A1 antagonist

D Propanolol: B1 selective antagonist

Explanation C

Non selective beat blockers with alpha1 blocking abilities:

* Labetalol, carvedilol, medroxalol and bucindolol

Other non selective beta blockers

* Propranolol, carteolol, penbutolol, pindolol, timolol, sotalol

B1 selective antagonist:

* Acebutolol, atenolol, betaxolol, bisoprolol, celiprolol, metoprolol, nevivolol, esmolol

**Question 3**

Which is the correct property of the beta blocker?

A Atenolol B1-B2 antagonsit

B Pindolol B2 selective antagonist

C Labetalol B1-B2-A1 antagonist

D Propanolol B1 selective antagonist

Explanation C

Extra:

Pindolol = Non selective (B1=B2) with moderate lipid solubility T1/2 = 3-4 hours

Propanolol = Non selective (B1=B2) with high lipid solubility T1/2 = 3.5=6 hours

Labetalol = Non selective (B1=B2 with some A1 effects) with low lipid solubility T1/2 = 5 hours

Atenolol = B1 selective (B1>>>B2) with low lipid solubility T1/2 = 6-9 hours

**Question 4**

Which of the following statements regarding receptor desensitization of adrenoreceptors in correct?

A Multiple other receptors can still be desensitised by an agonist that only binds to its receptor

B Secondary feedback mechanisms is an example of homologous desensitisation

C Receptor desensitisation occurs only after hours of repeated exposure to the agonist

D Phosphorylation of G proteins is an example of heterologous desensitization

Explanation A

One of the best studied examples of receptor regulation is the desensitisation of adrenoreceptors that may occur after exposure to catecholamines and other sympathomimetic drugs. After a cell or tissue has been exposed to a drug for a period of time to an agonist, the tissue often becomes less responsive to further stimulation by that agent. Other terms for desensitisation include tachyphlaxis, refractoriness and tolerance. Mechanisms of desensitisation occur within minutes, some over days.

There are two major categories of desensitisation

1-Homologous desensitisation: loss of responsiveness exclusively of the receptors that have been exposed to repeated or sustained activation by an agonist. E.g. phosphorylation of receptor members of the G protein coupled receptor kinase (GRK) family

2-Heterologous desensitisation: process by which desensitisation of one receptor by its agonist also results in desensitisation of another receptor that has not been directly activated by the agonist in question. E.g. secondary messenger feedback. cAMP leads to activation of protein kinase A which phosphorylates B receptor residues resulting in inhibition of receptor function. Protein kinase C works similarly. Both enzymes may phosphorylate any structurally similar receptors (not just their own receptors)

**Question 5**

The cholinesterase inhibitor with the shortest duration of action

A Echothiophate

B Physostigmine

C Ambenonium

D Pyridostigmine

Explanation B

The different cholinesterase inhibitors and thier duration of action

Alcohols= Edrophonium- 5-15min

Carbamates= Neostigmine-0.5-2hrs, Pyridostigmine-3-6hrs, Physostigmine-0.5-2hrs, Ambenonium-4-8hrs, Demecarium-4-6hrs

Organophosphates= Echothiophate-100hrs

**Question 6**

Which is true regarding Atropine?

A Atropine has a half life of 6 hours

B Atropine's effect on parasympathetic functions declines rapidly in all organs

C Atropine is a tertiary amine and does not cross the blood brain barrier

D Atropine competitively antagonises ACH at muscarinic receptors

Explanation D

Atropine causes reversible blockade of cholinomimetic actions at muscarininc receptors. Its block can be overcome with larger concentrations of ACH or muscarinic agonists. It is a tertiary amine. Significant levels are achieved in the CNS within 30min to one hr. Atropine's effect on parasympathetic functions declines rapidly in all organs except the eye. Effects on the iris and the cillary muscle persist for >72hrs. Atropine disappears rapidly form the blood after administration, with a half life of 2 hours.

Note: There seems to be a slight discrepancy with the values given to atropine. Example-Atropine has been given a t1/2=4.3 hours. However in other sources its t1/2 is 2hours.

Extra: The elimination of atropine from the blood following administration, occurs in 2 phases (Fast and slow phases): Rapid phase half-life= 2hrs Slow phase is approximately 13hrs

**Question 7**

Atropine

A Is a quaternary ammonium compound

B Its mydriatic action lasts 12-24hrs

C It is predominantly metabolised by the liver

D It may cause bradycardia

Explanation D

Atropine is a tertiary compound and therefore crosses the blood brain barrier. The drug's effect on parasympathetic function declines rapidly in all organs except the eye. The mydriatic effect on the iris and papillary muscles>72hrs. The effect of moderate to high therapeutic doses is a block of vagal activity and a tachycardia. However, lower doses often result in a bradycardia before the effects of peripheral vagal block become manifest. This effect (slowing) may be due to block pf presynaptic muscarinic receptors on vagal postganglionic fibres that normally limit ACH release in the sinus node and other tissue. The same mechanisms operate in the AV node. About 60%of the unchanged drug is excreted in the urine