**Question 1**

How much sodium is contained in a solution of 8.4% NAHCO3 (sodium bicarbonate)?

A 3mmol/ml

B 0.5mmol/ml

C 1mmol/ml

D 2mmol/ml

Explanation C

NAHCO3- 84mg/ml

Na- 1mmol/ml

HCO3-1mmol/ml

1:1 ration of Na: HCO3

pH 8.0

Extra: 1mL has a mass of 1g Therefore there is 0.084g of NaHCO3 present in 1mL of this solution. The molar mass of NaHCO3 is 84g/mol-0.084g divided by 84g/mol = 0.001mol or 1mmol. There is 1mmol of NaHCO3 and therefore 1mmol of Na

**Question 2**

A patients requires ÇSL fluid in ICU to prevent hyperchloraemic acidosis. Which is true of CSL fluid

A 145mmol/L of sodium

B 4mmol/L of calcium

C Osmolarity of 295mOsm/L

D 29mmol/L of lactate

Explanation D

Compound sodium lactate contents CSL= Hartmann’s solution

Contents:

131 mmol/L of sodium (other sources 129)

111mmol/L of Chloride (112)

29mmol/L of lactate (28)

5mmol/L of potassium

2mmol/L of calcium (but 4mEq/L due to the +2 valence)

Osmolarity of 279mOsm/L

**Question 3**

Regarding allopurinol, which of the following is incorrect?

A It should be avoided in patients with renal impairment Correct Answer

B It can cuase an acute attack of gout

C It inhibits the metabolism of anicoagulants

D It is used as an antiprotzoal agent

Explanation A

Allopurinol is often the first urate lowering drug used. Its most rational indications are: chronic tophaceous gout, in patients whose 24 urinary uric acid exceeds 600-700mg, when probenocid and sulfinpyrazone cannot be used, recurrent reanl stones and in patients with renal functional impairment.

It causes an acute attack of gout early in treatmentt when urate crystals are being withdrawn from the tissues and plasma levels are below normal.

It inhibits the metabolism of anticoagulants and probenocid. Chemtherapeutic agents must be reduced by 75%.

It is used as an antiprotozoal agent

**Question 4**

All of the following drugs can cause hyperkalaemia EXCEPT?

A Spironolactone

B ACE inhibitor

C Methyldopa

D Potassium supplement

Explanation C

Spironolactone is a potassium sparing diuretic. It inhibits aldosterone, thereby decreasing sodium absorption and potassium secretion. ACE inhibitors lead to a decrease in aldosterone levels by suppressing angiotensin II. Methyldopa doesn't seem to have an effect on potassium.

Extra: for interest only-following a internet search, methyldopa may increase potassium levels in the first month of ingestion. Following the first month, methyldopa does not appear to effect potassium levels

**Question 5**

Which drug has a half life of 6 hours?

A Adenosine

B Atenolol

C Aspirin

D Lignocaine

Explanation B

Aspirin-15-25min, lignociane-2hrs, and adenosine -10s

Note: aspirin is absorbed quickly and rapidly hydrolysed to acetic acid and salicylate. Aspirin has a half life of 15-25min and salicylate has a half life of 3.5-4.5 hrs. The text gives a range of 2-19hrs.

**Question 6**

Which of the following is the proposed mechanism of N-Acetylcysteine?

A Induction of NAPQI back to paracetamol

B Decreased glutathione availability and release

C Direct binding to NAPQI

D Provision of inorganic nitrate

Explanation C

NAC prevents NAPQI induced hepatotoxicity when given within 8 hrs of a paracetamol overdose. NAC ameliorates the clinical course of toxicity. Four possible mechanism are described: increased glutathione availability, direct binding to NAPQI, provision of an inorganic substrate and the reduction of NAPQI back to paracetamol.

Note: in Katzung it states "that NAC acts as a glutathione substitute, binding the toxic metabolite as it is being produced"

**Question 7**

Which of the following DOES NOT have its metabolism inhibited by limiting liver blood flow?

A Propoxyphene

B Verapamil

C Lignocaine

D Trimethoprim

Explanation d

All the drugs listed below (except trimetoprim) have their metabolism inhibited by limiting blood flow. Other drugs with the same problem include: alprenolol, amitriptyline, imipramine, INH, labetalol, lignociane, morphine, propanolol and meperidine

Note: Some drugs are metabolised so readily that even marked reduction in liver FUNCTION does not significantly prolong their action. However, cardiac disease, by limiting blood flow to the liver, may impair disposition of those drugs whose metabolism is FLOW-limited. These drugs are so readily metabolised by the liver that hepatic clearance is essentially equal to liver blood flow.

Flow dependant elimination- some drugs are cleared very readily by the organ of elimination, so that at any clinically realistic concentration of the drug, most of the drug in the blood perfusing the organ is eliminated on the first pass of the drug through it. The elimination of these drugs will thus depend primarily on the rate of the drug delivery to the organ of elimination. Such drugs are called high extraction drugs since they are almost completely extracted from the blood by the organ. BLOOD FLOW TO THE ORGAN IS THE MAIN DETERMINANT OF DRUG DELIVERY.

**Question 8**

Which of the following drugs is most likely to cause methaemoglobinemia in adults?

Note: This question can be asked using a clinical scenario: Bier's block for a reduction of a wrist fracxture develops methaemaglobinaemia-which drug is the likely cause?

A amethocaine

B lignocaine

C prilocaine

D bupivicaine

Explanation C

The physical examination of patients with suspected methemoglobinaemia should include examination of the skin and mucous membranes. Physical findings may include the following:

Discoloration of the skin, mucous membranes, and blood (the most striking physical finding)

Cyanosis –

Pallor of the skin or conjunctiva suggests anaemia

Seizures

Coma

Cardiac dysrhythmias (bradyarrhythmia or ventricular dysrhythmia)

Acidosis

Symptoms associated with cardiac and/or neurologic ischemia

Intravenous (IV) methylene blue is the first-line antidote agent. Exchange transfusion and hyperbaric oxygen treatment are second-line options for patients with severe methemoglobinaemia whose condition does not respond to methylene blue or who cannot be treated with methylene blue (e.g. 6GDP deficiency)

Treating a BLUE patient with a BLUE drug!

Extra: In some patients, o-toluidine, a metabolite of prilocaine, may cause methemoglobinemia, which may be treated with methylene blue.

**Question 9**

Which of the following drugs can cause alopecia?

A Digoxin

B Amiodarone

C Heparin

D Verapamil

Explanation C

Alopecia from drugs is a usually reversible diffuse nonscarring hair loss that occurs within days to weeks of starting a new medication or changing the dose.

There are two types of drug-induced hair loss:

Anagen effluvium – shedding of actively growing hairs

Telogen effluvium– shedding of resting, or bulb hairs

Anagen effluvium

Anagen effluvium is usually due to chemotherapeutic drugs and rarely with gold, colchicine or poisoning with arsenic, bismuth, thallium or boric acid

Telogen effluvium

Telogen effluvium is the mechanism of virtually all other medication-induced hair loss. The list of possible drug causes:

anti-coagulants –heparin and warfarin

anti-hypertensives – beta-blockers, ACE inhibitors

hormones – oral contraceptive pill (during/after/changing), hormone replacement therapy, androgens

anticonvulsants – valproic acid 12-28% (dose-dependent), carbamazepine up to 6%, phenytoin

mood stabilizers and antidepressants – most, e.g. lithium 12-19%

others – cimetidine, retinoids, antithyroid drugs, cholesterol lowering drugs, interferons, anti-infective agents, amphetamines, NSAIDS, bromocriptine, levodopa, some antipsychotic and anti-anxiety drugs, rarely amytriptyline

Note: According to an editor's note: 3 cases of hair loss has been reported following the use of amiodarone. Use this option, not to confuse further but to educate

**Question 10**

Which of the following drugs does not cause constipation?

A Codeine

B Chlorpromazine

C Verapamil

D Digoxin

E Imipramine

Explanation D

Chlorpromazine- may cause constipation due to its anticholinergic effects. Imipramine is a Tricyclic antidepressant-may cause constipation due to its anticholinergic. Verapamil has a more profound effect on gut smooth muscle than the other calcium channel antagonists. It reduces gut motility and causes constipation. Codeine- like all other opioids, causes constipation. Generally opiods causes reduced motility and peristaltic motions, but tone is increased. Digoxin causes diarrhoea.

**Question 11**

Which of the following drugs can cause hypoprothrombinemia?

A Cefaclor

B Cefuroxime

C Cefotetan

D Cefazolin

Explanation C

Cephalosporins that contain a methylthiotetrazolegroup (e.g. cefamandole, moxalactam, cefmetazole, cefotetan, cefoperazone) frequently cause hypoprothrobinaemia. Administration of 10mg vitamin K twice weekly can prevent this.

**Question 12**

All of the drugs listed produce similar effects except?

A Methacholine

B Muscarine

C Acetylcholine

D Hyoscine

Explanation D

Hyoscine is the only anticholinergic drug in this group

**Question 13**

Which drug and side effect are incorrectly matched?

A Sodiumvalpraote and idiosyncratic hepatic toxicity

B Phenobarbitol and enzyme induction

C Phenytoin and gum hypertrophy

D Ethosuximide and hirsutism

Explanation C

Phenytoin causes gum hyperplasia. In the prescribed texts, it is not clearly stated, but ethosuximide can cause hirsutism

**Question 14**

Regarding intracellular signalling, which of the drugs listed below has a different mode of action from the others?

A PTH

B Insulin

C Glucagon

D ACTH

Explanation B

Insulin mode of action involves tyrosine kinase A. The rest of the drugs involve a secondary mechanism cAMP

**Question 15**

Which of the following drugs does not interact with warfarin?

A Cepholosporins

B Phenobarbitone

C Loop diuretic

D Benzodiazepine

Explanation D

Phenobarbitone is an enzyme inducer thus increasing metabolism of warfarin which will decrease the INR.

Cephalosporins decrease bacteria in gut that produce vitamin K which will increase the anticoagulant effect of warfarin and increase the INR

Frusemide would cause dehydration and concentrate clotting factors, hence decreasing INR (decreasing anticoagulant effect)

**Question 16**

Regarding Alendronic acid (fosamax), which of the following best describes it's mechanism of action?

A Increases osteoblast activity

B Suppresses the activity of osteoclasts

C Increases calcium bone absorption

D Decrease in phosphate excretion

Explanation B

Alendronic acid is a bisphosphonate. Its mechanism of action is selective inhibition of bone resorption. It suppresses the activity of osteoclasts in part via inhibition of farnesyl pyrophosphate synthesis. Clinical application includes: osteoporosis, bony mets and hypercalcaemia. Toxicity: renal failure and adynamic bone.

**Question 17**

10mls of 50% glucose contains how much glucose?

A 50mg

B 50g

C 500mg

D 5g

Explanation D

Glucose Intravenous Infusion BP 50%w/v (25g/50mL)

Therefore 5g/10ml

Extra: 50% glucose solution contains 500mg/ml of glucose per ml of solution. 0.5g/ml. Therefore 10mls equals 5g of glucose.

**Question 18**

How many mmols of Sodium does a litre of normal saline contain?

A 145mmol

B 140

C 150

D 154

Explanation D

Normal saline (0.9% saline solution)

 0.9 % NaCl (NSaline) ----> 0.9 g in 100mls ----> 9 g in 1 L moelcular weight of NaCl = 23 + 35 = 58 g (exact: 58.44) 9/58 = 0.155 mol or 155 mmol

9 g of NaCl per litre of water

• 154 mmol/L sodium

• 154 mmol/L chloride

• Osmolality = 308 mosm/L

• pH = 5.0

Infusate Infusate Na

+

Extracellular fluid distribution

(mmol per litre) (%)

5% Sodium chloride in water 855

3% Sodium chloride in water 513

0.9% Sodium chloride in water 154

Ringer’s lactate solution 130

0.45% Sodium chloride in water 77

0.2% Sodium chloride in water 34

**Question 19**

Which drug has a half life of 6hrs

A Acetaminophen

B Disopyramide

C Diazepam

D Atropine

Explanation B

This question is taken form a table in section 1-basic principles

Diazepam > 40hrs

Atropine= 4.3hrs

Acetaminophen=2hrs

Others: atenolol-6.1hrs, fluoxetine-53hrs, amoxicillin-1.7hrs, ciprofloxacin-4.1hrs, digoxin-50hrs and clonidine-12hrs cyclosporin - wide range reported, up to 20 hours

**Question 20**

An example of passive immunisation is?

A Hepatitis B inactive viral antigen

B Rubella vaccine

C Typhoid vaccine

D Diphtheria antitoxin

Explanation D

Material available for passive immunisation:

Respiratory syncitial virus, rubella (immune globulin), snake bite (immune globulin), tetanus (immune globulin, varicella (varicella zoster immune globulin, measles (immune globulin, rabies (immune globulin), black widow antivenin, botulism (antitoxin/immune globulin), diphtheria (antitoxin), hepA (immune globulin), hepB (HBIG)

Note: Rubella vaccine is a live vaccine and is a form of active immunity. Typhoid vaccine (dead bact) is also a form of artificial active immunity.