The following Questions have either been used previously or have been retired. The questions in their exact format will not appear in future exams but the subject matter remains in scope.

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Part 1 Examination

The Part 1 comprises a single paper of 125 multiple choice questions (MCQs) in single best answer format set in broad topic areas aligned with the curriculum:

- Laboratory management competencies
- Analytical techniques and instrumentation
- Analytical methodology
- The chemical pathology of disease – biochemical basis
- The chemical pathology of disease – diagnosis and principles of management
- The chemical pathology basis of metabolic medicine

The examination is 3 hours long and therefore it is appropriate that questions should each be answered in just under 1.5 minutes. The questions take the form of a “Stem” to the question with some background information and then a “Lead-in” which asks the direct question. Currently this examination is held online using TestReach Software.

Candidates are presented with 5 potential answers which are displayed in alphabetical order. The question will be worded so that the candidate should be able to answer it without the requirement to consult the answer options.

Calculations and formulae can be included but would be at a degree of complexity that they could be answered within the time limit for the question. Examples might include calculation of Sensitivity or Specificity of an assay, or routine clinical calculations such as Creatinine Clearance.

The pass mark for the paper will be set by an objective procedure by an independently-chaired standard setting group where individual questions are reviewed to create a minimum standard using a modified Angoff process. Angoff is a standard setting method that requires a group of subject matter experts making judgements about how difficult each item in an exam by predicting the percentage of borderline candidates that would get a question correct thus creating a difficulty index for each question.

Dr Ian Godber – FRCPath Part 1 MCQ Lead

Stem of the Question Serum protein electrophoresis can identify changes in the patterns of serum proteins.
Lead-in Which regions are likely to increase during an acute phase response?
Option A Alpha 1 and Alpha 2
Option B Alpha 1 and Beta 1
Option C Alpha 1 and Beta 2
Option D Alpha 2 and Beta 1
Option E Beta 1 and Beta 2
Correct answer Alpha 1 and Alpha 2

Stem of the Question Investigation of the aldosterone/renin ratio for detecting primary hyperaldosteronism can be affected by many anti-hypertensive drugs.
Lead-in What effect do Angiotensin II Receptor blockers have on aldosterone and renin and the aldosterone/renin ratio?
Option A Decreased aldosterone, decreased renin
Option B Decreased aldosterone, increased renin, decreased ratio
Option C Increased aldosterone, decreased renin, increased ratio
Option D Increased aldosterone, increased renin
Option E No change
Correct answer Decreased aldosterone, increased renin, decreased ratio

Stem of the Question The Henderson-Hasselbalch equation is used to derive pH.
Lead-in What is the equation?
Option A $pH = pKa + \log_{10} \frac{[Base]}{[Acid]}$
Option B $pH = pKa + \log_{10} \frac{[Acid]}{[Base]}$
Option C $pH = pKa - \log_{10} \frac{[Base]}{[Acid]}$
Option D $pH = pKa \times \log_{10} \frac{[Acid]}{[Base]}$
Option E $pH = pKa - \log_{10} \frac{[Acid]}{[Base]}$
Correct answer $pH = pKa + \log_{10} \frac{[Base]}{[Acid]}$

Stem of the Question ‘Sepsis 6’ is commonly used to aid early identification and treatment of sepsis.
Lead-in Sepsis 6 includes IV fluid challenge, IV antibiotics, monitor urine output, administer oxygen and 3 laboratory components. What are the laboratory tests included?
Option A Blood cultures, CRP, ESR
Option B Blood cultures, full blood count, lactate
Option C CRP, full blood count, lactate
Option D CRP, ESR, lactate
Option E ESR, full blood count, lactate
Correct answer Blood cultures, full blood count, lactate

Stem of the Question A commonly measured analyte is measured using dye-binding methods, with bromocresol green or bromocresol purple. The resultant analyte-dye complexes absorb light at 628nm and 600nm respectively.
Lead-in What is the analyte in question?
Option A Albumin
Option B Alkaline Phosphatase
Option C Ammonia
Option D Bilirubin
Option E Phosphate
Correct answer Albumin

Stem of the Question Statins, also known as HMG-Co A reductase inhibitors are a class of lipid lowering drugs which are prescribed in order to lower the risk of cardiovascular disease.
Lead-in According to NICE which statin should be offered for the primary prevention of CVD to people who have a 10% or greater 10-year risk of developing CVD?
Option A Atorvostatin
Option B Fluvastatin
Option C Pravastatin
Option D Rosuvastatin
Option E Simvastatin
Correct answer Atorvostatin

Stem of the Question Jaundice is the most common clinical sign in the neonate, arising from either over-production or under-secretion of bilirubin. It affects 60% of full-term infants and 80% of pre-term infants in the first 3 days after birth. Kernicterus is the most severe complication of hyperbilirubinaemia. This condition is characterised by bilirubin staining of the basal ganglia and involves diffuse neuronal damage. It can result in marked developmental and motor delays.
Lead-in Treatment is with phototherapy – promoting the breakdown of trans-bilirubin to cis-bilirubin, which is water soluble. What wavelength of light is most commonly used for this treatment?
Option A 280 – 315nm
Option B 315 – 400nm
Option C 400 – 425nm
Option D 425 – 475nm
Option E 520 – 560nm
Correct answer 425 – 475nm

Stem of the Question Vitamin D is responsible for increasing intestinal absorption of calcium, magnesium and phosphate. Vitamin D absorbed from the diet or synthesised in the skin is biologically inactive, and is activated by hydroxylation, first in the liver then in the kidneys.
Lead-in What is the name of the biologically active form of vitamin D?
Option A Calcifediol
Option B Calcitriol
Option C Cholecalciferol
Option D Ergocalciferol
Option E 25-hydroxyergocalciferol
Correct answer Calcitriol

Stem of the Question The LHRH test can be useful in assessing pubertal disorders.
Lead-in What response would be expected in a case of gonadotrophin-independent precocious puberty?
Option A Elevated basal LH/ FSH concentrations with an exaggerated response to LHRH
Option B Elevated basal LH/ FSH concentrations with flat response to LHRH
Option C Pre-pubertal LH response with predominant FSH response to LHRH
Option D Suppressed basal LH/ FSH concentrations with an exaggerated response to LHRH
Option E Suppressed basal LH/ FSH concentrations with flat response to LHRH
Correct answer Suppressed basal LH/ FSH concentrations with flat response to LHRH

Stem of the Question Hurler syndrome (mucopolysaccharidosis type I) is a lysosomal storage disorder, inherited in an autosomal recessive manner.
Lead-in Hurler syndrome occurs due to a deficiency of which enzyme?
Option A Alpha galactosidase A
Option B Acid sphingomyelinase
Option C Iduronate-2-sulfatase
Option D α-L-iduronidase
Option E N-acetlyglucosaminidase
Correct answer α-L-iduronidase

Stem of the Question Daratumumab is a monoclonal antibody therapy used in the treatment of relapsed or refractory plasma cell myeloma.
Lead-in There have been concerns raised about interference of this drug in serum protein electrophoresis and immunofixation electrophoresis methods. What M-protein type does the drug mimic?
Option A IgAκ
Option B IgGκ
Option C IgGλ
Option D IgMκ
Option E IgMλ
Correct answer IgGκ

Stem of the Question Primary Biliary Cirrhosis (PBC) is an uncommon autoimmune disorder targeting intrahepatic bile ducts. The median age at onset is 50 years with a female to male ratio of 6:1. It typically presents as an asymptomatic elevation of ALP, but may present with features of cholestasis or with fatigue.
Lead-in What type of antibody is most commonly associated with PBC?
Option A Anti-mitochondrial antibody
Option B Anti-neutrophil cytoplasmic antibody
Option C Anti-nuclear antibody
Option D Anti-smooth muscle antibody
Option E Anti-tissue transglutaminase antibody
Correct answer Anti-mitochondrial antibody

Stem of the Question Cystinuria is an inherited condition characterised by high concentrations of cystine in the urine, which results in the formation of cystine stones in the kidney, ureter and bladder.
Lead-in What is the mode of inheritance of cystinuria?
Option A Autosomal dominant
Option B Autosomal recessive
Option C Co-dominant
Option D Mitochondrial
Option E X-linked
Correct answer Autosomal recessive

Stem of the Question Meltzer’s triad describes the classical symptoms associated with polyclonal cryoglobulinaemia.
Lead-in What are the 3 symptoms?
Option A Anaemia, arthralgia, purpura
Option B Anaemia, purpura, Raynaud’s phenomenon
Option C Arthralgia, purpura, Raynaud’s phenomenon
Option D Arthralgia, purpura, weakness
Option E Purpura, Raynaud’s phenomenon, weakness
Correct answer Arthralgia, purpura, weakness

Stem of the Question Familial dysbetalipoproteinaemia is caused by mutations in the APOE gene. Patients with this condition are at increased cardiovascular risk.
Lead-in According to the Fredrickson criteria for classifying primary hyperlipidaemias, which classification does familial dysbetalipoproteinaemia fall into?
Option A Type I
Option B Type IIa
Option C Type IIb
Option D Type III
Option E Type IV
Correct answer Type III

Stem of the Question Urate is measured as part of the management of patients with gout and is formed as the end product of purine metabolism. Purine synthesis is an expensive process and as such there is a salvage pathway for their recovery.
Lead-in Which of the following enzymes is involved in the salvage pathway?
Option A Guanase
Option B Hypoxanthine-guanine phosphoribosyl transferase
Option C Nucleotidase
Option D Purine nucleoside phosphorylase
Option E Xanthine oxidase
Correct answer Hypoxanthine-guanine phosphoribosyl transferase

Stem of the Question Ornitine transcarbamylase (OTC) deficiency is the most common urea cycle disorder. It is inherited in an x-linked manner and results in accumulation of ammonia in the blood.

Lead-in OTC is the final enzyme in the proximal portion of the urea cycle. It is required for the conversion of ornithine into which amino acid?
Option A Arginine
Option B Arginosuccinate
Option C Aspartate
Option D Citrulline
Option E Fumarate
Correct answer Citrulline

Stem of the Question Exposure to carbon monoxide causes tissue hypoxia as it binds to haemoglobin with a much higher affinity than oxygen does, forming carboxyhaemoglobin.
Lead-in Approximately how many times higher is the affinity of carbon monoxide for haemoglobin, compared to oxygen?
Option A 50 – 100 times
Option B 100 – 150 times
Option C 150 – 200 times
Option D 200 – 250 times
Option E 250 – 300 times
Correct answer 200 – 250 times

Stem of the Question A 35-year-old lady with a BMI of 32 Kg/m^2 attended the midwife for her booking appointment during her first pregnancy. On review the lady admits that she is tired, drinking a lot of water and is concerned as her sister had diabetes when she was pregnant.
Lead-in According to the NICE guidelines what test should be used to screen for diabetes in this patient?
Option A 2hr 75g oral glucose tolerance test carried out as soon as possible
Option B 2hr 75g oral glucose tolerance test carried out at 24 – 28 weeks of pregnancy
Option C Fasting plasma glucose
Option D HbA1c
Option E Random blood glucose
Correct answer 2hr 75g oral glucose tolerance test carried out as soon as possible

Stem of the Question

Pre-analytical factors can affect the quality of laboratory results, and can lead to spurious results that may, ultimately, affect patient care. The following results were obtained on a sample from a patient admitted to the accident and emergency department. The patient was on an IV drip containing 0.9% saline at the time of sampling.

Sodium	165mmol/L
Potassium	HAEM
Chloride	70mmol/L
Bicarbonate	10mmol/L
Urea	4.2mmol/L
Creatinine	41µmol/L
eGFR	>59

Lead-in

What is the most likely cause of these results?

Option A

Analytical error, due to short sampling on the analyser

Option B

Sample contamination from an IV drip – ‘drip arm sample’

Option C

Sample contamination with potassium EDTA

Option D

Sample contamination with sodium citrate

Option E

Severe dehydration causing hypernatraemia

Correct answer

Sample contamination with sodium citrate

Stem of the Question Lithium is used in the treatment and prophylaxis of manic depression and psychosis. Its narrow therapeutic window (0.4 - 1.0 mmol/L) and self-perpetuating toxicity make monitoring of plasma levels essential throughout treatment.
Lead-in Which technique for measurement of lithium, employing the use of a substituted porphyrin compound, is commonly available on routine laboratory analysers?
Option A Colorimetric
Option B Fluorescence polarisation
Option C Immunoturbidimetric
Option D Ion-selective electrode
Option E Potentiometric
Correct answer Colorimetric

Stem of the Question B vitamins are water soluble vitamins which play important roles in cellular metabolism.
Lead-in Deficiency of which B vitamin can result in a macrocytic anaemia and elevated homocysteine concentration? Deficiency in pregnant women may lead to birth defects, and supplementation is recommended pre-conception and during the first trimester of pregnancy.
Option A Vitamin B1
Option B Vitamin B3
Option C Vitamin B6
Option D Vitamin B9
Option E Vitamin B12
Correct answer Vitamin B9

Stem of the Question Porphyria cutanea tarda (PCT) is the most common of all the porphyrias. It is usually sporadic with only 10-20% of cases familial. It is a cutaneous porphyria with skin lesions that include fragile skin, subepidermal bullae, pigmentation and hypertrichosis.
Lead-in Which enzyme is affected by PCT?
Option A Coproporphyrinogen oxidase
Option B Ferrochetalase
Option C Haem oxygenase
Option D Porphobilinogen synthase
Option E Uroporphyrinogen decarboxylase
Correct answer Uroporphyrinogen decarboxylase

Stem of the Question Heparin is a naturally occurring anticoagulant, produced by basophils and mast cells.
Lead-in Heparin acts by binding to which molecule?
Option A Antithrombin III
Option B Factor IIa
Option C Factor Xa
Option D Fibrinogen
Option E Thrombin
Correct answer Antithrombin III

Stem of the Question High Performance Liquid Chromatography (HPLC) is a technique commonly used to separate, identify and quantify component parts of a solution.
Lead-in Which type of HPLC has a non-polar stationary phase and an aqueous, moderately polar mobile phase?
Option A Displacement HPLC
Option B Ion-exchange HPLC
Option C Normal-phase HPLC
Option D Partition HPLC
Option E Reversed-phase HPLC
Correct answer Reversed-phase HPLC

Stem of the Question
Lead-in According to the Beer Lambert law A=Ɛcl, what does Ɛ represent?
Option A Attenuation cross section
Option B Avagadro constant
Option C Molar attenuation coefficient
Option D Molar concentration
Option E Path length
Correct answer Molar attenuation coefficient

Stem of the Question Renal Tubular Acidosis (RTA) is a group of disorders affecting the overall ability of the renal tubules either to secrete hydrogen ions (H^+) or to retain bicarbonate ions (HCO_3^-).
Lead-in The most common form of RTA is type IV RTA, resulting in hyperkalaemia and acidosis in a patient with mild, chronic renal insufficiency, usually caused by tubulo-interstitial disease or diabetes. How does this disorder affect the renin-angiotensin-aldosterone system?
Option A Hyperreninaemic hyperaldosteronism
Option B Hyperreninaemic hypoaldosteronism
Option C Hyporeninaemic hyperaldosteronism
Option D Hyporeninaemic hypoaldosteronism
Option E No effect on this system
Correct answer Hyporeninaemic hypoaldosteronism

Stem of the Question Congenital Adrenal Hyperplasia (CAH) results from a genetically determined defect in the biosynthesis of adrenal steroids.
Lead-in In the adrenal biosynthetic pathway, which enzyme deficiency results in an impaired conversion of pregnenolone to progesterone?
Option A 11β hydroxylase deficiency
Option B 17α hydroxylase deficiency
Option C 21 hydroxylase deficiency
Option D 3β hydroxysteroid dehydrogenase deficiency
Option E Star protein deficiency
Correct answer 3β hydroxysteroid dehydrogenase deficiency

Stem of the Question Osteocalcin is a gla protein produced by osteoblasts. Higher osteocalcin concentrations have been shown to correlate with increases in bone mineral density during treatment with anabolic bone formation drugs for osteoporosis.
Lead-in Which vitamin is its synthesis dependent on?
Option A Vitamin A
Option B Vitamin B12
Option C Vitamin C
Option D Vitamin D
Option E Vitamin K
Correct answer Vitamin K

Stem of the Question A 32-year-old female patient presents to her GP with symptoms of flushing, diarrhoea and wheezing. Following exclusion of other causes, the GP considers a neuroendocrine tumour, and requests urinary 5HIAA measurement.
Lead-in 5HIAA is the main metabolite of which neurotransmitter?
Option A Adrenaline
Option B Dopamine
Option C Histamine
Option D Noradrenaline
Option E Serotonin
Correct answer Serotonin

Stem of the Question In 1859, Berthelot described a reaction between ammonia and an alkaline solution of phenol hypochlorite suitable for the determination of ammonia. The assay, however, proved to be subject to interferences, and several alternatives have been proposed to eliminate the problems inherent in the method. Today the most frequently used methods are enzymatic methods based upon the action of glutamate dehydrogenase.
Lead-in In the reaction catalyzed by glutamate dehydrogenase (GLDH), ammonia reacts with which molecule and NADPH to form glutamate and NADP+ ?
Option A α-ketoglutarate
Option B Acetyl-CoA
Option C Fumarate
Option D Isocitrate
Option E Succinyl-CoA
Correct answer α-ketoglutarate

Stem of the Question An elderly man was admitted to hospital by his GP for exacerbation of his COPD and LVF. He was treated on the ward with bendrofluazide and iv furosemide where it was noted that he had developed a metabolic alkalosis.
Lead-in What biochemical findings indicate a metabolic alkalosis?
Option A Decreased H+, decreased plasma bicarbonate
Option B Decreased H+, increased plasma bicarbonate
Option C Decreased H+, normal plasma bicarbonate
Option D Increased H+, decreased plasma bicarbonate
Option E Increased H+, increased plasma bicarbonate
Correct answer Decreased H+, increased plasma bicarbonate

Stem of the Question Paracetamol is a common OTC medication which has analgesic, antipyretic and weak anti-inflammatory actions.
Lead-in A small amount of the drug (about 5 – 10% of a therapeutic dose) is oxidised by cytochrome p450 enzymes to produce N-acetly-*p*-benzoquinone imine (NABQI), a hepato and nephrotoxic metabolite. NAPQI is detoxified through which metabolic pathway?
Option A Glucuronidation
Option B Glutathione conjugation
Option C Glycine conjugation
Option D N-hydroxylation
Option E Sulfation
Correct answer Glutathione conjugation

Stem of the Question IV fluids are often given to ward patients in bags of either 5% dextrose or 0.9% NaCl. 0.9% NaCl is often referred to as “physiological saline”.
Lead-in How many mmol of Na are in a 1 Litre (1000 mL) bag of 0.9% NaCl? (Molecular Weight Na = 23, Molecular Weight Cl = 35)
Option A 77 mmol
Option B 135 mmol
Option C 154 mmol
Option D 158 mmol
Option E 308 mmol
Correct answer 154 mmol

Stem of the Question

A 40-year-old female was admitted on several occasions to the accident and emergency department with dizziness, blurred vision, sweating, palpitations and confusion. Her symptoms resolved after administration of glucose. Results on one of these occasions are as follows:

Glucose 2.5 (3.0 – 8.0 mmol/L)
Insulin <1.0 (< 13 mmol/L)
C-peptide <0.10 (0.36 – 1.12 mmol/L)
Hydroxybutyrate 5.77 (<0.45 mmol/L)

Lead-in

What is the most likely diagnosis?

Option A

Addison's Disease

Option B

Hyperthroidism

Option C

Non-islet cell tumour

Option D

Sulphonylurea overdose

Option E

Surreptitious insulin use

Correct answer

Addison's Disease

Stem of the Question A phaeochromocytoma is a tumour arising from adrenomedullary chromaffin cells that commonly produces one or more catecholamines: epinephrine, norepinephrine and dopamine. It is recommended that initial screening should be done by measuring plasma free or urinary fractionated metanephrines.
Lead-in What type of medication commonly causes falsely elevated test results when measuring plasma and urinary metanephrines?
Option A ACE inhibitors
Option B Aminoglycosides
Option C Loop diuretics
Option D NSAIDs
Option E Tricylic antidepressants
Correct answer Tricylic antidepressants

Stem of the Question Antenatal screening for Down's syndrome is provided to pregnant women during the first trimester or the second trimester. Second trimester screening normally only takes place if the pregnancy has been identified after the first trimester or the first appointment has been missed. Second trimester screening involves the measurement of the biomarkers alpha fetoprotein (AFP), total human chorionic gonadotrophin (hCG), inhibin A and unconjugated oestriol (uE3) as well as other clinical details such as weight, smoking status etc.
Lead-in What combination of biomarkers used for second trimester screening constitutes a pregnancy with a high risk of Down's syndrome?
Option A ↑hCG, ↓Inhibin A ↑uE3 ↓AFP
Option B ↑hCG, ↑Inhibin A ↑uE3 ↓AFP
Option C ↑hCG, ↑Inhibin A ↓uE3 ↓AFP
Option D ↓hCG, ↓Inhibin A ↑uE3 ↑AFP
Option E ↓hCG, ↑Inhibin A ↑uE3 ↓AFP
Correct answer ↑hCG, ↑Inhibin A ↓uE3 ↓AFP

Stem of the Question A short synacthen test is used to investigate suspected hypoadrenalism. Synacthen is tetracoasactrin, the first 24 amino acids of ACTH. To perform a short synacthen test first a basal sample is taken for cortisol, the patient is then given intravenous or intramuscular synacthen and another sample is taken for cortisol at 30 minutes.
Lead-in How much synacthen is given during a standard short synacthen test?
Option A 150 µg
Option B 200 µg
Option C 250 µg
Option D 200 mg
Option E 250 mg
Correct answer 250 µg

Stem of the Question Hereditary Fructose Intolerance (HFI) is an inborn error of fructose metabolism. Individuals usually present after weaning or if given supplementary fructose containing food. Symptoms include vomiting, apathy, coma, liver dysfunction, hypoglycaemia and renal tubular dysfunction.
Lead-in Which enzyme is deficient in HFI?
Option A Aldolase A
Option B Aldolase B
Option C Fructokinase
Option D Galactokinase
Option E Phosphofructokinase
Correct answer Aldolase B

Stem of the Question Kallman Syndrome is characterised by hypogonadotropic hypogonadism with anosmia.
Lead-in Which hypothalamic hormone is deficient in Kallman Syndrome?
Option A Corticotropin-releasing hormone (CRH)
Option B Dopamine (DA)
Option C Gonadotropin-releasing hormone (GnRH)
Option D Growth-hormone-inhibiting hormone (GHIH)
Option E Growth-hormone-releasing hormone (GHRH)
Correct answer Gonadotropin-releasing hormone (GnRH)

Stem of the Question A 45-year old lady presented to her General Practitioner with vague abdominal symptoms and polyuria associated with polydipsia. There is no history of mental illness. The GP did some blood tests. U/Es, LFTs, fasting glucose and thyroid function were within reference limits. The phosphate was modestly low at 0.58 mmol/L and the calcium was unequivocally elevated at 3.12 mmol/L along with an elevated parathyroid hormone (PTH) at 14.1 pmol/L.
Lead-in What is the most likely diagnosis?
Option A Cancer of colon
Option B Primary hyperparathyroidism
Option C Primary polydipsia
Option D Renal tubular disease
Option E Secondary hyperparathyroidism
Correct answer Primary hyperparathyroidism

Stem of the Question Blood lactate concentration is determined by the rate of production (from muscle, brain, skin, renal medulla and erythrocytes) and rate of metabolism in the liver and kidneys. The Cori cycle converts glucose to lactate in the periphery, and re-conversion of lactate to glucose in the liver. Lactic acidosis occurs when rate of production exceeds rate of removal.
Lead-in Which form of lactic acidosis is not detected by routine lactate measurements, and is a result of absorption from abnormal intestinal bacteria?
Option A A-lactate
Option B B-lactate
Option C C-lactate
Option D D-lactate
Option E E-lactate
Correct answer D-lactate

Stem of the Question Statins are used in the primary and secondary prevention of cardiovascular disease.
Lead-in Which Cytochrome P450 enzyme metabolises atorvastatin?
Option A CYP2C8
Option B CYP2C9
Option C CYP2C19
Option D CYP3A4
Option E CYP3A7
Correct answer CYP3A4

Stem of the Question The glomerular filtration rate (GFR) is widely considered the best overall index of kidney function in health and disease. Because direct measurements of GFR cannot always be performed in clinical routine settings, various formulas have been proposed to estimate the GFR (eGFR). In these formulas, serum creatinine is most commonly used as a marker for renal function.
Lead-in Forumlae used in adults tend to overestimate GFR in children, and several paediatric equations are available. These paediatric equations tend to use serum creatinine, age and which other variable?
Option A Body mass index
Option B Body surface area
Option C Head circumference
Option D Height
Option E Weight
Correct answer Height

Stem of the Question

A 45-year-old woman visits her GP as she has been experiencing hot flushes and menstrual irregularity. She has been on the progesterone only pill for 2 years.

A request is sent to the laboratory with the clinical details '?menopausal' and the results are as follows;

FSH	0.9 U/L	(3.0 – 10.0)
LH	1.2 U/L	(2.0 – 9.0)
Oestradiol	562 pmol/L	(75 – 140)

Lead-in

What is the most likely cause of these results?

Option A

Not possible to interpret results due to contraceptive pill

Option B

Possible hypopituitariusm - further pituitary function tests should be added in view of the low gonadotrophins

Option C

Results are consistent with normal cyclical variation

Option D

She is peri-menopausal

Option E

The raised oestradiol suggests she may be on oestrogen supplements

Correct answer
Results are consistent with normal cyclical variation

Stem of the Question C-reactive protein (CRP) is an acute phase reactant produced by the liver that is released into the blood within a few hours after tissue injury, the start of an infection or other inflammatory process.
Lead-in CRP is produced in response to which cytokine, secreted by macrophages and T cells?
Option A Interleukin 1
Option B Interleukin 4
Option C Interleukin 6
Option D Interleukin 9
Option E Interleukin 15
Correct answer Interleukin 6

Stem of the Question
Lead-in Multiple endocrine neoplasia type 1 (MEN-1) is a group of disorders that affect the endocrine system through development of neoplastic lesions in which glands?
Option A Pancreas, parathyroid, adrenal
Option B Pituitary, parathyroid, pancreas
Option C Pituitary, thyroid, parathyroid
Option D Thyroid, pancreas, pituitary
Option E Thyroid, parathyroid, adrenal
Correct answer Pituitary, parathyroid, pancreas

Stem of the Question Refeeding syndrome is a syndrome consisting of metabolic disturbances that occur as a result of reinstitution of nutrition to malnourished patients. It is associated with significant morbidity and mortality.
Lead-in What is the hallmark laboratory feature of this disorder?
Option A Hyperkalaemia
Option B Hypermagnesaemia
Option C Hyperuricaemia
Option D Hypoglycaemia
Option E Hypophosphataemia
Correct answer Hypophosphataemia

Stem of the Question Bartter syndrome and Gitelman syndrome are autosomal recessive disorders with characteristic sets of metabolic abnormalities, which include hypokalaemia, hyperreninaemia, hyperplasia of the juxtaglomerular, and hyperaldosteronism.
Lead-in Which acid-base disorder is also characteristic of these syndromes?
Option A Metabolic acidosis
Option B Metabolic alkalosis
Option C Mixed metabolic acidosis with respiratory alkalosis
Option D Respiratory acidosis
Option E Respiratory alkalosis
Correct answer Metabolic alkalosis

Stem of the Question

Measurement of oxyhaemoglobin and bilirubin in CSF is an important second line test in patients suspected of having had a subarachnoid haemorrhage. An equation can be used to minimise false positive results from an increased serum bilirubin when there is bilirubin detected, but the oxyhaemoglobin concentration is below the cut off. The predicted absorbance due to serum bilirubin is calculated, then subtracted from the measured bilirubin concentration.

Lead-in

What is the equation that can be used to calculate the predicted absorbance (PA) of CSF at 476nm due to increased serum bilirubin?

Option A

$$PA = \frac{\text{Serum total protein (g/L)}}{\text{CSF total protein (g/L)}} \times \text{Serum bilirubin (µmol/L)} \times 0.042\text{AU}$$

Option B

$$PA = \frac{\text{CSF total protein (g/L)}}{\text{Serum total protein (g/L)}} \times \text{Serum bilirubin (µmol/L)} \times 0.042\text{AU}$$

Option C

$$PA = \frac{\text{Serum bilirubin (µmol/L)}}{\text{CSF bilirubin (µmol/L)}} \times \text{Serum protein (µmol/L)} \times 0.042\text{AU}$$

Option D

$$PA = \frac{\text{CSF total protein (g/L)}}{\text{Serum total protein (g/L)}} \times \text{Serum bilirubin (µmol/L)} \times 0.056\text{AU}$$

Option E

$$PA = \frac{\text{CSF bilirubin (µmol/L)}}{\text{Serum bilirubin (µmol/L)}} \times \text{Serum protein (µmol/L)} \times 0.056\text{AU}$$

Correct answer

$$PA = \frac{\text{CSF total protein (g/L)}}{\text{Serum total protein (g/L)}} \times \text{Serum bilirubin (µmol/L)} \times 0.042\text{AU}$$