CLINICAL HAEMATOLOGY-ONCOLOGY MCQs

Q-1

A 10-year-old boy is referred to you following his 7th course of antibiotics for lower respiratory tract infection in the last 6 years. He has difficult to control eczema for which he is currently on a topical steroid cream. His bloods are as follows

Hb	**139 g/l**
Platelets	**65 * 109/l**
WBC	**12.3 * 109/l**

In which of the following genes may you expect to see an abnormality?

A. WASP
B. PKD1
C. CFTR
D. HFE1
E. RET

ANSWER:
A. WASP

EXPLANATION:
The combination of frequent infections, eczema and thrombocytopenia are characteristic of the Wiskott-Aldrich syndrome, which is caused by an abnormality in the WASP gene.

The PKD1 gene is associated with polycystic kidney disease, CFTR with cystic fibrosis, HFE1 with haemochromatosis and RET an oncogene associated with multiple endocrine neoplasia and also Hirschsprung's disease.

Please see Wiskott-Aldrich Syndrome

Q-2

A patient with a history of recurrent thromboembolic events develops a deep vein thrombosis despite full anticoagulation with heparin. Which one of the following causes of thrombophilia is associated with resistance to heparin?

A. Protein S deficiency
B. Antithrombin III deficiency
C. Protein C deficiency
D. Lupus anticoagulant
E. Activated protein C resistance

ANSWER:
B. Antithrombin III deficiency

EXPLANATION:

Heparin works by binding to antithrombin III, enhancing its anticoagulant effect by inhibiting the formation of thrombin and other clotting factors. Patients with antithrombin III deficiency may therefore by resistant to heparin treatment

Please see Antithrombin III Deficiency

Q-3

A 45-year-old man of Afro-Caribbean origin attends his GP for a routine health check as part of his life insurance policy. He has a past medical history of depression, which has been well controlled for several years on citalopram. He is well, and denies any symptoms of physical illness.

You perform route blood tests, the results of which are shown below.

Hb	**145 g/L**	**Male: (135-180)**	**Female: (115 - 160)**
Platelets	**265 * 109/L**	**(150 - 400)**	
WBC	**3.2 * 109/L**	**(4.0 - 11.0)**	
Neuts	**0.8 * 109/L**	**(2.0 - 7.0)**	
Lymphs	**2.4 * 109/L**	**(1.0 - 3.5)**	
Na	**142 mmol/L**	**(135 - 145)**	
K	**3.9 mmol/L**	**(3.5 - 5.0)**	
Urea	**3.0 mmol/L**	**(2.0 - 7.0)**	
Creatinine	**65 µmol/L**	**(55 - 120)**	
CRP	**2 mg/L (< 5)**		

What is the most likely cause for the abnormality seen?

A. Acute myeloid leukaemia
B. Aplastic anaemia
C. Benign ethnic neutropaenia
D. Citalopram
E. Parvovirus B19 infection

ANSWER:

C. Benign ethnic neutropaenia

EXPLANATION:

Benign ethnic neutropaenia is common in people of black African and Afro-Caribbean ethnicity

The blood tests for this patient demonstrate a mild neutropaenia. The most likely explanation in this case is benign ethnic neutropaenia, which is common in people of black African and Afro-Caribbean ethnicity and requires no treatment.

Citalopram use is not associated with neutropaenia. Neutropaenia is a potential side effect of antipsychotic use, and is most commonly associated with clozapine, with an incidence of 2.6-3%.

There is no evidence of aplastic anaemia, as the patient has a normal haemoglobin and platelet count.

Parvovirus B19 infection (also known as slapped check infection) generally causes a mild, self-limiting condition, however some patients (usually with may experience a transient aplastic crisis. This patient has no viral symptoms to suggest infection.

Acute myeloid leukaemia (AML) generally presents with symptoms associated with pancytopaenia, such as fatigue, easily bleeding or bruising and frequent infections. This patient has a normal platelet count and haemoglobin, and is asymptomatic, therefore AML is unlikely.

Please see Neutropaenia

Q-4

You are arranging a blood transfusion for a patient who has been admitted with an upper gastrointestinal haemorrhage as their haemoglobin is 59 g/l. They are concerned about the risks of contracting diseases from the transfusion and ask specifically about the risk of variant Creutzfeldt-Jakob Disease (vCJD) transmission. What is the most appropriate advice with respect to vCJD?

A. There was never any risk of vCJD being transmitted via blood transfusion
B. There had previously been a small risk of vCJD transmission but the risk has now been eliminated through screening
C. Measures are taken to reduce the risk of vCJD transmission but there remains a very small risk of transmission
D. There is a significant chance of vCJD transmission to patients who are between the ages of 40-60 years
E. There is a significant chance of vCJD transmission to patients who are between the ages of 60-90 years

ANSWER:
C. Measures are taken to reduce the risk of vCJD transmission but there remains a very small risk of transmission

EXPLANATION:

Please see Blood Product Transfusion Complications

Q-5

A 34-year-old man who is known to have type 1 von Willebrand's disease asks for advice. He is due to have a tooth extracted at the dentist next week. Which one of the following is the most appropriate management to reduce the risk of bleeding?

A. Mefanamic acid
B. Vitamin K
C. Desmopressin
D. Factor VIII concentrate
E. Factor VII concentrate

ANSWER:
C. Desmopressin

EXPLANATION:

Blood products such as factor VIII concentrate should be avoided when possible to minimise the risk of transfusion acquired viral illnesses.

Please see von Willebrand's Disease

Q-6

A 74-year-old male is seen on the acute medical ward with a history of persistent frontal headaches associated with blurred vision for the past week. On further questioning, the patient reports a history of worsening fatigue and shortness of breath over the preceding 2 months.

The results of preliminary investigations are as follows:

Hb	**98 g/l**
Platelets	**100 * 109/l**
WBC	**6 * 109/l**
Erythrocyte Sedimentation Rate	**50mm/hr**

On examination you note that the patient has enlarged cervical lymph nodes and palpable splenomegaly.

Which of the following conditions is most likely to be the cause of the patient's symptoms?

A. Hodgkin's lymphoma
B. Multiple myeloma
C. Acute myeloid leukaemia
D. Waldenstrom's macroglobulinaemia
E. Acute lymphoblastic leukaemia

ANSWER:

D. Waldenstrom's macroglobulinaemia

EXPLANATION:

Patients with Waldenstrom's macroglobulinaemia often present with issues secondary to hyperviscosity

Waldenstrom's macroglobulinaemia is a form of lymphoplasmacytoid lymphoma (LPL), characterised by a monoclonal IgM paraproteinaemia. This paraproteinaemia leads to systemic symptoms of hyperviscosity such as headaches, visual disturbances and in rarer cases, strokes and ischaemic organ damage.

Many patients often present with issues secondary to this hyperviscosity, as well as the more generalised systemic symptoms and signs common to many haematological diseases.

1) Hodgkin's lymphoma, although likely to cause cervical lymphadenopathy and splenomegaly, is not usually associated with thrombocytopaenia or issues secondary to hyperviscosity

2) Multiple myeloma often causes bony pain in areas of lesions and isn't often associated with lymphadenopathy or organomegaly

3) AML doesn't usually cause lymphadenopathy or splenomegaly.

5) ALL is less common in adults, and although capable of causing lymphadenopathy and splenomegaly, would not usually be associated with symptoms of hyperviscosity

Please see Waldenstrom's Macroglobulinaemia

Q-7

A 64-year-old man is reviewed in the haematology clinic. Which one of the following features would suggest that a diagnosis monoclonal gammopathy of undetermined significance is more likely than myeloma?

A. Bone pain
B. IgG paraprotein band = 18g/l
C. Creatinine = 160 µmol/l
D. Raised beta-2 microglobulin
E. Lytic lesions on x-ray

ANSWER:
B. IgG paraprotein band = 18g/l

EXPLANATION:
Paraproteinaemia is seen in both myeloma and monoclonal gammopathy of undetermined significance (MGUS) - at this level a diagnosis of MGUS is more likely. The other features indicate myeloma

Please see MGUS

Q-8

A 17-year-old girl with known sickle cell disease attends the emergency department with a 1 day history of neck and back pain, and fevers. She has experienced a rapidly worsening dyspnoea, but denies chest pain.

On examination, the patient is pale and lethargic, but not jaundiced. There is considerable bony tenderness along the thoracic and cervical spine. She has bilateral non-tender cervical lymphadenopathy. There is no palpable hepatosplenomegaly.

Her observations were as follows:
Blood pressure - 98/64mmHg, heart rate - 98bpm, temperature - 39.1ºC, oxygen saturations - 88% on air, respiratory rate - 26/min.

Blood tests revealed:

Hb	**54 g/L**	**Female: (115 - 160)**
Platelets	**301 * 109/L**	**(150 - 400)**
WBC	**3.6 * 109/L**	**(4.0 - 11.0)**
Reticulocytes	**0.3%**	**(0.5 - 1.5)**

Examination of her notes reveals a baseline haemoglobin of 110g/L.

What is the most likely diagnosis?

A. Sequestration crisis
B. Aplastic crisis
C. Vaso-occlusive crisis
D. Osteomyelitis
E. Haemolytic crises

ANSWER:
B. Aplastic crises

EXPLANATION:
Aplastic crises in sickle cell disease are associated with a sudden drop in haemoglobin

Option 1. Incorrect - while this is a logical and important differential for a decrease in haemoglobin, the lack of significant splenomegaly or hypotension drastically reduces the likelihood. Sequestration crises occur due to sickling of cells within the splenic vasculature, and resultant trapping of significant blood volume within the spleen itself.

Option 2. Correct - the sudden decrease in haemoglobin, alongside bone pain and reticulocytopoenia point towards an aplastic crisis. Aplastic crises are a result of a sudden arrest of bone marrow erythropoiesis, commonly due to parvovirus B19 infection. The lack of red cell production is evidenced by the low circulating level of reticulocytes. Recurrence is rare, due to immunity.

Option 3. Incorrect - vaso-occlusive crises typically present with extremely severe, deep bone pain, and are not normally associated with such a severe drop in haemoglobin.

Option 4. Incorrect - osteomyelitis is an important differential in the setting of bony pain, where infection arises from areas of bone infarction. In this instance it does not explain the blood test results nor the dyspnoea.

Option 5. Incorrect - haemolytic crises are extremely rare and are strongly disputed over. It is only important to note the reasoning why this is not a haemolytic crisis: in such an event there would be significant reticulocytosis as well as a pre-hepatic jaundice, neither of which are observed here.

Please see Sickle-Cell Crises

Q-9

A 45-year-old woman who is being treated for Hodgkin's lymphoma with ABVD chemotherapy is reviewed on the haematology ward.

Six days ago she was admitted with a fever of 38.9ºC. After admission she was immediately started on piperacillin with tazobactam (Tazocin). Her blood count on arrival was as follows:

Hb	**10.1 g/dl**
Platelets	**311 * 109/l**
WBC	**0.8 * 109/l**
Neutrophils	**0.35 * 109/l**
Lymphocytes	**0.35 * 109/l**

After 48 hours she remained febrile and tachycardic, Tazocin was stopped and meropenem + vancomycin prescribed.

Today, six days after being admitted she remains unwell with a temperature of 38.4ºC. Blood pressure is 102/66 mmHg and the heart rate is 96/min. Respiratory examination remains unremarkable and blood/urine cultures have failed to show any cause for the fever. What is the most appropriate next step?

A. Add amphotericin B
B. Add G-CSF
C. Add gentamicin
D. Add aciclovir
E. Refer for a stem cell transplant

ANSWER:
A. Add amphotericin B

EXPLANATION:
This patient meets the diagnostic criteria for neutropenic sepsis. After failing to respond to standard empirical treatment the questions is what to do next.

There are no guidelines that can fit every patient & scenario. The decision to use antifungals is now often taken after risk stratifying patients and ordering investigations such as HRCT, Aspergillus PCR etc to determine the likelihood of systemic fungal infection. For the purposes of the exam however the answer is often to give antifungals empirically.

G-CSF is not used routinely in neutropenic sepsis.

Please see Neutropenic Sepsis

Q-10

A 48-year-old man is started on a course of chemotherapy for bladder cancer. Three days after his first dose of chemotherapy, he becomes unwell and is admitted to the hospital following a seizure. His blood result shows the following:

Na+	**136 mmol/L**	**(135 - 145)**
K+	**3.5 mmol/L**	**(3.5 - 5.0)**
Calcium	**2.1 mmol/L**	**(2.1-2.6)**
Phosphate	**0.8 mmol/L**	**(0.8-1.4)**
Magnesium	**0.21 mmol/L**	**(0.7-1.0)**
Uric acid	**0.42 mmol/L**	**(0.18 - 0.48)**

Which of the following chemotherapy agent is most consistent with this presentation?

A. Cisplatin
B. Bleomycin
C. Doxorubicin
D. Cyclophosphamide
E. Vincristine

ANSWER:
A. Cisplatin

EXPLANATION:
Cisplatin is associated with hypomagnesaemia

The correct answer is cisplatin. This patient has a low magnesium level. This patient is likely to have developed a seizure secondary to hypomagnesaemia which is one of the side effects of this treatment. Other adverse effects include ototoxicity and peripheral neuropathy.

Both bleomycin and doxorubicin do not cause electrolyte disturbances. The most significant adverse effects of bleomycin is lung fibrosis, whilst for doxorubicin, it is cardiotoxicity.

Cyclophosphamide and vincristine can cause electrolyte disturbance in the form of hyponatraemia. This patient's sodium level is normal and therefore these are unlikely to be the cause of his presentation and biochemical findings.

The adverse effects of cyclophosphamide include hyponatraemia by causing SIADH, haemorrhagic cystitis and myelosuppression. This treatment is also carcinogenic and may increase the risk of developing transitional cell carcinoma of the bladder.

The adverse effects of vincristine include hyponatraemia, alopecia, peripheral neuropathy and constipation.

Please see Cytotoxic Agents

Q-11

Which one of the following statements regarding allergy testing is incorrect?

A. Both irritants and allergens may be tested for using skin patch testing
B. The radioallergosorbent test determines the level of IgE to a specific allergen
C. Skin prick testing is easy to perform and inexpensive
D. Skin prick testing should be read after 48 hours
E. Skin prick testing normally includes a histamine control

ANSWER:
D. Skin prick testing should be read after 48 hours

EXPLANATION:
Skin prick testing can be read after 15-20 minutes. Skin patch testing is read after 48 hours

Please see Allergy Tests

Q-12

A 71-year-old woman who is known to have multiple myeloma is admitted with confusion. Blood tests show the following:

Corrected calcium 2.91 mmol/l

Which one of the following is the most significant cause of the raised calcium level?

A. Adverse effects of standard treatment
B. Increased osteoclastic activation
C. Impaired renal function
D. Increased renal tubular calcium reabsorption
E. Elevated PTH-rP levels

ANSWER:
B. Increased osteoclastic activation

EXPLANATION:

Please see Myeloma: Features

Q-13

A nurse who is known to have an allergy to latex develops a widespread urticarial rash and facial oedema shortly after eating lunch. Which food is she most likely to have consumed?

A. Peanut
B. Apple
C. Grapes
D. Pear
E. Banana

ANSWER:
E. Banana

EXPLANATION:
The nurse is likely to suffer from latex-fruit syndrome.

Please see Latex Allergy

Q-14

A 25-year-old man presents with bloating and alteration in his bowel habit. He has been keeping a food diary and feels his symptoms may be secondary to a food allergy. Blood tests show a normal full blood count, ESR and thyroid function tests. Anti-endomysial antibodies are negative. What is the most suitable test to investigate possible food allergy?

A. Total IgE levels
B. Hair analysis
C. Skin patch testing
D. Skin prick test
E. Jejunal biopsy

ANSWER:

D. Skin prick test

EXPLANATION:

Skin prick testing would be first-line here as it is inexpensive and a large number of allergens can be investigated. Whilst there is a role for IgE testing in food allergy it is in the form of specific IgE antibodies rather than total IgE levels.

Please see Allergy Tests

Q-15

A 49-year-old woman is referred to the haematology clinic with easy bruising and recurrent epistaxis. She is otherwise well. Blood tests reveal the following:

Hb	**12.9 g/dl**
Platelets	**19 * 109/l**
WCC	**6.6 * 109/l**

The patient refuses consent for a bone marrow examination. What is the most appropriate initial management?

A. Platelet transfusion
B. Oral prednisolone
C. No treatment
D. ABVD chemotherapy
E. Splenectomy

ITP - give oral prednisolone

ANSWER:

B. Oral prednisolone

EXPLANATION:

The likely diagnosis in this patient is idiopathic thrombocytopenic purpura. The first line treatment in such patients is high-dose prednisolone. Bone marrow examination would demonstrate increased megakaryocytes

Please see ITP: Investigation and Management

Q-16

A 32-year-old woman attends general practice complaining of a 12 month history of intermittently heavy periods. On further questioning, she reports nosebleeds up to 6-8 times a week for 2 months, as well as frequent atraumatic bruising. She has had no weight loss or fevers, and denies any abdominal pain or arthralgia.

She has no significant medical or drug history, and takes no regular medications nor any herbal remedies.

She has no family history of bleeding pathologies. She has had no recent travel.

On examination, she has a multiple purpura on her sacrum, which extend down to the buttocks. She does not have any palpable lymphadenopathy nor any hepatosplenomegaly. Urine dip is normal.

Blood tests reveal:

Hb	**124 g/L**	**Female: (115 - 160)**
Platelets	**18*109/L**	**(150 - 400)**
WBC	**7*109/L**	**(4.0 - 11.0)**
Prothrombin time (PT)	**12 secs**	**(10-14 secs)**
Activated partial thromboplastin time (APTT)	**28 secs**	**(25-35 secs)**
ESR	**2 mm/hr**	**Women: < ((age + 10) / 2)**

What is the most likely diagnosis?

A. Henoch-Schonlein purpura
B. Immune thrombocytopenia (ITP)
C. Von Willebrand disease
D. Thrombotic thrombocytopenic purpura
E. Haemolytic uraemic syndrome

ANSWER:
B. Immune thrombocytopenia (ITP)

EXPLANATION:
ITP should be considered in the presence of symptoms that suggest isolated thrombocytopenia e.g. epistaxis, menorrhagia

Option 1. Incorrect - Henoch-Shonlein purpura (HSP) occurs mainly in children and is typically accompanied by abdominal pain, arthralgia and renal dysfunction, none of which were present here. The blood tests in HSP normally would not display thrombocytopenia, as the mechanism of purpura is different: in HSP the purpura is related to the IgA complex deposition in the small vessels.

Option 2. Correct - ITP classically presents with frequent bruising and easy bleeding. It is a diagnosis of exclusion and relies on other more sinister pathologies to be excluded e.g. myelodysplasia, leukaemia, vasculitides. Therefore a thorough workup should always be performed. Patients with primary ITP are typically well and have no related systemic symptoms.

Option 3. Incorrect - Von Willebrand disease (VWD) is a good differential in a patient presenting with easy bleeding/bruising, and can often present with a normal activated partial thromboplastin time (aPTT) and thrombocytopenia. However, in VWD, the thrombocytopenia is usually less marked and there will likely be a positive family history.

Option 4. Incorrect - thrombotic thrombocytopenic purpura is thrombotic microangiopathy that typically presents with much more severe symptoms of end-organ damage due to vascular occlusion. The pentad of symptoms includes: fever, neurological signs, thrombocytopenia, haemolytic anaemia and renal impairment. This patient only had isolated thrombocytopenia and was generally well.

Option 5. Incorrect - haemolytic-uraemic syndrome is thrombotic microangiopathy that is secondary to certain bacterial infections (shigella, enterohaemorrhagic E. coli), therefore the presentation is usually preceded by a period of diarrhoea. The triad of symptoms includes: thrombocytopenia, haemolytic anaemia and renal impairment.

Please see Immune Thrombocytopenia (ITP) in Adults

Q-17

A 66-year-old man presents to the Emergency Department with a 5-day history of worsening breathlessness. He also reports a headache over a similar time period. He has noticed these symptoms are worsened on bending forward. He has a long-standing cough. He has a past medical history of small-cell lung cancer, chronic obstructive pulmonary disease (COPD), ischaemic heart disease and gout.

On examination, the patient is tachypnoeic with a respiratory rate of 25 breaths/min. Oxygen saturations are 92% on room air. Pulse is 90 beats per minute and blood pressure is 150/85 mmHg. Temperature is 37.2ºC.

You note the patient's face appears slightly flushed. The jugular venous pulse (JVP) is elevated. Heart sounds are normal. There are scattered crepitations in both bases, but the lungs are otherwise clear. There is bilateral pitting oedema to the calves but the patient reports this is longstanding.

Chest xray demonstrates hyperexpanded lungs, cardiomegaly and a mass in the right upper lobe.

Which of the following is the most likely explanation for this patient's presentation?

A. Acute exacerbation of COPD
B. Acute pulmonary oedema
C. Cardiac tamponade
D. Pulmonary embolism
E. Superior vena cava obstruction (SVCO)

ANSWER:
E. Superior vena cava obstruction (SVCO)

EXPLANATION:
SVC obstruction - oncological emergency

This patient's presentation is typical for SVCO. The history of lung malignancy, facial flushing, and the postural nature of symptoms are key features of this diagnosis. SVCO can be caused by external pressure, thrombus or direct tumour invasion causing obstruction of the SVC. It occurs in 5–10% of patients with a right-sided thoracic malignancy, most commonly lung cancer (70% of all cases), but also lymphoma and thymoma. If SVCO is suspected, urgent CT chest should be performed in order to confirm the diagnosis. Initial treatment includes sitting the patient up, oxygen and a stat dose of dexamethasone to help reduce swelling. Definitive management options include SVC stenting, radiotherapy and chemotherapy.

Acute exacerbation of COPD is incorrect. While this patient has a history of COPD, this presentation is not in keeping with an exacerbation, which would usually present with symptoms including worsened cough, increased sputum production, wheeze and hypoxia (and/or hypercarbia).

Acute pulmonary oedema is incorrect. This often presents with a short history of breathlessness, fatigue, and worsened peripheral oedema. The chest examination findings in this patient are not in keeping with this diagnosis.

Cardiac tamponade is incorrect. This can present with dyspnoea and may occur in patients with malignancy due to metastatic infiltration of the pericardium. Pulsus paradoxus is often present, and the JVP is seen to vary with respiration. Quiet heart sounds, hypotension and tachycardia are also key diagnostic features.

Pulmonary embolism is incorrect. This typically presents with symptoms including dyspnoea, pleuritic chest pain, haemoptysis and fever. Unilateral eg swelling may be present.

Please see Superior Vena Cava Obstruction

Q-18

A patient is diagnosed with acute lymphoblastic leukaemia after presenting with lethargy and easy bruising. Which one of the following is a marker of a bad prognosis in acute lymphoblastic leukaemia?

A. Pre-B phenotype
B. Presentation in childhood
C. Initial white cell count of 18 * 109/l
D. Female sex
E. Philadelphia chromosome positive

ANSWER:
E. Philadelphia chromosome positive

EXPLANATION:
Philadelphia translocation, t(9;22) - good prognosis in CML, poor prognosis in AML + ALL

Please see Acute Lymphoblastic Leukaemia: Prognostic Features

Q-19

A 27-year-old male is receiving cyclophosphamide as part of his chemotherapy for non-Hodgkin' lymphoma. What is the most appropriate management to reduce the likelihood of haemorrhagic cystitis?

A. Hydration + tranexamic acid
B. Hydration + twice-daily bladder washouts
C. Hydration + prophylactic antibiotics
D. Hydration + twice-daily bladder washouts + prophylactic antibiotics
E. Hydration + mesna

ANSWER:
E. Hydration + mesna

EXPLANATION:
Cyclophosphamide - haemorrhagic cystitis - prevent with mesna

Cyclophosphamide may be converted to urotoxic metabolites such as acrolein. Mesna binds to these metabolites through its sulfhydryl-moieties and reduces the incidence of haemorrhagic cystitis

Please see Cyclophosphamide

Q-20

Which one of the following is the most common type of Hodgkin's lymphoma?

A. Lymphocyte predominant
B. Nodular sclerosing
C. Lymphocyte depleted
D. Mixed cellularity
E. Hairy cell

ANSWER:
B. Nodular sclerosing

EXPLANATION:
Hodgkin's lymphoma - most common type = nodular sclerosing

Please see Hodgkin's Lymphoma: Histological Classification and Prognosis

Q-21

A 40-year-old lady presents with fatigue, shortness of breath and palpitations. She has a history of hypothyroidism and migraine. On examination, she is comfortable at rest with normal cardiovascular, respiratory and abdominal examination although her conjunctiva appears pale.

Her full blood count results are shown below:

Hb	**98 g/l**
Platelets	**146 * 109/l**
WBC	**3.5 * 109/l**

On further testing, her MCV is 101 fL and her blood film displays hypersegmented polymorphs.

What would be the most appropriate next set of investigations?

A. Folate levels and anti-gastric parietal cell antibodies
B. Schilling test
C. Iron studies
D. Folate levels and LDH
E. Colonoscopy

ANSWER:
A. Folate levels and anti-gastric parietal cell antibodies

EXPLANATION:

This patient has a macrocytic anaemia due to B12 deficiency demonstrated by the low B12 levels and hypersegmented polymorphs on blood film. The next step is to identify the cause of the B12 deficiency by investigating for pernicious anaemia and checking folate levels (combined B12 and folate deficiency are common). Anti-gastric parietal cell antibodies are present in 90% patients with PA (but also 5-10% patients without PA). Other tests for PA are anti-intrinsic factor antibodies which are more specific but less sensitive than anti-parietal cell antibodies (present in 50%). In the past, Schilling tests using radioisotope labelled B12 were used.

Explanation for other options:

2. Schilling test no longer used in clinical practice due to shortage of B12 radioisotope and less invasive means of testing available

3. Folate levels are useful and LDH would be raised in pernicious anaemia but this is a non-specific finding and does not aid diagnosis

4. Colonoscopy not indicated at this stage and would be more useful in a microcytic anaemia when GI blood loss would be a possible cause

5. This patient has a macrocytic rather than microcytic anaemia (which would fit with iron deficiency)

Please see Vitamin B12 Deficiency

Q-22

A 48-year-old who was initially investigated for having an abdominal mass is diagnosed as having Burkitt's lymphoma. He is due to start chemotherapy today. Which one of the following should be given to prior to his chemotherapy to reduce the risk of tumour lysis syndrome?

A. Rasburicase
B. Allopurinol
C. Sodium bicarbonate
D. Albumin
E. Calcium gluconate

ANSWER:

A. Rasburicase

EXPLANATION:

Please see Burkitt's Lymphoma

Q-23

A 56 year old man is treated with doxorubicin for transition cell carcinoma of the bladder. Which one of the following adverse effects is most characteristically associated with this drug?

A. Ototoxicity
B. Pulmonary fibrosis
C. Peripheral neuropathy
D. Cardiomyopathy
E. Haemorrhagic cystitis

ANSWER:
D. Cardiomyopathy

EXPLANATION:
Anthracyclines (e.g. doxorubicin) may cause cardiomyopathy

Please see Cytotoxic Drugs

Q-24

Burkitt's lymphoma is associated with which one of the following genetic changes:

A. Cyclin D1-IGH gene translocation
B. TEL-JAK2 gene translocation
C. Bcl-2 gene translocation
D. C-myc gene translocation
E. BCR-Abl1 gene translocation

ANSWER:
D. C-myc gene translocation

EXPLANATION:
Burkitt's lymphoma - c-myc gene translocation

Please see Burkitt's Lymphoma

Q-25

Which one of the following causes of primary immunodeficiency is due to a defect in B-cell function?

A. Di George syndrome
B. Chediak-Higashi syndrome
C. Common variable immunodeficiency
D. Chronic granulomatous disease
E. Wiskott-Aldrich syndrome

ANSWER:
C. Common variable immunodeficiency

EXPLANATION:

Please see Primary Immunodeficiency

Q-26

A 64-year-old female is brought to the Emergency Department by her family, who are concerned about her increasing confusion over the past 2 days. On examination she is found to be pyrexial at 38ºC. Blood tests reveal:

Hb	**9.6 g/dl**
Platelets	**65 * 109/l**

WCC	**11.1 * 109/l**
Urea	**23.1 mmol/l**
Creatinine	**366 µmol/l**

What is the most likely diagnosis?

A. Wegener's granulomatosis
B. Thrombotic thrombocytopenic purpura
C. Haemolytic uraemic syndrome
D. Idiopathic thrombocytopenic purpura
E. Rapidly progressive glomerulonephritis

ANSWER:
B. Thrombotic thrombocytopenic purpura

EXPLANATION:
HUS or TTP? Neuro signs point towards TTP

The combination of neurological features, renal failure, pyrexia and thrombocytopaenia point towards a diagnosis of thrombotic thrombocytopenic purpura

Please see Thrombotic Thrombocytopenic Purpura

Q-27

A 45-year-old woman attends the acute medical unit with her second DVT this year. Her background is notable for COPD, hypertension and chronic kidney disease stage 4 secondary to membranous glomerulonephritis.

In chronic kidney disease, which of the following contributes most to the increased risk of VTE?

A. Immobility
B. Loss of protein C
C. Loss of antithrombin III
D. Concurrent cancer
E. Lupus anticoagulant

ANSWER:
C. Loss of antithrombin III

EXPLANATION:
CKD is the most common cause of antithrombin III deficiency

Antithrombin III is an important regulatory molecule that reduces the activity of the intrinsic pathway of the clotting cascade. Loss of antithrombin III, thus, increases coagulability.

Whilst there are hereditary causes of antithrombin III, it is a particularly small protein and is easily lost through the nephron in CKD.

CKD does also increase the risk of concurrent cancers, but not as significantly as the protein loss. Lupus anticoagulant is indeed highly prothrombotic and is associated with antiphospholipid syndrome.

Please see Antithrombin III Deficiency

Q-28

Which one of the following causes of primary immunodeficiency is due to a defect in both B-cell and T-cell function?

A. Common variable immunodeficiency
B. Chronic granulomatous disease
C. Wiskott-Aldrich syndrome
D. Chediak-Higashi syndrome
E. Di George syndrome

ANSWER:
C. Wiskott-Aldrich syndrome

EXPLANATION:
Combined B- and T-cell disorders: SCID WAS ataxic (SCID, Wiskott-Aldrich syndrome, ataxic telangiectasia)

Wiskott-Aldrich syndrome causes primary immunodeficiency due to a combined B- and T-cell dysfunction. It is inherited in a X-linked recessive fashion and is thought to be caused by mutation in the WASP gene. Features include recurrent bacterial infections (e.g. chest), eczema and thrombocytopenia

Please see Primary Immunodeficiency

Q-29

A 54-year-old female is receiving a course of chemotherapy for breast cancer. She is experiencing troublesome vomiting which has not been helped by domperidone. What is the most appropriate next management step?

A. Add an antihistamine
B. Add a 5HT2 antagonist
C. Add a phenothiazine
D. Add a dopamine receptor antagonist
E. Add a 5HT3 antagonist

ANSWER:
E. Add a 5HT3 antagonist

EXPLANATION:

Please see Chemotherapy Side-Effects: Nausea and Vomiting

Q-30

A 30-year-old man is investigated for enlarged, painless cervical lymph nodes. A biopsy is taken and a diagnosis of Hodgkin's lymphoma is made. Which one of the following types of Hodgkin's lymphoma carries the best prognosis?

A. Lymphocyte predominant
B. Mixed cellularity
C. Nodular sclerosing
D. Hairy cell
E. Lymphocyte depleted

ANSWER:
A. Lymphocyte predominant

EXPLANATION:
Hodgkin's lymphoma - best prognosis = lymphocyte predominant

Please see Hodgkin's Lymphoma: Histological Classification and Prognosis

Q-31

A 4-year-old child with a deforming mandibular neck swelling. Biopsy of the lesion reveals a 'starry sky' appearance under microscopy.

Infection with which virus is an essential step in the pathogenesis of this disease?

A. HTLV-1
B. EBV
C. HPV
D. HIV
E. HSV-2

ANSWER:
B. EBV

EXPLANATION:
EBV infection is implicated in the pathogenesis of Burkitt's lymphoma

EBV is identifiable in nearly all cases of Burkitt's lymphoma.

HTLV-1 is associated with adult T cell lymphoma

HPV is associated with cervical and anal cancers

HIV infection is important in the pathogenesis of immunodeficiency-associated Burkitt's lymphoma. However, in the endemic variant clearly described here the disease may occur in HIV negative children.

HSV-2 causes genital herpes

Please see Burkitt's Lymphoma

Q-32

Which one of the following causes of primary immunodeficiency is due to a defect in both B-cell and T-cell function?

A. **Di George syndrome**
B. **Chronic granulomatous disease**
C. **Bruton's congenital agammaglobulinaemia**
D. **Leukocyte adhesion deficiency**
E. **Ataxic telangiectasia**

ANSWER:
E. Ataxic telangiectasia

EXPLANATION:
Combined B- and T-cell disorders: SCID WAS ataxic (SCID, Wiskott-Aldrich syndrome, ataxic telangiectasia)

Please see Primary Immunodeficiency

Q-33

Maggie is a 72-year-old female with non-Hodgkin's lymphoma, admitted to hospital for her third cycle of chemotherapy. Her current observations are blood pressure 125/80mmHg, pulse 70/min, respiratory rate 14/min, and temperature 36.5ºC. During her second cycle of chemotherapy six weeks ago, she had an episode of neutropenia (neutrophils 0.4 x 109/L). Her current bloods are shown below.

Hb 120 g/L Male: (135-180)
Female: (115 - 160)
Platelets 160 * 109/L (150 - 400)
WBC 4.5 * 109/L (4.0 - 11.0)
Neuts 0.8 * 109/L (2.0 - 7.0)

Which of the following options may be appropriate to treat Maggie's neutropenia?

A. **Bone marrow transplant**
B. **Filgrastim**
C. **Fluoroquinolone**
D. **Intravenous immunoglobulin (IVIG)**
E. **Piperacillin with tazobactam**

ANSWER:
B. Filgrastim

EXPLANATION:
Filgrastim is a granulocyte-colony stimulating factor used to treat neutropenia

Filgrastim is a granulocyte-colony stimulating factor (G-CSF) used to treat neutropenia in select cases. Maggie is high risk for neutropenia, as she is elderly, with a previous episode of neutropenia, and has a high-risk malignancy. Therefore, it may be appropriate to treat her with G-CSF.

G-CSF is not needed in all types of chemotherapy and is not routinely used unless there is a specific reason, usually in patients at high risk of neutropenia (>20% risk of developing febrile neutropenia).
Examples of patients at high risk of febrile neutropenia include:

The elderly
Those with specific malignancies (e.g. non-Hodgkin's lymphoma, acute lymphoblastic leukaemia)
Previous neutropenic episodes
Those receiving combination chemotherapy and radiation therapy
Before each cycle of chemotherapy, a patient's neutrophil count is checked. If neutropenia is present, there is an increased risk of developing an infection or more severely, neutropenic sepsis. Treatment with G-CSF is considered in these patients as it helps the neutrophil count recover quicker. Therefore, it can be used to reduce the risk of developing neutropenic sepsis, or to prevent delays or dose reductions in the chemotherapy regime.

It seems that G-CSF tends to be used mostly in scenarios where a large benefit is expected. The largest benefit of G-CSF is expected with chemotherapy regimes that are given particularly with the intent to cure or prolong remission, or when there is a risk of febrile neutropenia >40%. Examples of this include chemotherapy regimens for patients with non-Hodgkin's lymphoma (as seen with the patient above), relapsed Hodgkin's lymphoma, germ cell tumours and acute lymphoblastic leukaemia (ALL). G-CSF can also be considered for patients undergoing myeloablative therapy followed by bone marrow transplantation, or in patients with a severe congenital, cyclic, or idiopathic neutropenia. Currently, G-CSF is not recommended for patients with myeloid malignancies, as the data is showing that it may in fact stimulate some of these cancers. Thankfully, G-CSF is well tolerated by most patients and therefore generally the benefits outweigh the risks. For most patients, the only significant side effect is bone pain, which occurs in approximately 15-20% of patients.

Bone marrow transplants are not used in the management of neutropenia.

Fluoroquinolones are used as antibiotic prophylaxis in patients with predicted chemotherapy induced neutropenia. The NICE guidelines suggest that for adult patients (>18 years old) with acute leukaemias, stem cell transplants or solid tumours in whom significant neutropenia is an anticipated chemotherapy consequence, fluoroquinolone can be used as prophylaxis.

Intravenous immunoglobulin is not used in the management of chemotherapy induced neutropenia.

Piperacillin with tazobactam is used in the management of febrile neutropenia.

Please see Granulocyte-Colony Stimulating Factors

Q-34

A 54-year-old man is diagnosed as having acute myeloid leukaemia. What is the single most important test in determining his prognosis?

A. Gene-expression profiling
B. White cell count at diagnosis
C. Immunophenotyping
D. Lactate dehydrogenase
E. Cytogenetics

ANSWER:
E. Cytogenetics

EXPLANATION:

All of the above may be important but chromosomal abnormalities detected by cytogenetics are the single most important prognostic factor.

Please see Acute Myeloid Leukaemia

Q-35

A patient is investigated for leukocytosis. Cytogenetic analysis shows the presence of the following translocation: t(9;22)(q34;q11). Which haematological malignancy is most strongly associated with this translocation?

A. Chronic myeloid leukaemia
B. Acute promyelocytic leukaemia
C. Acute lymphoblastic leukaemia
D. Burkitt's lymphoma
E. Mantle cell lymphoma

ANSWER:

A. Chronic myeloid leukaemia

EXPLANATION:

CML - Philadelphia chromosome - t(9:22)

The Philadelphia translocation is seen in around 95% of patients with chronic myeloid leukaemia. Around 25% of adult acute lymphoblastic leukaemia cases also have this translocation.

Please see Haematological Malignancies: Genetics

Q-36

A 45-year-old woman has been diagnosed with breast cancer two months ago. Following mastectomy, she was started on a course of docetaxel by the oncology team. She is currently on her second cycle of treatment.

What is the mechanism of action for this treatment?

A. It prevents microtubule depolymerisation and disassembly, decreasing free tubulin
B. It inhibits topoisomerase I which prevents relaxation of supercoiled DNA
C. It inhibits dihydrofolate reductase and thymidylate synthesis
D. It causes cross-linking in DNA
E. It stabilises DNA-topoisomerase II complex which inhibits DNA & RNA synthesis

ANSWER:

A. It prevents microtubule depolymerisation and disassembly, decreasing free tubulin

EXPLANATION:

Taxanes such as docetaxel - prevents microtubule depolymerisation & disassembly, decreasing free tubulin

Docetaxel belongs to the taxane family of medications. It is a chemotherapy agent designed to disrupt the normal function of microtubules by preventing microtubule depolymerisation and disassembly. This results in a reduction of free tubulin and thereby stopping cell division.

Topoisomerase inhibitors such as irinotecan work by inhibiting topoisomerase I which prevents relaxation of supercoiled DNA. This results in DNA damage and cell death.

Antimetabolites such as methotrexate work by inhibiting dihydrofolate reductase and thymidylate synthesis. This results in slowing and stopping DNA and protein synthesis that is necessary for normal cell cycle.

Cisplatin is a cytotoxic drug that works by binding to DNA which results in cross-linking and inhibiting its replication.

Doxorubicin is also a cytotoxic drug that works by stabilising the topoisomerase II complex. This stops the process of replication resulting in inhibition of DNA and RNA synthesis that is necessary for cell division.

Please see Cytotoxic Agents

Q-37

A 34-year-old female presents due to the development of a purpuric rash on the back of her legs. Her only regular medication is Microgynon 30. She also reports frequent nose bleeds and menorrhagia. A full blood count is requested:

Hb 11.7 g/dl
Platelets 62 * 109/l
WCC 5.3 * 109/l

PT 11 secs
APTT 30 secs

Factor VIIIc activity Normal

What is the most likely diagnosis?

A. Drug-induced thrombocytopenia
B. Henoch-Schonlein purpura
C. Thrombotic thrombocytopenic purpura
D. Idiopathic thrombocytopenic purpura
E. Antiphospholipid syndrome

ANSWER:
D. Idiopathic thrombocytopenic purpura

EXPLANATION:
The isolated thrombocytopenia in a well patient points to a diagnosis of ITP. The combined oral contraceptive pill does not commonly cause blood dyscrasias

Please see Immune Thrombocytopenia (ITP) in Adults

Q-38

A 45-year-old woman is diagnosed with non-Hodgkin's lymphoma. She is a recovering alcoholic and has been left with significant alcohol-related peripheral neuropathy. Which one of the following chemotherapy agents should be avoided if possible, given her past history?

A. Doxorubicin
B. Vincristine
C. Chlorambucil
D. Docetaxel
E. Cyclophosphamide

ANSWER:
B. Vincristine

EXPLANATION:
Vincristine - peripheral neuropathy

Please see Cytotoxic Agents

Q-39

A 34-year-old man is reviewed four years after having an orchidectomy for a testicular teratoma. What are the most useful follow-up investigation(s) to detect disease recurrence?

A. CRP + beta-HCG
B. Testosterone + beta-HCG
C. ESR + alpha-fetoprotein
D. Alpha-fetoprotein + beta-HCG
E. LDH + ESR

ANSWER:
D. Alpha-fetoprotein + beta-HCG

EXPLANATION:

Please see Tumour Markers

Q-40

A 68-year-old man who takes warfarin for atrial fibrillation is taken to the emergency department after being involved in a road traffic accident. His GCS is reduced and a CT head shows an intracranial haemorrhage. Bloods on admission show the following:

Hb	**132 g/l**
Platelets	**222 * 109/l**
WBC	**11.2 * 109/l**
INR	**3.1**

In addition to vitamin K, which one of the following blood products should be given?

A. Cryoprecipitate
B. Platelet transfusion
C. Prothrombin complex concentrate
D. Packed red cells
E. Fresh frozen plasma (FFP)

ANSWER:
C. Prothrombin complex concentrate

EXPLANATION:
Prothrombin complex concentrate is used for the emergency reversal of anticoagulation in patients with severe bleeding or a head injury

Please see Blood Products: FFP, Cryoprecipitate and Prothrombin Complex

Q-41

A 32-year-old demolitions worker comes to the haematology clinic for review. He has suffered from abdominal pain and lethargy for the past few months, and his GP has noted a microcytic anaemia. Over the past few weeks he has begun tripping over because of weakness of both lower legs. His blood pressure is 123/82 mmHg, pulse is 82 beats per minute and regular. The abdomen is soft and non-tender, the body mass index is 23 kg/m² and there is bilateral weakness of ankle dorsiflexion.

Investigations show the following:

Hb	**98 g/l**
MCV	**77 fL**
Blood film	**Basophilic stippling**
Platelets	**203 * 109/l**
WBC	**7.1 * 109/l**

What is the most likely diagnosis?

A. Iron deficiency anaemia
B. Lead poisoning
C. Porphyria cutanea tarda
D. Thalassaemia trait
E. Wilson's disease

ANSWER:
B. Lead poisoning

EXPLANATION:
The picture here with microcytic anaemia, basophilic stippling on the blood film, and peripheral motor neuropathy is consistent with lead poisoning. It's likely this patient was exposed during their work as a demolitions operative. Chelation therapy is the intervention of choice, with EDTA, DMSA and penicillamine all potential options.

The other conditions aren't associated with basophilic stippling. In addition, porphyria is associated with a photosensitive skin rash, and thalassaemia trait isn't associated with clinical symptoms. Wilson's tends to present earlier with either movement disorder or psychiatric symptoms.

Please see Lead Poisoning

Q-42

Which one of the following is the most common cause of recurrent first trimester spontaneous miscarriage?

A. Factor V Leiden gene mutation
B. Polycystic ovarian syndrome
C. Hyperprolactinaemia
D. Antithrombin III deficiency
E. Antiphospholipid syndrome

ANSWER:
E. Antiphospholipid syndrome

EXPLANATION:
Antiphospholipid antibodies (aPL) are present in 15% of women with recurrent miscarriage, but in comparison, the prevalence of aPL in women with a low risk obstetric history is less than 2%

Please see Antiphospholipid Syndrome: Pregnancy

Q-43

A 68-year-old man presents with lymphadenopathy. On examination you note splenomegaly. Investigations reveal:

Hb	**125 g/l**
Ca2+	**2.34 mmol/l**
Creatinine	**101 µmol/l**

Further investigations reveal an IgM paraprotein of 40 g/L and skeletal survey shows no bone lesions.

What is the most likely diagnosis?

A. Acute myeloid leukaemia
B. Monoclonal gammopathy of unknown significance
C. Chronic lymphocytic leukaemia
D. Waldenstrom's macroglobulinaemia
E. Myeloma

ANSWER:
D. Waldenstrom's macroglobulinaemia

EXPLANATION:

A paraproteinaemia is most often seen in myeloma, although a few other lymphoproliferative disorders can be associated with this. In this case, the patient most likely has a type of lymphoma (lymphoplasmacytic lymphoma) producing excess IgM. Collectively the syndrome is called Waldenstrom's macroglobulinaemia, which usually also presents with bone marrow infiltration, splenomegaly and sometimes lymphadenopathy. In contrast to myeloma it does not cause lytic bone lesions or hypercalcaemia. Further evidence against myeloma would be the nature of the paraprotein. A true IgM myeloma is very rare (IgG, IgA, and IgD being much more common). To fulfill the diagnostic criteria for monoclonal gammopathy of unknown significance, patients must have a monoclonal paraprotein band lesser than 30 g/L.

Please see Waldenstrom's Macroglobulinaemia

Q-44

A 52-year-old woman presents with fever, sweats and persistent dyspepsia despite omeprazole. She has also lost 5kg in weight over the last 1 year. Prior to this she is normally fit and well with no other past medical or drug history.

She works as a bus driver and her only recent foreign travel was to Ibiza on holiday.

She undergoes an endoscopy which reveals a tumour in the antrum of the stomach.

Which of the following is most likely to have been causative?

A. Epstein Barr virus
B. Helicobacter pylori
C. Coeliac disease
D. Schistosoma haematobium
E. Human T-lymphotropic virus 1

ANSWER:

B. Helicobacter pylori

EXPLANATION:

Helicobacter pylori infection can lead to gastric lymphoma (MALT)

Helicobacter pylori infection can lead to gastric lymphoma (MALT). These are typically arise in the antrum of the stomach and can present with systemic features such as fevers and night sweats.

While coeliac disease can predispose to gastrointestinal (GI) tumours, this is rare. Furthermore, coeliac is associated with enteropathy-associated T-cell lymphoma, a disease of the small intestine.

Epstein Barr Virus (EBV) predisposes to nasopharyngeal cancer and Hodgkin's lymphoma.

Schistosoma haematobium predisposes to bladder tumours.

HTLV1 predisposes to adult T-cell leukaemia/lymphoma.

Please see Haematological Malignancies: Infections

Q-45

A 31-year-old man is referred to the acute medical unit with a painful swollen left leg. The patient reports that he has the 'Factor V Leiden mutation'. Which one of the following best describes the pathophysiology of his condition?

A. Protein S deficiency
B. Activated protein C excess
C. Antithrombin deficiency
D. Resistance to action of protein C
E. Activated protein C deficiency

ANSWER:
D. Resistance to action of protein C

EXPLANATION:
Factor V Leiden mutation results in activated protein C resistance

Please see Factor V Leiden

Q-46

A 54-year-old man presents to his GP with a one-month history of fever, malaise and weight loss. He also complains of abdominal fullness and early satiety. His past medical history and travel history is unremarkable and he is not on any regular medications. On examination, the GP detects splenomegaly.

The results of his full blood count and white cell differential are presented below:

Hb	**123 g/l**	**(130-180 g/l)**
MCV	**85.6 fL**	**(80-100 fL)**
Platelets	**420 * 109/l**	**(140-400 * 109/l)**
WBC	**102 * 109/l**	**(4-11 * 109/l)**
Neutrophils	**51.0 %**	**(50-70%)**
Bands	**23.0 %**	**(0-4%)**
Lymphocytes	**2.0 %**	**(20-40%)**
Monocytes	**2.0 %**	**(2-8%)**
Eosinophils	**1.0 %**	**(0-5%)**
Basophils	**3.0 %**	**(0-2%)**

What is the most likely diagnosis?

A. Acute myeloid leukaemia
B. Acute lymphocytic leukaemia
C. Chronic myeloid leukaemia
D. Chronic lymphocytic leukaemia
E. Essential thrombocytosis

ANSWER:
C. Chronic myeloid leukaemia

EXPLANATION:

In chronic myeloid leukaemia there is an increase in granulocytes at different stages of maturation +/- thrombocytosis

Acute myeloid leukaemia - blood tests will reveal immature blood cells (blasts).

Acute lymphocytic leukaemia - far more common in children and blood tests will reveal immature blasts.

Chronic lymphocytic leukaemia - a malignancy of the lymphoid lineage so there will be a raised lymphocyte count.

Essential thrombocytosis - although patients with essential thrombocytosis can have a raised white cell count, these patients tend to have much higher platelet counts (typically >450 * 109/l).

The white cell differential in this case demonstrates granulocytes at different stages of maturation (immature band forms and mature neutrophils) which is suggestive of chronic myeloid leukaemia. The platelet count may also be raised in these patients.

Please see Chronic Myeloid Leukaemia

Q-47

What is the mechanism of action of DDAVP in von Willebrand's disease?

A. Prevents renal excretion of von Willebrand's factor
B. Induces release of factor VIII from endothelial cells
C. Induces release of von Willebrand's factor from endothelial cells
D. Inhibits breakdown of von Willebrand's factor
E. Acts as substitute carrier molecule for factor VIII

ANSWER:

C. Induces release of von Willebrand's factor from endothelial cells

EXPLANATION:

Desmopressiin - induces release of von Willebrand's factor from endothelial cells

Please see von Willebrand's Disease

Q-48

A 60-year-old woman develops a deep vein thrombosis (DVT) 10 days after having a hip replacement despite taking prophylactic dose low-molecular weight heparin (LMWH). She has no significant past medical history of note other than osteoarthritis. After being diagnosed she is started on treatment dose LMWH. What is the most appropriate anticoagulation strategy?

A. Continue on treatment dose LMWH for 6 weeks
B. Continue on treatment dose LMWH for 3 months
C. Continue on treatment dose LMWH for 6 months
D. Switch to warfarin for 3 months
E. Switch to warfarin for 6 months

ANSWER:
D. Switch to warfarin for 3 months

EXPLANATION:
Venous thromoboembolism - length of warfarin treatment
provoked (e.g. recent surgery): 3 months
unprovoked: 6 months

The recent surgery is an obvious 'provoking' factor for the DVT. She should therefore be anticoagulated for 3 months.

Please see Deep Vein Thrombosis: Diagnosis and Management

Q-49

A 66-year-old woman with lung cancer develops a deep vein thrombosis. She is reviewed in the hospital clinic and started on treatment a direct oral anticoagulants (DOACs). What is the most appropriate treatment plan?

A. Switch to warfarin, continue for 6 months
B. Switch to warfarin, continue for 3 months
C. Switch to low molecular weight heparin for 3-6 months
D. Switch to low molecular weight heparin for 6 weeks
E. Continue on the DOAC for 3-6 months

ANSWER:
E. Continue on the DOAC for 3-6 months

EXPLANATION:
Cancer patients with VTE - 6 months of a DOAC

NICE updated their guidance in 2020 and now recommend using DOACs for patients with active cancer. Previously, low molecular weight heparin was recommended.

Please see Deep Vein Thrombosis: Diagnosis and Management

Q-50

A man is investigated for anaemia. A blood film is ordered and reported as follows:

Ring sideroblasts

Which one of the following is least likely to give this picture?

A. Anti-tuberculosis medication
B. Alcohol
C. Pyridoxine
D. Lead
E. Myelodysplasia

ANSWER:
C. Pyridoxine

EXPLANATION:
Pyridoxine is actually a treatment for sideroblastic anaemia. Rarely pyridoxine deficiency may be the cause

Please see Sideroblastic Anaemia

Q-51

An 80-year-old man has spent his whole working life as a loft insulator and is concerned that he may have been exposed to asbestos. He has been informed of the risk of mesothelioma but wants to know if there are any other conditions for which he is at higher risk than the general population. Which of the following is also proven to have a causal link with asbestos exposure?

A. Bronchiectasis
B. Type II diabetes
C. Bronchial carcinoma
D. Basal cell carcinoma of the skin
E. Ischaemic heart disease

ANSWER:
C. Bronchial carcinoma

EXPLANATION:
Exposure to asbestos is a risk factor for bronchial carcinoma as well as mesothelioma

Answer 3 is correct. Asbestos is well known to increase the risk of mesothelioma, but also increases the risk of bronchial carcinoma, laryngeal cancer and ovarian cancer. There is also some limited evidence that asbestos may increase the risk of cancer of the stomach, pharynx and bowel.

Exposure to asbestos also increases the risk of some benign diseases, including pleural plaques, diffuse pleural thickening, asbestos related benign pleural effusions and asbestosis.

BMJ Clinical Review:
http://www.bmj.com/content/339/bmj.b3209.full

National Cancer Institute:
https://www.cancer.gov/about-cancer/causes-prevention/risk/substances/asbestos/asbestos-fact-sheet#q3

Please see Carcinogens

Q-52

A 25-year-old female patient presents with massive haemorrhage. You are working in the hospital blood bank and are asked to prepare 2 units each of Red cells and Fresh Frozen Plasma (FFP) when the result of the group and save is available.

The patient's sample is grouped as B RhD negative. You manage to procure some Group B red cells from the fridge but there is no Group B FFP available.

FFP from a donor of which blood group would be best to give?

A. A RhD negative
B. A RhD positive
C. AB RhD negative
D. AB RhD positive
E. O RhD positive

ANSWER:
C. AB RhD negative

EXPLANATION:
The universal donor of fresh frozen plasma is AB RhD negative blood

This patient is blood group B RhD negative, meaning her red cells possess B antigens only from the ABO grouping, and she naturally produces anti-A antigens in her plasma. Therefore, she needs to receive red cells with only B antigen or no antigens at all (i.e. Groups B or O) but needs to receive FFP that does not have anti-B in it. Group O donors naturally produce anti-A and anti-B, Group A donors naturally produce only anti-B, so she can only receive FFP from groups B or AB.

Group AB is the universal donor for FFP because they produce neither anti-A or anti-B and is therefore compatible with all ABO groups.

In many cases the RhD status would not matter for blood transfusion, however as this is a woman of childbearing age who is RhD negative, she should receive RhD negative blood in order to avoid problems with future pregnancies in which the foetus is RhD positive.

Source: http://lifeinthefastlane.com/ccc/blood-products/

Please see Blood Products: FFP, Cryoprecipitate and Prothrombin Complex

Q-53

A 52-year-old man with a history of anaemia and abdominal discomfort is diagnosed as having chronic myeloid leukaemia. What is the mechanism of action of imatinib?

A. EGF receptor antagonist
B. Tyrosine kinase inhibitor
C. Anti-CD52 monoclonal antibody
D. Anti-CD23 monoclonal antibody
E. p53 inhibitor

ANSWER:
B. Tyrosine kinase inhibitor

EXPLANATION:

Chronic myeloid leukaemia - imatinib = tyrosine kinase inhibitor

Imatinib is an inhibitor of the tyrosine kinase associated with the BCR-ABL defect

Please see Chronic Myeloid Leukaemia

Q-54

You are the haematology registrar. A 42-year-old lady has been referred by her GP with a persistently elevated platelet count. It was incidentally found on a blood test originally six months ago at 632 x10^9/L. The latest reading was 848 x10^9/L which was the highest it has been yet. She is otherwise well but does suffer with regular headaches which she takes simple analgesia for. You suspect a diagnosis of essential thrombocytosis and arrange a JAK-2 test which is negative (including an exon 12 test). Which is the most likely other gene mutation responsible for this condition?

A. BCR-ABL
B. MPL
C. CMYC
D. Platelet factor 4
E. CALR

ANSWER:

E. CALR

EXPLANATION:

CALR (calreticulin) is a more commonly found gene mutation in ET in around 20% of JAK-2 negative patients.

MPL (myeloproliferative leukaemia protein) is less common at less then 10%.

BCR-ABL is associated with the myeloproliferative disorder chronic myeloid leukaemia.

CMYC is a proto-oncogene associated with many malignancies including Burkitt's lymphoma.

Platelet factor 4 (PF4 complex) is the antigen found in heparin-induced thrombocytopenia.

Please see Thrombocytosis

Q-55

You are working on a geriatric post when you notice that a 93-year-old man on your ward has had consistently high white blood cells, despite several courses of antibiotics. His bloods today show:

Hb	**91 g/l**
Platelets	**250 * 109/l**
WBC	**32.2 * 109/l**
Neutrophils	**28.1 * 109/l**

Despite this he has at no point shown signs of any infection. Your consultant suggests contacting haematology with regards to ascertaining the leucocyte alkaline phosphatase score.

Which of the following conditions would have a high leucocyte alkaline phosphatase score?

A. Chronic myeloid leukaemia (CML)
B. Acute myeloid leukaemia (AML)
C. Paroxysmal nocturnal haemoglobinuria (PNH)
D. Leukemoid reaction
E. Pregnancy

ANSWER:
D. Leukemoid reaction

EXPLANATION:
Leukemoid reaction has a high leucocyte alkaline phosphatase score

The answer is leukemoid reaction. Leucocyte ALP is one of types of alkaline phosphatase. It has a diagnostic value in differentiating causes of high number of white blood cells, seen on manual differentials.

The leukemoid reaction refers to the 'left-shift' of immature white blood cells that occurs in underlying infections. On a blood film, this could mistakenly be thought to be a malignant process (like CML). Leukocyte ALP can differentiate the two - a low score indicates undeveloped leukocytes, like those found in CML and AML. PNH also causes a low score.

Placental ALP found in pregnancy is a distractor.

Please see Leucocyte Alkaline Phosphatase

Q-56

A 61-year-old woman has recently been diagnosed with breast cancer. Pathology testing confirms that it is oestrogen receptor-positive and the oncology team plans to start her on an aromatase inhibitor.

Which of the following adverse effect should you warn the patient about before starting this medication?

A. Endometrial cancer
B. Osteoporosis
C. Venous thromboembolism
D. Hypertrichosis
E. Ovarian cancer

ANSWER:
B. Osteoporosis

EXPLANATION:
Aromatase inhibitors (e.g. anastrozole) may cause osteoporosis

The correct answer is osteoporosis. Aromatase inhibitors such as anastrozole reduce peripheral oestrogen synthesis. It is used for post-menopausal women with ER+ve breast cancer.

Anastrozole does not increase the risk of venous thromboembolism or endometrial cancer. Instead, selective oestrogen receptor modulators such as tamoxifen do, as they act as both an oestrogen receptor antagonist and partial agonist.

Other adverse effects of aromatase inhibitors include alopecia, hot flushes, arthralgia and headache.

Please see Anti-Oestrogen Drugs

Q-57

A 77-year-old lady is admitted by the emergency department complaining of difficulty coping at home. She is unable to mobilise independently and has a poor appetite due to difficulty swallowing. She has a diagnosis of oesophageal cancer but is not thought to be a candidate for chemotherapy. Her GP recently started her on nitrofurantoin for a urinary tract infection.

On examination she is a thin, frail lady who is alert and oriented. There is no neurological deficit in the upper limbs. She has weakness of hip flexion and knee extension in both legs, but markedly more so on the right. You are able to elicit some loss of pinprick sensation on the anterior thigh. Her reflexes are brisk with an upgoing plantar on the right.

Her blood results are as follows:

Hb	**101 g/l**
Platelets	**440 * 109/l**
WBC	**8.4 * 109/l**
MCV	**99 fL**
Na+	**136 mmol/l**
K+	**4.8 mmol/l**
Urea	**3.7 mmol/l**
Creatinine	**52 µmol/l**

What is the next most appropriate step in this patient's management?

A. Transfer to hospice
B. Refer for physiotherapy
C. MRI imaging of the spinal cord
D. Check B12 and folate levels
E. Stop nitrofurantoin

ANSWER:
C. MRI imaging of the spinal cord

EXPLANATION:
Patients with suspected neoplastic spinal cord compression should have an urgent MRI of the whole spine

A patient with new lower limb neurology and a history of cancer should raise the suspicion of metastatic spinal cord compression, which is best demonstrated on MRI.

Although nitrofurantoin and B12 deficiency could cause a peripheral neuropathy, both are less urgent problems than cord compression.

Please see Neoplastic Spinal Cord Compression

Q-58

A 52-year-old female patient presents to the oncology clinic with an 8-months history of poor appetite and weight loss. She also complains of a right upper quadrant discomfort which has been present for the last 3 months. An ultrasound scan reveals multiple lesions in the liver suggestive of liver metastasis. A tumour marker profile reveals a raised level of CA 15-3.

What is the most likely primary tumour?

A. Colorectal carcinoma
B. Small cell lung carcinoma
C. Breast carcinoma
D. Ovarian carcinoma
E. endometrial carcinoma

ANSWER:
C. Breast carcinoma

EXPLANATION:
CA 15-3 is a tumour marker in breast cancers

CA 15-3 is a tumour marker in breast cancers.

Bombesin is a tumour marker in small cell lung cancers.

Carcinoembryonic antigen (CEA) is a tumour marker in colorectal cancers.

CA 125 is a tumour marker in ovarian cancers and also endometrial cancers.

Please see Tumour Markers

Q-59

What chemical mediator is mainly responsible for the tissue oedema seen in patients in hereditary angioedema?

A. Histamine
B. Serotonin
C. Neurokinin A
D. Bradykinin
E. Nitric oxide

ANSWER:
D. Bradykinin

EXPLANATION:

Please see Hereditary Angioedema

Q-60

A 58-year-old woman is seen in clinic for review. She is halfway through 6 cycles of chemotherapy and complains of tiredness, muscle weakness and lethargy. Routine blood tests are taken with the following results.

Hb	**112 g/L**	**Male: (135-180)**	**Female: (115 - 160)**
Platelets	**211* 109/L**	**(150 - 400)**	
WBC	**4.62 * 109/L**	**(4.0 - 11.0)**	
Na+	**137 mmol/L**	**(135 - 145)**	
K+	**4.2 mmol/L**	**(3.5 - 5.0)**	
Urea	**2.8 mmol/L**	**(2.0 - 7.0)**	
Creatinine	**56 µmol/L**	**(55 - 120)**	
CRP	**9 mg/L**	**(< 5)**	
Calcium	**2.19 mmol/L**	**(2.1-2.6)**	
Phosphate	**1.23 mmol/L**	**(0.8-1.4)**	
Magnesium	**0.24 mmol/L**	**(0.7-1.0)**	

Which of the following cytotoxic agents is most likely to be responsible?

A. Docetaxel
B. Vincristine
C. Cisplatin
D. Cyclophosphamide
E. Cytarabine

ANSWER:
C. Cisplatin

EXPLANATION:
Cisplatin is associated with hypomagnesaemia

The correct answer is cisplatin. Platinum-based compounds are commonly used to treat ovarian cancer and can cause a number of side effects including peripheral neuropathy, ototoxicity and hypomagnesaemia, as seen here.

Taxanes such as docetaxel are often used in combination with platinum-based compounds to treat ovarian cancer. Common side effects include neutropenia but they do not cause hypomagnesaemia.

Vincristine is more commonly used to treat haematological malignancies and breast cancer. Common side effects include peripheral neuropathy and paralytic ileus.

Cyclophosphamide can be used to treat ovarian cancer, but is not associated with hypomagnesaemia. It more commonly causes haemorrhagic cystitis, myelosuppression and transitional cell carcinoma.

Cytarabine is used to treat haematological malignancies and can cause myelosuppression and ataxia.

Please see Cytotoxic Agents

Q-61

A 17-year-old man is investigated for recurrent infections and easy bruising. In the past year he has had four episodes of pneumonia. Other than the bruising he is noted to have severe eczema on his trunk and arms. A full blood count is ordered and reported as follows:

Hb 14.1 g/dl
Plt 82 * 109/l
WBC 5.9 * 109/l
Neuts 4.4 * 109/l

Further bloods show low immunoglobulin M levels. What is the most likely diagnosis?

A. Bruton's congenital agammaglobulinaemia
B. Wiskott-Aldrich syndrome
C. Ataxic telangiectasia
D. Chediak-Higashi syndrome
E. DiGeorge syndrome

ANSWER:
B. Wiskott-Aldrich syndrome

EXPLANATION:
Wiskott-Aldrich syndrome
- *recurrent bacterial infections (e.g. Chest)*
- *eczema*
- *thrombocytopaenia*

Please see Wiskott-Aldrich Syndrome

Q-62

A 69-year-old male patient of yours is found to have an elevated serum paraprotein level of 35g/L. Bone marrow aspirate reveals 32% monoclonal plasma cell infiltrate. He has no evidence of anaemia, renal impairment, hypercalcaemia or lytic lesions. What is the next step in management?

A. Observe and monitor
B. Arrange for autologous stem cell transplantation
C. Commence thalidomide
D. Commence dexamethasone
E. Commence combined therapy with prednisolone and thalidomide / bortezomib

ANSWER:
A. Observe and monitor

EXPLANATION:
This question is asking about the diagnostic criteria for multiple myeloma and it's subsequent management. Here, because the patient is asymptomatic but has the criteria for multiple myeloma, the underlying diagnosis of this stem is smoldering multiple myeloma. The treatment of smoldering multiple myeloma is typically to watch and wait.

This decision to delay therapy in patients with smoldering multiple myeloma is supported by a 2003 Cochrane meta-analysis that compared chemotherapy at diagnosis versus deferral of chemotherapy until progression. Early treatment delayed progression of the disease but did not have significant effects on mortality or response rate, and early treatment may have increased the risk of acute leukaemia.

Please see Myeloma: Features

Q-63

A 65-year-old woman presents to oncology clinic following a new diagnosis of non-metastatic breast cancer. She is commenced on neoadjuvant chemotherapy with docetaxel.

What is the mechanism of action of this type of chemotherapy?

A. Causes cross-linking in DNA
B. Degrades preformed DNA
C. Inhibits dihydrofolate reductase
D. Inhibits formation of microtubules
E. Prevents microtubule depolymerisation and disassembly

ANSWER:
E. Prevents microtubule depolymerisation and disassembly

EXPLANATION:
Taxanes such as docetaxel - prevents microtubule depolymerisation & disassembly, decreasing free tubulin

Taxane chemotherapy agents (such as docetaxel) act by preventing microtubule depolymerisation and disassembly in the metaphase stage of cell division, and therefore inhibit mitosis.

Please see Cytotoxic Agents

Q-64

A 19-year-old male who emigrated from Ghana as a child presents with an intermittent painful morning erection for the last 5 hours. On examination he has mild splenomegaly. He has never had this problem before and is usually fit and well. Investigations demonstrate:

Hb 115 g/L Male: (135-180) Female: (115 - 160)
MCV 76 fL (80-95)

The peripheral blood film shows multiple small red blood cells, a few sickle cells and target cells.

What is the most likely genotype for his condition?

A. HbAA
B. HbSC
C. HbSS
D. HbSβ0
E. Hbβ/β0

ANSWER:
B. HbSC

EXPLANATION:
Hb SC is a milder form of sickle disease

Most children in the UK are screened for sickle cell disease, leading to early diagnosis and regular follow up. In HbSC patients have the sickle mutation and the HbC mutation - where a lysine replaces glutamic acid on position 6 of the normal beta chain. The presentation is similar to sickle cell disease but with reduced severity and frequency of symptoms. There are varying genotypes associated with different severity of disease:

Genotype	Disease severity
HbAA	Normal
HbAS	sickle cell trait, usually asymptomatic
Hb SC/ Sβ+	moderate sickle cell disease (sickle cell beta + thalassemia indicates the blood has some normal haemoglobin)
Hb SS/ Sβ0	severe sickle cell disease/ Sickle cell beta 0 thalassemia (the zero indicates the blood has no normal haemoglobin)

Please see Sickle-Cell Anaemia

Q-65

A 74-year-old woman with a past history of chronic lymphocytic leukaemia presents with lethargy. The following blood results are obtained:

Hb 7.9 g/dl
Plt 158 * 109/l
WCC 24.0 * 109/l

Blood film: normochromic, normocytic anaemia

What complication has most likely occurred?

A. Paroxysmal nocturnal haemoglobinuria
B. Microangiopathic haemolytic anaemia
C. Sideroblastic anaemia
D. Warm autoimmune haemolytic anaemia
E. Cold autoimmune haemolytic anaemia

ANSWER:
D. Warm autoimmune haemolytic anaemia

EXPLANATION:
Warm autoimmune haemolytic anaemia occurs in around 10-15% of patients with chronic lymphocytic leukaemia

Please see Chronic Lymphocytic Leukaemia

Q-66

A 4-year-old boy is admitted after developing a haemarthrosis in his right knee whilst playing in the garden. The following blood results are obtained:

Platelets 220 * 109/l

PT 11 secs
APTT 76 secs

Factor VIIIc activity Normal

What is the most likely diagnosis?

A. Antithrombin III deficiency
B. Von Willebrand's disease
C. Antiphospholipid syndrome
D. Haemophilia A
E. Haemophilia B

ANSWER:
E. Haemophilia B

EXPLANATION:
A grossly elevated APTT may be caused by heparin therapy, haemophilia or antiphospholipid syndrome. A normal factor VIIIc activity points to a diagnosis of haemophilia B (lack of factor IX). Antiphospholipid syndrome is a prothrombotic condition

Please see Haemophilia

Q-67

A 58-year-old man is reviewed in clinic. Six months ago he had a Whipple procedure for pancreatic cancer and is currently undergoing chemotherapy. Which one of the following blood tests is most useful in monitoring his disease?

A. CA 15-3 levels
B. Faecal elastase
C. CA 125 levels
D. Amylase levels
E. CA 19-9 levels

ANSWER:
E. CA 19-9 levels

EXPLANATION:
Pancreatic cancer - CA 19-9

Please see Tumour Markers

Q-68

A 20-year-old woman presents with fatigue and a preceding viral infection. She reports she is known to have hereditary spherocytosis.

Investigations show:
Hb 81 g/L Male: (135-180) Female: (115 - 160)
LDH 700 U/L (140-280)

Blood film schistocytes and circular red blood cells

Her blood pressure is 101/57 mmHg, she denies chest pain or feeling light headed. Abdominal exam demonstrates a palpable spleen 3cm below the costal margin.

What is the best treatment option?

A. Emergency splenectomy
B. Fluids
C. Fluids and high dose folic acid
D. Steroids
E. Immediate transfusion

ANSWER:
C. Fluids and high dose folic acid

EXPLANATION:
Generally supportive treatment is given in the management of a patient in haemolytic crisis secondary to hereditary spherocytosis. I.e. folic acid, transfusion if symptomatic from anaemia. Steroids are not indicated

Most patients with hereditary spherocytosis undergo elective splenectomy to reduce the risk of acute haemolytic crisis.

If a patient is in acute haemolytic crisis treatment is supportive with fluids, high dose folic acid, careful monitoring of the blood count and transfusing if symptomatic from the anaemia.

Steroids are not indicated as haemolysis is not an autoimmune process. It is due to mechanical fragility of the round red blood cells.

Please see Hereditary Spherocytosis

Q-69

A 54-year-old woman presents with malaise, fatigue, myalgia and night sweats.

Initial blood tests show the following.

Hb	**115 g/L**	**Male: (135-180)**	**Female: (115 - 160)**
Platelets	**160 * 109/L**	**(150 - 400)**	
WBC	**53 * 109/L**	**(4.0 - 11.0)**	

Blood film report comments upon: 'presence of myeloblasts, promyelocytes and nucleated red cells'.

You are concerned about the possibility of chronic myeloid leukaemia (CML).

Which of the following features would suggest a leukemoid reaction instead?

A. **Low leukocyte alkaline phosphatase score**
B. **Toxic granulation (dohle bodies) in the white cells**
C. **Right shift of neutrophils**
D. **Presence of t(9;22)(q34;q11) translocation of chromosome 22**
E. **Neutrophilia**

ANSWER:
B. Toxic granulation (dohle bodies) in the white cells

EXPLANATION:
Differentiating chronic myeloid leukaemia from leukaemoid reactions: leukocyte alkaline phosphatase score is low in CML, high in leukaemoid reaction

Leukemoid reactions are normally distinguished from CML using cytogenetics- presence of the Philadelphia chromosome (t(9;22)(q34;q11) is specific for CML.

Other features suggesting leukemoid reactions include high leucocyte alkaline phosphatase score, toxic granulation (dohle bodies) in the white cells, and 'left shift' of neutrophils (i.e. three or less segments of the nucleus).

Please see Leukemoid Reaction

Q-70

Which electrolyte disturbance is cisplatin most associated with?

A. **Hypocalcaemia**
B. **Hyponatraemia**
C. **Hypomagnesaemia**
D. **Hypokalaemia**
E. **Hypercalcaemia**

ANSWER:
C, Hypomagnesaemia

EXPLANATION:

Cisplatin is associated with hypomagnesaemia

Please see Cytotoxic Agents

Q-71

A 66-year-old woman is referred by her GP with anaemia. She has been feeling generally unwell for the past 3 weeks. Bloods on admission show:

Hb 8.7 g/dl
MCV 87 fl
Plt 198 * 109/l
WBC 5.3 * 109/l

Further tests were then ordered:

Reticulocytes 5.2%l
Direct antiglobulin test Positive, IgG only
Film Spherocytes and reticulocytes

Which one of the following is the most likely underlying cause?

A. Non-Hodgkin's lymphoma
B. Mycoplasma pneumonia
C. Chronic myeloid leukaemia
D. Acute myeloid leukaemia subtype M3
E. Cytomegalovirus infection

ANSWER:

A. Non-Hodgkin's lymphoma

EXPLANATION:

The blood results suggest warm autoimmune haemolytic anaemia (AIHA) which may be caused by non-Hodgkin's lymphoma. Mycoplasma pneumonia is associated with cold AIHA. The other three listed conditions are not commonly associated with AIHA.

Please see Autoimmune Haemolytic Anaemia

Q-72

Which of the following is a cause of extravascular haemolysis?

A. Hereditary spherocytosis
B. Paroxysmal nocturnal haemoglobinuria
C. Disseminated intravascular coagulation
D. Mismatched blood transfusion
E. Haemolytic uraemic syndrome

ANSWER:
A. Hereditary spherocytosis

EXPLANATION:
Extravascular haemolysis - hereditary spherocytosis

Please see Haemolytic Anaemias: By Site

Q-73

A 65-year-old man who is undergoing bone marrow transplant requires a blood transfusion. Irradiated packed red cells are requested. What is the purpose of requesting irradiated blood products in this situation?

A. Depletes the packed cells of platelets reducing the risk of thrombotic complications
B. Ensures the blood products are free of viruses and organisms
C. Destroys HLA markers reducing the risk of blood transfusion reaction
D. Reduces the HbA2/Hb ratio
E. Depleted T-lymphocyte numbers reduce the risk of transfusion graft versus host disease

ANSWER:
E. Depleted T-lymphocyte numbers reduce the risk of transfusion graft versus host disease

EXPLANATION:
Irradiated blood products are used as they are depleted in T-lymphocytes

The most common indications for irradiated blood products are conditions where the immune system is compromised.

Please see Blood Products: CMV Negative and Irradiated Blood

Q-74

A 40-year-old male patient is admitted with recurrent pancreatitis. A CT scan reveals no pancreatic mass, but evidence of widespread lymphadenopathy. Dedicated liver imaging reveals a stricture in the common bile duct but no stones. He also has a history of parotiditis. What is the most likely diagnosis?

A. Lymphoma
B. IgG4 disease
C. Pancreatic cancer
D. Biliary malignancy
E. Primary sclerosing cholangitis

ANSWER:
B. IgG4 disease

EXPLANATION:
IgG4-related disease has been described in virtually every organ system: the biliary tree, salivary glands, periorbital tissues, kidneys, lungs, lymph nodes, meninges, aorta, breast, prostate, thyroid, pericardium, and skin. The histopathological features are similar across organs, regardless of the site. IgG4-related disease is analogous to sarcoidosis, in which diverse organ manifestations are linked by similar

histopathological characteristics. Raised concentrations of IgG4 in tissue and serum can be helpful in diagnosing IgG4 disease, but neither is a specific diagnostic marker.

Examples include:

- *Riedel's Thyroiditis*
- *Autoimmune pancreatitis*
- *Mediastinal and Retroperitoneal Fibrosis*
- *Periaortitis/periarteritis/Inflammatory aortic aneurysm*
- *Kuttner's Tumour (submandibular glands) & Mikulicz Syndrome (salivary and lacrimal glands)*
- *Possibly sjogren's and primary biliary cirrhosis*

Please see IgG4-Related Disease

Q-75

A 62-year-old man presents with lethargy. A full blood count is taken and is reported as follows:

Hb	**10.2 g/dl**
Platelets	**330 * 109/l**
WBC	**15.2 * 109/l**

Film Leucoerythroblastic picture. Tear-drop poikilocytes seen

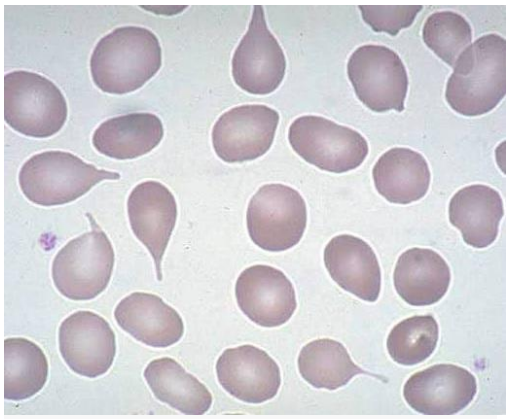
What is the most likely diagnosis?

A. Myelodysplasia
B. Chronic lymphocytic leukaemia
C. Myelofibrosis
D. Chronic myeloid leukaemia
E. Post-splenectomy

ANSWER:
C. Myelofibrosis

EXPLANATION:
Myelofibrosis is associated with 'tear drop' poikilocytes on blood film

Thrombocytopenia and leucopenia are seen in progressive disease.



Blood film showing tear-drop poikilocytes

Please see Myelofibrosis

Q-76

A patient with a newly diagnosed high grade B cell lymphoma begins chemotherapy treatment.

On day 2 his bloods are as shown in the table below:

Na+	**135 mmol/L**	**(135 - 145)**
K+	**6.3 mmol/L**	**(3.5 - 5.0)**
Urea	**8.8 mmol/L**	**(2.0 - 7.0)**
Creatinine	**180 µmol/L**	**(55 - 120)**

What is the best management option for this patient?

A. **Allopurinol IV**
B. **Allopurinol IV and rasburicase**
C. **Allopurinol, rasburicase and IV fluids**
D. **IV fluids**
E. **Rasburicase and IV fluids**

ANSWER:
E. Rasburicase and IV fluids

EXPLANATION:
Rasburicase and allopurinol should not be given together in the management of tumour lysis syndrome as this reduces the effect of rasburicase

Rasburicase is the preferred treatment choice for patients at high risk of tumour lysis syndrome. Rasburicase is a recombinant form of urate oxidase which catalyzes the oxidation of existing uric acid to allantoin. Allantoin is more soluble than uric acid and is therefore excreted in the kidneys. Allopurinol stops new uric acid being made by blocking the conversion of xanthines to uric acid. If less uric acid is made, this will reduce the substrate available for rasburicase to work. They should not be given together.

All patients undergo a risk assessment prior to chemotherapy and they are given IV fluids, allopurinol or rasburicase depending on their risk assessment.

Please see Tumour Lysis Syndrome

Q-77

A 77-year-old man with a history of chronic lymphocytic leukaemia is admitted to the Acute Medical Unit with pneumonia. This is his fourth admission for pneumonia in the past six months. Which one of the following factors is most likely to be responsible?

A. **Hypersplenism**
B. **Decreased lymphocyte survival**
C. **Hypogammaglobulinaemia**
D. **Transformation to high-grade lymphoma**
E. **Immature lymphocytes**

ANSWER:
C. Hypogammaglobulinaemia

EXPLANATION:

Please see Chronic Lymphocytic Leukaemia

Q-78

A 12-year-old boy is noted to bleed excessively during an elective dental extraction. Following the procedure, examination reveals petechial skin haemorrhages. Blood results show:

Hb 12.3 g/dl
Plt 255 * 109/l
WBC 7.9 * 109/l

PT 13.3 secs
APTT 39 secs

Factor VIII activity 87%

What is the most likely diagnosis?

A. Disseminated intravascular coagulation
B. Idiopathic thrombocytopenic purpura
C. Von Willebrand's disease
D. Haemophilia A
E. Haemophilia B

ANSWER:
C. Von Willebrand's disease

EXPLANATION:
The combination of a petechial skin rash combined with a slightly elevated APTT and reduced factor VIII activity make Von Willebrand's disease the most likely diagnosis

Please see Von Willebrand's Disease

Q-79

A 54-year-old man who is about to start chemotherapy for a high-grade lymphoma is given intravenous rasburicase to help lower the risk of tumour lysis syndrome. What is the mechanism of action of this drug?

A. Inhibits urate oxidase
B. Converts uric acid to allantoin
C. Inhibits xanthine oxidase
D. Converts uric acid to hypoxanthine
E. Guanylic oxidase inhibitor

ANSWER:
B. Converts uric acid to allantoin

EXPLANATION:
Rasburicase - a recombinant version of urate oxidase, an enzyme that metabolizes uric acid to allantoin

Please see Tumour Lysis Syndrome

Q-80

Which one of the following is least associated with eosinophilia?

A. Churg-Strauss syndrome
B. Nematode infection
C. Histoplasmosis
D. Allergic bronchopulmonary aspergillosis
E. Asthma

ANSWER:
C. Histoplasmosis

EXPLANATION:

Please see Eosinophilia

Q-81

A 54-year-old woman is reviewed in oncology clinic following debulking surgery for primary peritoneal cancer. She is known to have two liver metastases. She underwent surgery one month ago and has come in for review prior to adjuvant chemotherapy. During her chemotherapy treatment, which tumour marker would be most appropriate to monitor disease progression?

A. CA 15-3
B. CA 19-9
C. CA 125
D. Human chorionic gonadotropin (hCG)
E. S-100

ANSWER:
C. CA 125

EXPLANATION:
Ovarian cancer - CA 125

CA 125 is the tumour marker most associated with primary peritoneal cancer as well as ovarian cancer and can be used to monitor response to chemotherapy, alongside regular CT scans. It can also be raised in various other cancers.

The other tumour markers are more appropriate for other cancers.

Source:

Sturgeon, C. M., L. C. Lai, and M. J. Duffy. 'Serum Tumour Markers: How to Order and Interpret Them.' BMJ (2009): 852-58.

Please see Tumour Markers

Q-82

Burkitt's lymphoma is associated with a mutation in which one of the following genes?

A. Cyclin D1 gene
B. PML gene
C. BCR-ABL gene
D. RAR-alpha gene
E. MYC gene

ANSWER:
E. MYC gene

EXPLANATION:

Please see Haematological Malignancies: Genetics

Q-83

You are an SHO on an acute oncology ward. You are asked to speak to a 56-year-old man with colorectal cancer. He was diagnosed 1 month ago after participating in screening. Following a positive faecal occult blood test, colonoscopy demonstrated a malignant lesion in the descending colon. CT staging showed lymph node involvement but no distant metastases. He has undergone a left-hemicolectomy and is due to start adjuvant chemotherapy with a combination of 5-FU and oxaliplatin. During his work-up, his consultant explained that he would need to be monitored for disease recurrence.

Which of the following has a role in monitoring disease activity in colorectal cancer?

A. Alpha-Fetoprotein (AFP)
B. Mesorectal MRI
C. Ca-19-9
D. Carcinoembryonic Antigen (CEA)
E. Ca-15-3

ANSWER:
D. Carcinoembryonic Antigen (CEA)

EXPLANATION:
Carcinoembryonic Antigen (CEA) is a tumour marker in colorectal cancer and has a role in monitoring disease activity

The correct answer is carcinoembryonic antigen (CEA). CEA is a known tumour marker for colorectal cancer. It is not used diagnostically, but in patient's with a known diagnosis of colorectal cancer associated

with raised CEA levels, it can be used to monitor disease activity and help with early identification of disease recurrence.

Please see Tumour Markers

Q-84

A 42-year-old female is noted to have a Hb of 17.8 g/dL. Which one of the following is least likely to be the cause?

A. Polycythaemia rubra vera
B. Chronic obstructive pulmonary disease
C. Hypernephroma
D. Haemochromatosis
E. Dehydration

ANSWER:
D. Haemochromatosis

EXPLANATION:
Haemochromatosis is not associated with polycythaemia. Blood tests typically reveal a raised ferritin and iron, associated with a transferrin saturation of greater than 60% and a low total iron binding capacity

Please see Polycythaemia

Q-85

Chronic lymphocytic leukaemia is mostly due to a:

A. Polyclonal proliferation of B-cell lymphocytes
B. Monoclonal proliferation of B-cell lymphocytes
C. Monoclonal proliferation of large granular lymphocytes
D. Monoclonal proliferation of T-cell lymphocytes
E. Polyclonal proliferation of T-cell lymphocytes

ANSWER:
B. Monoclonal proliferation of B-cell lymphocytes

EXPLANATION:
CLL is caused by a monoclonal proliferation of B-cell lymphocytes

Please see Chronic Lymphocytic Leukaemia

Q-86

A 24-year-old female presents to the acute medical take with several lumps in her neck and under her arms, weight loss, vomiting and low mood. She is found to have several areas of suspicious lymphadenopathy, including in the neck, both axillae and mediastinum. She also has multiple lesions in her liver. All lesions are confirmed to be manifestations of Hodgkin's lymphoma after biopsy and discussion at the oncology MDT. Which stage of disease does she have?

A. I
B. II
C. III
D. IV
E. V

ANSWER:
D. IV

EXPLANATION:
Spread into the liver, bone marrow, lungs or other organs would be classified as stage IV on the Ann Arbor staging system for Hodgkin's lymphoma

This patient has stage IV disease as per the Ann Arbor scale. She has spread of disease beyond the lymph nodes into the liver.

Stage I consists of disease in one lymph node area only. Stage II consists of disease in two lymph node areas, but both on the same side of the diaphragm. Stage III consists of disease in two lymph node areas on different sides of the diaphragm. Stage IV consists of the spread of disease beyond the lymph nodes, into the liver, lungs or bone marrow. Stage V is not included in the scale.

Lymphoma Association: Staging of lymphoma.
https://www.lymphomas.org.uk/about-lymphoma/what-is-lymphoma/staging-lymphoma

Please see Hodgkin's Lymphoma: Staging

Q-87

Which one of the following haematological malignancies is most commonly associated with the t(11;14) translocation?

A. Acute promyelocytic leukaemia
B. Burkitt's lymphoma
C. Acute lymphoblastic leukaemia
D. Mantle cell lymphoma
E. Chronic myeloid leukaemia

ANSWER:
D. Mantle cell lymphoma

EXPLANATION:

Please see Haematological Malignancies: Genetics

Q-88

A patient presents as she has a strong family history of cancer. Which one of the following cancers is least likely to be inherited?

A. Colorectal cancer
B. Breast cancer
C. Gastric cancer
D. Endometrial cancer
E. Ovarian cancer

ANSWER:
C. Gastric cancer

EXPLANATION:
Between 5 and 10% of all breast cancers are thought to be hereditary. Mutation in the BRCA1 and BRCA2 genes also increase the risk of ovarian cancer. For colorectal cancer around 5% of cases are caused by hereditary non-polyposis colorectal carcinoma (HNPCC) and 1% are due to familial adenomatous polyposis. Women who have HNPCC also have a markedly increased risk for developing endometrial cancer - around 5% of endometrial cancers occur in women with this risk factor.

Please see Cancer in the UK

Q-89

A woman is prescribed docetaxel as part of her chemotherapy for breast cancer. What is the mechanism of action of docetaxel?

A. Inhibits RNA synthesis
B. Stabilizes DNA-topoisomerase II complex
C. Prevents microtubule disassembly
D. Inhibits formation of microtubules
E. Causes cross-linking in DNA

ANSWER:
C. Prevents microtubule disassembly

EXPLANATION:
Taxanes such as docetaxel - prevents microtubule depolymerisation & disassembly, decreasing free tubulin

Like other taxanes the principal mechanism of action is the prevention of microtubule disassembly.

Please see Cytotoxic Agents

Q-90

A 34-year-old intravenous drug user is admitted with a purpuric rash affecting her legs. Blood tests reveal the following:

Hb	**11.4g/dl**
Platelets	**489 * 109/l**
WCC	**12.3 * 109/l**
HCV PCR	**positive**
HBsAg	**negative**

Rheumatoid factor positive
C3/C4 reduced

What is the most likely diagnosis?

A. Polyarteritis nodosa
B. Henoch-Schonlein purpura
C. Wegener's granulomatosis
D. Cryoglobulinaemia
E. Systemic lupus erythematous

ANSWER:
D. Cryoglobulinaemia

EXPLANATION:
Hepatitis C infection is associated with type II (mixed) cryoglobulinaemia, suggested by the purpuric rash, positive rheumatoid factor and reduced complement levels

Please see Cryoglobulinaemia

Q-91

A 46-year-old woman presents to her GP with a 2-month history of increasing tiredness and fatigue. She has also noticed that she has been getting more short of breath recently. Her past medical history includes two urinary tract infections in the past year and lower back pain for which she takes paracetamol. She does not take any other medications. On examination, she is pale. The GP orders some baseline blood tests:

Hb 101 g/l (115–165 g/L)
MCV 88.1 fL (80-100 fL)
Platelets 129 * 109/l (140-400 * 109/l)
ESR 114 mm/h (3–9 mm/h)
WBC 3.2 * 109/l (4.0-11.0 * 109/l)

Na+ 137 mmol/l (135-145mmol/l)
K+ 4.9 mmol/l (3.5-5mmol/l)
Urea 10 mmol/l (2.5-6.7mmol/l)
Creatinine 108 µmol/l (45-90µmol/l)
eGFR 50 ml/min/1.73m2 (>90 ml/min/1.73m2)
Ca2+ 2.9 mmol/L (2.12-2.65mmol/L)

What is the next most appropriate investigation?

A. Renal ultrasound scan
B. Cervical lymph node biopsy
C. PTH levels
D. CT KUB
E. Serum electrophoresis

ANSWER:
E. Serum electrophoresis

EXPLANATION:
'CRAB' features of multiple myeloma = hyperCalcaemia, Renal failure, Anaemia (and thrombocytopenia) and Bone fractures/lytic lesions

The combination of the history, examination findings and blood test results point towards a diagnosis of multiple myeloma. This patient is demonstrating evidence of all four features of multiple myeloma:
C - hypercalcaemia
R - renal insufficiency (suggested by the U&Es and complicated by the recurrent UTIs - patients are susceptible to infections as the production of antibodies by normal plasma cells is impaired)
A - this patient is short of breath due to her anaemia (and the FBC shows evidence of pancytopenia - typically due to plasma cells infiltrating the bone marrow)
B - bone pain (albeit subtle in the form of a vague history of lower back pain)

The immunoglobulin produced by dysplastic plasma cells shows up as a monoclonal band on serum electrophoresis.

Renal ultrasound scan will not aid diagnosis of multiple myeloma.

Cervical lymph node biopsy may be helpful in lymphoma but not myeloma (a bone marrow biopsy would be more helpful in multiple myeloma).

PTH levels can help identify the cause of hypercalcaemia but this patient has enough features suggestive of multiple myeloma to justify investigating for myeloma first.

CT scan of the kidneys, ureters and bladder is unlikely to be helpful in identifying multiple myeloma (although whole-body CT scanning is often used to detect osteolytic lesions).

Please see Myeloma: Features

Q-92

You are a doctor in the haematology clinic. You are asked to review a 46-year-old man that was referred to the clinic with purpuric rash, generalised weakness and joint pain.

He has a history of hypertension and hepatitis C. He is a non-smoker and occasionally drinks alcohol.

Immunology results:

IgM monoclonal
IgG polyclonal

Which of the following diagnoses is associated with his history and immunology?

A. **Buerger disease**
B. **Henoch-Schönlein purpura**
C. **Polyarteritis nodosa**
D. **Type I cryoglobulinaemia**
E. **Type II cryoglobulinaemia**

ANSWER:
E. Type II cryoglobulinaemia

EXPLANATION:
Hepatitis C is associated with mixed (type II) cryoglobulinaemia

Buerger disease - vasculitis affecting small and medium-sized arteries commonly in users of tobacco.

Henoch-Schönlein purpura - vasculitis affecting small-sized vessels most common in children. Serum IgA may be elevated.

Polyarteritis nodosa - vasculitis affecting small and medium-sized arteries, often with necrosis of the vessels. Hepatitis C is a risk factor for cutaneous polyarteritis nodosa, however, IgG and IgM levels are not affected.

Type I cryoglobulinaemia - associated with lymphoproliferative disorders with immunology demonstrating the presence of monoclonal IgG or IgM.

Type II cryoglobulinaemia - also known as mixed cryoglobulinaemia. Associated with autoimmune disorders and infectious diseases. Immunology demonstrates the presence of monoclonal and polyclonal IgG and IgM.

Please see Cryoglobulinaemia

Q-93

A 69-year-old male patient presents to the oncology clinic with a 3-months history of right upper quadrant discomfort, weight loss and anorexia. Ultrasound liver raises the suspicion of a hepatocellular carcinoma.

Which carcinogen had he likely been exposed to?

A. **Nitrosamine**
B. **Aflatoxin**
C. **Aniline dye**
D. **Arsenic**
E. **Benzene**

ANSWER:
B. Aflatoxin

EXPLANATION:
Exposure to aflatoxin is a risk factor for hepatocellular carcinoma

Exposure to aflatoxin is a risk factor for hepatocellular carcinoma.

Exposure to nitrosamine is a risk factor for gastric and oesophageal carcinoma.

Exposure to aniline dye is a risk factor for transitional cell carcinoma.

Exposure to arsenic is a risk factor for lung malignancy and liver angiosarcoma.

Exposure to benzene is a risk factor for leukaemia.

Please see Carcinogens

Q-94

A 28-year-old gentleman was diagnosed with Hodgkin's lymphoma after presenting to his GP with painless lymphadenopathy. Following a staging positron emission tomography (PET) scan, nodes involving both sides of the diaphragm were found. Which stage of the Ann-Arbor classification does his presentation fall under?

A. Stage I
B. Stage II
C. Stage III
D. Stage IV
E. Stage V

ANSWER:
C. Stage III

EXPLANATION:
Stage III of the Ann-Arbor clinical staging of lymphomas involve lymph nodes on both sides of the diaphragm

The Ann-Arbor classification is used for Hodgkin's lymphoma and is split into 4 stages according to the spread of the disease.

Stage I - involves a single regional lymph node

Stage II - involves two or more lymph nodes on one side of the diaphragm

Stage IV - distant spread involving one or more extra lymphatic organs

Stage V - Not part of the Ann-Arbor classification

Please see Hodgkin's Lymphoma: Staging

Q-95

A 77-year-old female presents to the emergency department with a 1 month history of lethargy and progressive dyspnoea. She has a past medical history of rheumatoid arthritis and angina.

A full workup is done and blood tests reveal a haemoglobin of 53g/L, for which she is prescribed 3 units of blood.

One hour into her third bag of blood, the patient begins to feel increasingly breathless, with chills and a headache. There is no focal less swelling or tenderness.

Her observations are as follows:
Blood pressure - 172/101mmHg, heart rate - 113 bpm, temperature - 37.3ºC, oxygen saturation - 92% on air, respiratory rate - 34/min.

The transfusion is immediate stopped. Initial blood tests reveal:

Hb	**82 g/L**	**Female: (115 - 160)**
Platelets	**171 * 109/L**	**(150 - 400)**
WBC	**6.4 * 109/L**	**(4.0 - 11.0)**
Neuts	**4.1 * 109/L**	**(2.0 - 7.0)**
Lymphs	**1.8 * 109/L**	**(1.0 - 3.5)**
Mono	**0.4 * 109/L**	**(0.2 - 0.8)**
Eosin	**0.1 * 109/L**	**(0.0 - 0.4)**

Chest X-ray revealed diffuse bilateral infiltrates, with no focal consolidation or effusion.

What is the most likely diagnosis?

A. Acute haemolytic reaction
B. Transfusion related acute lung injury
C. Transfusion associated circulatory overload
D. Pulmonary embolus
E. Transfusion associated sepsis

ANSWER:
C. Transfusion associated circulatory overload

EXPLANATION:
TRALI is differentiated from TACO by the presence of hypotension in TRALI vs hypertension in TACO

While transfusion related lung injury (TRALI) and transfusion associated circulatory overload (TACO) are similar and difficult to differentiate, there are key factors in the patient history and investigations that point towards TACO:

- ***TACO usually occurs in elderly patients with a decreased cardiovascular reserve and ability to compensate for an increase in fluid volume.***
- ***TACO is more likely in rapid/substantial transfusions, whereby receiving more units increase the likelihood of overload.***
- ***TACO presents with hypertension due to volume excess, whereas TRALI presents with hypotension due to ARDS and the resultant hypovolaemic shock.***
- ***TRALI is likely to be associated with fever and leukopenia, whereas TACO usually has neither.***

TACO is also more common than TRALI with an incidence of roughly 1%, compared to 0.1% of TRALI.

The other explanations are all less likely than TRALI/TACO:
Option 1. Acute haemolysis typically presents immediately after the transfusion begins, with fever, flank/chest pain and oozing from the venepuncture site. Here the onset is after an hour of initiation, and the patient is not pyrexial.

Option 4. Pulmonary embolus should be suspected in any patient who suffers sudden dyspnoea, however it is less clinically likely with no signs of deep vein thrombosis nor any predisposing risk factors.

Option 5. Transfusion associated sepsis would cause fever, chills and hypotension secondary to septic shock.

Please see Blood Product Transfusion Complications

Q-96

John, a 35-year-old gentleman on the gastrointestinal ward has been suffering from melaena for a week. His haemoglobin level today is 60g/L and the consultant has requested that you transfuse John a unit of packed red blood cells. Within minutes of starting the transfusion, John complains of itching and stinging sensations on his trunk. On examination, you observe red raised welts over his abdomen and chest. His blood pressure is unaltered from prior to the transfusion at 130/70mmHg, his temperature is 37ºC and there are no signs of dyspnoea, wheezing, stridor or angioedema. Which one of the following management options is the most appropriate?

A. Temporary transfusion termination and an antihistamine
B. Permanent transfusion termination, generous fluid resuscitation with saline solution and inform the lab
C. Permanent transfusion termination, intramuscular adrenaline, antihistamines, corticosteroids, bronchodilators and supportive care
D. Temporary transfusion termination and an antipyretic
E. Permanent transfusion termination and high dose immune globulin therapy

ANSWER:
A. Temporary transfusion termination and an antihistamine

EXPLANATION:
During blood transfusions, minor allergic reactions may be managed by temporarily stopping the transfusion and giving an antihistamine

This patient is suffering from an urticarial rash following blood transfusion, hence the transfusion should be stopped and an antihistamine given. Once the symptoms resolve, the transfusion may be continued with no need for further workup.

Additional IM adrenaline, corticosteroids, bronchodilators and supportive care would only be required for symptoms of anaphylaxis or severe allergic reaction. This patient does not have angioedema or signs of breathing difficulties.

Permanent termination with generous fluid resuscitation and informing the lab is not appropriate and is the management of acute haemolytic transfusion reaction. There is no fever, abdominal/chest pain or hypotension to indicate this complication.

Temporary transfusion termination with an antipyretic is used to treat non-haemolytic febrile reaction, however, there is no fever here to indicate this complication.

High dose immunoglobulin is used to treat post-transfusion purpura, which is a rare, delayed transfusion reaction

(BMJ Best Practice)

Please see Blood Product Transfusion Complications

Q-97

Which one of the following cytotoxic agents acts by inhibiting dihydrofolate reductase and thymidylate synthesis?

A. Methotrexate
B. Vincristine
C. Bleomycin
D. Cyclophosphamide
E. Doxorubicin

ANSWER:
A. Methotrexate

EXPLANATION:
Methotrexate - inhibits dihydrofolate reductase and thymidylate synthesis

Please see Cytotoxic Agents

Q-98

A 67-year-old man is diagnosed with myelofibrosis. What is the most common presenting symptom of myelofibrosis?

A. Lethargy
B. Anorexia and weight loss
C. Night sweats
D. Easy bruising
E. Splenomegaly

ANSWER:
A. Lethargy

EXPLANATION:
Myelofibrosis - most common presenting symptom - lethargy

Whilst all the above may be seen in myelofibrosis lethargy is the most common

Please see Myelofibrosis

Q-99

A 25-year-old woman with primary antiphospholipid syndrome is reviewed. She has just had a booking ultrasound at 11 weeks gestation which confirms a viable pregnancy. This is her first pregnancy and she is otherwise fit and well. Which one of the following is the recommend treatment?

A. Aspirin + prednisolone
B. Low-molecular weight heparin
C. Prednisolone + low-molecular weight heparin
D. Aspirin + low-molecular weight heparin
E. Aspirin

ANSWER:
D. Aspirin + low-molecular weight heparin

EXPLANATION:
Antiphospholipid syndrome in pregnancy: aspirin + LMWH

The ultrasound at 11 weeks gestation would show a fetal heart if the pregnancy was viable. This patient should therefore be taking both aspirin and low-molecular weight heparin.

Please see Antiphospholipid Syndrome: Pregnancy

Q-100

A 23-year-old student is investigated following an anaphylactic reaction suspected to be secondary to a wasp sting. Which one of the following is the most appropriate first-line test to investigate the cause of the reaction?

A. Hair analysis
B. Radioallergosorbent test (RAST)
C. Desensitization therapy
D. Skin patch test
E. Skin prick test

ANSWER:
B. Radioallergosorbent test (RAST)

EXPLANATION:
Given the history of anaphylaxis it would not be appropriate to perform a skin prick test

Please see Allergy Tests

Q-101

A 29-year-old woman who has a history of recurrent pulmonary emboli is identified as having factor V Leiden. How does this particular inherited thrombophilia increase her risk of venous thromboembolic events?

A. Decreased levels of factor V
B. Increased levels of factor V
C. Activated factor V is inactivated much more slowly by activated protein C
D. Activated factor V is inactivated much more quickly by activated protein C
E. Decreased antithrombin III levels

ANSWER:
C. Activated factor V is inactivated much more slowly by activated protein C

EXPLANATION:
In patients with factor V Leiden, activated factor V is inactivated 10 times more slowly by activated protein C than normal

Please see Factor V Leiden

Q-102

A 26-year-old woman with known sickle cell anaemia presents to the emergency department with acute onset left sided pleuritic chest pain, dyspnoea and non-productive cough. Her symptoms began 2 days ago and progressively worsened.

Examination reveals obvious gross respiratory distress, a dull percussion note in the left base and coarse inspiratory crackles throughout the left lung.

Her observations are as follows:
Blood pressure - 112/89mmHg, heart rate - 112bpm, temperature - 38.7ºC, oxygen saturations - 87% on room air, respiratory rate - 28/min.

Chest X-ray revealed a left sided upper and lower lobe infiltrates with blunting of the costophrenic angle on the left.

What is the first-line long term therapy to reduce the occurrence of future incidents of this complication?

A. Hydroxycarbamide
B. Prophylactic antibiotics
C. Warfarin
D. Long term opioid analgesia
E. Regular blood transfusions

ANSWER:
A. Hydroxycarbamide

EXPLANATION:
Sickle cell patients should be started on long term hydroxycarbamide to reduce the incidence of complications and acute crises

This patient is experience acute chest syndrome, a form of acute lung injury, on the background of sickle cell anaemia. This is a common crisis in sickle cell patients and is characterised by new pulmonary infiltrates with consolidation, and new onset respiratory symptoms/signs such as cough, chest pain, pyrexia, hypoxia and tachypnoea.

Hydroxycarbamide is first line in the prevention of acute crises in sickle cell, and acts by increasing foetal haemoglobin (HbF) production. This reduces intravascular concentrations of pathological HbS resulting in less likely red blood cell polymerisation and precipitation.

Hydroxycarbamide has been shown in many randomised controlled trials to reduce incidence of mortality, hospitalisation and vaso-occlusive crises. Other therapies that have been shown to reduce incidence of acute chest crises include regular incentive spirometry and chronic blood transfusions.

Option 1. Correct - hydroxycarbamide should be started in all sickle cell patients who experience 3 or more vaso-occlusive painful crises per year, or any history of severe/recurrent acute chest syndrome.

Option 2. Incorrect - while infection can indeed be a common cause of acute chest syndrome, hydroxycarbamide is the only pharmaceutical treatment that has been shown to decrease the frequency of acute chest episodes.

Option 3. Incorrect - while a pulmonary embolism is a good differential in this patient, acute chest syndrome is more likely given the 2 day history, fever and widespread pulmonary infiltrates.

Option 4. Incorrect - while long term opioids are indicated in sickle cell to manage chronic pain, they do not aid the frequency of episodes and only serve to reduce pain levels.

Option 5. Incorrect - while blood transfusions reduce the incidence of sickle cell crises and are a mainstay of chronic treatment, they are indicated after failing hydroxycarbamide therapy. All patients on frequent transfusions should be monitored regularly to prevent iron excess.

Source: Charache et al. N Engl J Med. 1995 May 18;332(20):1317-22.

Please see Sickle Cell Anaemia

Q-103

A 72-year-old man is referred to haematology with a raised haemoglobin. A diagnosis of polycythaemia vera is suspected. Which other abnormality of the blood would be most consistent with this diagnosis?

A. Raised alkaline phosphatase
B. Hypokalaemia
C. Thrombocytopaenia
D. Raised ferritin level
E. Neutrophilia

ANSWER:
E. Neutrophilia

EXPLANATION:

Please see Polycythaemia Vera: Features

Q-104

A patient with testicular cancer is started on cisplatin therapy. Which of the following side-effects is most characteristically associated with cisplatin?

A. Liver cirrhosis
B. Alopecia
C. Peripheral neuropathy
D. Haemorrhagic cystitis
E. Cardiomyopathy

ANSWER:
C. Peripheral neuropathy

EXPLANATION:
Cisplatin may cause peripheral neuropathy

Please see Cytotoxic Agents

Q-105

Which one of the following malignancies may be associated with HTLV-1?

A. Adult T-cell leukaemia
B. Colorectal cancer
C. Burkitt's lymphoma
D. Medullary thyroid cancer
E. Breast cancer

ANSWER:
A. Adult T-cell leukaemia

EXPLANATION:

Please see Haematological Malignancies: Infections

Q-106

A 14-year-old girl is admitted to the Emergency Department. Over the past hour she has developed a painless, non-pruritic erythematous rash associated with severe angioedema. She has a past medical history of recurrent abdominal pain. Her symptoms fail to respond to adrenaline and she is therefore intubated to protect the airway. She is discharged from ITU after three days. During outpatient follow-up two weeks later a diagnosis of hereditary angioedema is suspected. What is the most appropriate screening test to perform?

A. Serum IgE levels
B. Serum C3 levels
C. Serum tryptase levels
D. Serum C4 levels
E. Serum C1-INH levels

ANSWER:
D. Serum C4 levels

EXPLANATION:
Hereditary angioedema - C4 is the best screening test inbetween attacks

Please see Hereditary Angioedema

Q-107

A 67-year-old gentleman presents with the blurring of his vision. This was sudden in onset and associated with this was shortness of breath and headache which came on gradually following the blurry vision. His past medical history includes treatment of squamous cell carcinoma of the lung which has failed to shrink despite the chemotherapy. On examination, he is short of breath with bulging veins on his forehead. Fundoscopic examination reveals papilloedema. His face appears swollen. Pemberton sign is positive. You administer oxygen and called for help. What is the next immediate step in managing this?

A. Administer dexamethasone
B. IM adrenaline
C. Topical latanoprost
D. Full blood count
E. Mannitol

ANSWER:
A. Administer dexamethasone

EXPLANATION:
SVC obstruction can cause visual disturbances such as blurred vision

This is superior vena cava obstruction. Due to the malignancy present, the superior vena cava has been compressed by a tumour. This is confirmed by the bulging of the veins on the forehead (back pressure due to compression), the papilloedema which is a sign of raised intracranial pressure and Pemberton sign. This is when you ask a patient to raise their arms until they touch the side of their face. If they develop cyanosis or worsening of their shortness of breath or facial congestion, it is said to be positive. The next best step would be a steroid to dampen the inflammatory response to a tumour and swelling. Then either a stent or radiotherapy/ chemotherapy would be given.

IM adrenaline would be useful if this was anaphylaxis. It would not be appropriate here.

Latanoprost is a treatment for glaucoma. It is a prostaglandin analogue and serves to reduce ocular pressure. This would not be the next immediate treatment in this condition.

A full blood count will be taken, but it is not the main priority.

Mannitol would not be suitable here. It is given to reduce intracranial pressure. However, dexamethasone is more effective.

Please see Superior Vena Cava Obtruction

Q-108

A 32-year-old man presents to the emergency department with abdominal pain, numbness and tingling in bilateral lower limbs and feeling generally tearful. There is a history of recurrent abdominal pain and neurological symptoms in the past, however a diagnosis was never found. He is otherwise fit and well. On examination, there is reduced sensation up to the knees in a stocking distribution in the lower limbs. There is no other neurology of note. There is no rash found. You suspect a type of porphyria.

What is the most likely finding to support the diagnosis of this type of porphyria?

A. Raised urine lead level
B. Raised urinary porphobilinogen
C. Raised urinary uroporphyrinogen
D. Raised urinary uroporphyrinogen decarboxylase
E. Raised urinary protoporphyrin

ANSWER:
B. Raised urinary porphobilinogen

EXPLANATION:
In acute intermittent porphyria, urinary porphobilinogen is typically raised

The presentation of abdominal pain, neurological and psychiatric symptoms raises the suspicion of acute intermittent porphyria. In acute intermittent porphyria (AIP), urinary porphobilinogen is typically raised.

Lead level is not usually raised in porphyria.

Uroporphyrinogen is usually raised in porphyria cutanea tarda. The lack of skin lesions makes acute intermittent porphyria more likely.

Uroporphyrinogen decarboxylase is not usually measured.

Urinary protoporphyrin may be slightly raised in AIP but raised porphobilinogen is more likely.

Please see Acute Intermittent Porphyria

Q-109

A 21-year-old man comes for review. He recently had an abdominal ultrasound for episodic right upper quadrant pain which demonstrated gallstones. A full blood count was also ordered which was reported as follows:

Hb	**9.8 g/dl**
MCV	**91 fl**
Plt	**177 * 109/l**
WBC	**5.3 * 109/l**

The patient also mentions that his father had a splenectomy at the age of 30 years.

Which one of the following tests is most likely to be diagnostic?

A. **Ham's test**
B. **PAS staining of erythrocytes**
C. **Glucose-6-phoshate dehydrogenase levels**
D. **EMA binding test**
E. **Direct Coombs' test**

ANSWER:
D. EMA binding test

EXPLANATION:
This patient likely has hereditary spherocytosis (HS) as evidenced by the normocytic anaemia, gallstones and family history. The British Journal of Haematology guidelines state that a clinical diagnosis of HS can sometimes be made for classical histories. However, if the case is more equivocal then a diagnostic test is recommended, such as the EMA binding test.

The EMA binding test uses flow cytometry to determine the amount of fluorescence (reflecting EMA bound to specific transmembrane proteins) derived from individual red cells.

Please see Hereditary Spherocytosis

Q-110

A 49-year-old female is admitted to hospital due to shortness of breath and pleuritic chest pain. She also complains of a marked decrease in appetite for the past 4 months. An admission chest x-ray shows a right-sided pleural effusion. An underlying malignancy is suspected and a series of tumour markers are requested:

CA 19-9	**55 u/ml (< 40)**
CA 125	**654 u/ml (< 30)**
CA 15-3	**9 u/ml (<40)**

What is the most likely underlying diagnosis?

A. **Ovarian fibroma**
B. **Small cell lung cancer**
C. **Pancreatic carcinoma**
D. **Hepatocellular cancer**
E. **Breast carcinoma**

ANSWER:
A. Ovarian fibroma

EXPLANATION:
This patient has Meig's syndrome - an ovarian fibroma associated with a pleural effusion and ascites

Please see Tumour Markers

Q-111

Which of the following is a good prognostic factor in chronic lymphocytic leukaemia?

A. Female sex
B. Lymphocyte doubling time < 12 months
C. CD38 expression positive
D. Age > 70 years
E. Raised LDH

ANSWER:
A. Female sex

EXPLANATION:

Please see Chronic Lymphocytic Anaemia: Prognostic Factors

Q-112

A 52-year-old is found to have chronic myeloid leukaemia following investigation for splenomegaly. Which one of the following best describes the function of the BCR-ABL fusion protein?

A. Epidermal growth factor receptor
B. Phospholipase C
C. CD52 co-receptor
D. Tyrosine kinase
E. Fibroblast growth factor receptor

ANSWER:
D. Tyrosine kinase

EXPLANATION:
Chronic myeloid leukaemia - imatinib = tyrosine kinase inhibitor

Please see Chronic Myeloid Leukaemia

Q-113

A patient develops methaemoglobinaemia after being prescribed isosorbide mononitrate. Which substance is most likely to be depleted?

A. Pyruvate kinase
B. Hyponitrite reductase
C. Pyridoxine 5-dehydrogenase
D. Glucose-6-phosphate dehydrogenase
E. NADH

ANSWER:
E. NADH

EXPLANATION:

Please see Methaemoglobinaemia

Q-114

A 78-year-old male is admitted to the ward with suspected sepsis. He is receiving IV antibiotics. The nurse informs you the patient is deteriorating with tachycardia, hypotension and bleeding from the IV site. You suspect the patient has disseminated intravascular coagulation (DIC) secondary to sepsis.

If a blood film was taken from the patient, which of the following would most likely be observed on histology?

A. Schistocytes
B. Bite cells
C. Howell-Jolly bodies
D. Heinz bodies
E. Target cells

ANSWER:
A. Schistocytes

EXPLANATION:
DIC is associated with schistocytes due to microangiopathic haemolytic anaemia

DIC can trigger microangiopathic haemolytic anaemia. Red blood cells are sheared by microthrombi as they pass through the circulation producing schistocytes which can be visualised on histology.

Heinz bodies and bite cells are characteristic of glucose-6-phosphate dehydrogenase (G6PD) deficiency.

Howell-Jolly bodies are seen in asplenic patients.

Target cells can be seen in conditions such as thalassaemia.

Please see Disseminated Intravascular Coagulation - Diagnosis

Q-115

A 67-year-old man presents feeling 'generally unwell' and complaining of pain in his back and legs. His wife also reports that he has been slightly confused for the past two weeks. Basic blood tests are ordered:

Hb	**12.1 g/dl**
Platelets	**411 * 109/l**
WBC	**7.6 * 109/l**
Na+	**143 mmol/l**
K+	**5.3 mmol/l**
Urea	**15.7 mmol/l**
Creatinine	**208 µmol/l**
Bilirubin	**20 µmol/l**
ALP	**110 u/l**
ALT	**55 u/l**
γGT	**67 u/l**
Albumin	**31 g/l**
Total protein	**84 g/l**

Calcium **3.10 mmol/l**
Phosphate **0.79 mmol/l**

What is the most likely underlying diagnosis?

A. Multiple myeloma
B. Renal cancer with bony metastases
C. Sarcoidosis
D. Primary hyperparathyroidism
E. Prostate cancer with bony metastases

ANSWER:
A. Multiple myeloma

EXPLANATION:
Hypercalcaemia, renal failure, high total protein = myeloma

One of the stand out results is the high calcium level. This immediately narrows the differential diagnosis considerably. Remember the two most common causes of hypercalcaemia are malignancy and primary hyperparathyroidism. Neither of these alone would however explain the renal failure and high total protein, both common features of untreated myeloma.

Please see Myeloma: Features

Q-116

In idiopathic thrombocytopenic purpura what are the autoantibodies most commonly directed at?

A. Platelet activating factor
B. Glycoprotein IIb/IIIa complex
C. ATP receptor
D. Anti-thrombin III receptor
E. ADP receptor

ANSWER:
B. Glycoprotein IIb/IIIa complex

EXPLANATION:

Please see Immune Thrombocytopaenia (ITP) in Adults

Q-117

A 65-year-old woman is reviewed. She is on the waiting list for a varicose vein operation but during the preoperative assessment was noted to have a raised lymphocyte count. She reports feeling well currently and clinical examination is normal. Her bloods were as follows:

Hb **11.8 g/dl**
Plt **184 * 109/l**
WBC **21.2 * 109/l**

There are no previous bloods to compare these results with. Following referral to haematology a diagnosis of chronic lymphocytic leukaemia was made. What is the most appropriate management?

A. No treatment + cancel operation
B. No treatment + go ahead with operation
C. Chlorambucil + cancel operation
D. Fludarabine + go ahead with operation but with quinolone prophylaxis
E. Alemtuzumab + cancel operation

ANSWER:
B. No treatment + go ahead with operation

EXPLANATION:
There is no indication for treating this patient at the current time or not going ahead with surgery

Please see Chronic Lymphocytic Leukaemia: Management

Q-118

A 40-year-old female is referred to medical assessment unit by her physician for querying thrombotic thrombocytopenic purpura (TTP) after she presented with a temperature of 38.9ºC. Her subsequent urea and electrolytes showed deteriorating renal function with a creatinine 3 times greater than her baseline.

What is the underlying pathophysiology of TTP?

A. Autoimmune destruction of red blood cells
B. Failure to cleave von Willebrand factor normally
C. Anti-bodies against von Willebrand factor
D. Autoimmune destruction of platelets
E. A deficiency of von Willebrand factor

ANSWER:
B. Failure to cleave von Willebrand factor normally

EXPLANATION:
TTP is caused by the failure to cleave vWF normally

Patients with TTP have unusually large multimers of von Willebrand factor (vWF) in their plasma. Patients with TTP lack a plasma protease that is responsible for the breakdown of these ultra-large vWF multimers. See notes below.

Autoimmune destruction of red blood cells is a form of autoimmune hemolytic anaemia and is not the correct answer in this scenario.

Autoimmune destruction of platelets is seen in idiopathic thrombocytopenic purpura (ITP).

A deficiency of von Willebrand factor (vWF) is seen in von Willebrand disease, a genetic disorder.

Anti-bodies against vWF is incorrect.

Please see Thrombotic Thrombocytopaenic Purpura

Q-119

A 28-year-old man is investigated for cervical lymphadenopathy. A biopsy shows nodular sclerosing Hodgkin's lymphoma. Which one of the following factors is associated with a poor prognosis?

A. History of Epstein Barr virus infection
B. Mediastinal involvement
C. Female sex
D. Night sweats
E. Lymphocytes 20% of total white blood cells

ANSWER:
D. Night sweats

EXPLANATION:
Night sweats are a 'B' symptom and imply a poor prognosis

Please see Hodgkin's Lymphoma: Histological Classification and Prognosis

Q-120

A 30-year-old male with sickle cell disease presents to the Emergency Department (ED) with fever, tachypnoea and rib pain. On examination, they have a low grade fever of 37.9ºC, oxygen saturations of 95% on air, and on auscultation there are bilateral vesicular breath sounds. A chest X-ray shows opacification in the right middle zone. Which of these statements most accurately describes the management of this patient?

A. Bronchodilators are indicated
B. The patient should undergo a simple transfusion to a target Hb > 8g/L
C. The patient should undergo an exchange transfusion to a target Hb > 8g/L
D. Incentive spirometry is indicated
E. Empirical antibiotic therapy is not indicated

ANSWER:
D. Incentive spirometry is indicated

EXPLANATION:
This question requires the candidate first of all to diagnose this presentation as an acute chest syndrome. The British Committee for Standards in Haematology (BCSH) defines this as 'an acute illness characterized by fever and/or respiratory symptoms, accompanied by a new pulmonary infiltrate on chest X-ray'.

The fundamentals of initial management are as follows:

- ***Oxygen therapy to maintain saturations > 95%***
- ***Intravenous fluids to ensure euvolaemia***
- ***Adequate pain relief***
- ***Incentive spirometry in all patients presenting with rib or chest pain***

- *Antibiotics with cover for atypical organisms*
- *Early consultation with the critical care team and haematology*

A senior haematologist will make a decision as to whether a simple or exchange transfusion is necessary, and guidelines suggest an Hb target of 100-110g/L in either instance. On presentation, patients with acute chest syndrome should be fully cross matched and a history of red cell antibodies sought.

Bronchodilators are indicated if asthma co-exists with acute chest syndrome, or if there is evidence of acute bronchospasm on auscultation.

Please see Sickle-Cell Crises

Q-121

What is the most common inherited bleeding disorder?

A. Haemophilia A
B. Activated protein C resistance
C. Haemophilia B
D. Antithrombin III deficiency
E. von Willebrand's disease

ANSWER:
E. von Willebrand's disease

EXPLANATION:

Please see von Willebrand's Disease

Q-122

A 15-year-old girl is referred to haematology. She started having periods three years ago which have always been heavy and prolonged. Unfortunately the menorrhagia has responded poorly to trials of tranexamic acid and the combined oral contraceptive pill. Blood tests show the following:

Hb	**10.3 g/dl**
Plt	**239 * 109/l**
WBC	**6.5 * 109/l**

PT	**12.9 secs**
APTT	**37 secs**

What is the most likely diagnosis?

A. Haemophilia B
B. Disseminated intravascular coagulation
C. Haemophilia A
D. Idiopathic thrombocytopenic purpura
E. Von Willebrand's disease

ANSWER:
E. Von Willebrand's disease

EXPLANATION:
Von Willebrand's disease is the most likely diagnosis as it is the most common inheritied bleeding disorder. The mildy elevated APTT is consistent with this diagnosis.

The mild anaemia is consistent with the long history of menorrhagia.

Please see von Willebrand's Disease

Q-123

A 66-year-old female presents with fever, weight loss and low-grade pain. After an array of tests are performed and she is diagnosed with chronic lymphocytic leukaemia (CLL). Further investigations are undertaken to assess genetic aberrations and levels of prognostic markers in order to aid management.

Which of the following would likely worsen her prognosis?

A. High levels of serum beta-2 microglobulin
B. Being female
C. Developing CLL at a younger age
D. Deletion of 17p13 region
E. Deletion of 13q14 region

ANSWER:
Deletion of 17p13 region

EXPLANATION:
del 17p is associated with a poor prognosis in CLL

The prognosis of CLL varies and can range from 2 to 20 years. The variability highlights the importance of assessing prognostic factors and factoring this appropriately in the management of the patient. Fluorescence in situ hybridization tests (FISH) panel tests, flow cytometry and lab markers are used in order to gather information on prognosis.

Deletion of 17p13 is the strongest independent prognostic factor for CLL. The disease progresses more rapidly and tends to be refractory to many conventional treatments.

The most common genetic aberration in CLL is deletion of 13q. It is associated with a more indolent course of the disease improving the prognosis.

Female patients, younger people (<65) and patients with high levels of serum beta-2 microglobulin are associated with having a better prognosis.

Please see Chronic Lymphocytic Leukaemia: Prognostic Factors

Q-124

A 61-year-old presents for review. She has been having atypical lower back pain for the past two months. An x-ray of her lumbar spine reported raised the possibility of spinal metastases but there is no current evidence of a primary tumour. A series of tumour markers were sent. Which one of the following is most associated with raised levels of CA 15-3?

A. Pancreatic cancer
B. Colorectal cancer
C. Breast cancer
D. Ovarian cancer
E. Hepatocellular carcinoma

ANSWER:
C. Breast cancer

EXPLANATION:
CA 15-3 is a tumour marker in breast cancers

Please see Tumour Markers

Q-125

A 54-year-old man is investigated for recurrent episodes of abdominal pain associated with weakness of his arms and legs. Which one of the following urine tests would best indicate lead toxicity?

A. Haemoglobinuria
B. Coproporphyrin
C. Porphobilinogen
D. Uroporphyrin
E. Ham's test

ANSWER:
B. Coproporphyrin

EXPLANATION:

Please see Lead Poisoning

Q-126

Which of the following is a cause of intravascular haemolysis?

A. Hereditary spherocytosis
B. Sickle cell anaemia
C. Paroxysmal nocturnal haemoglobinuria
D. Haemolytic disease of the newborn
E. Warm autoimmune haemolytic anaemia

Intravascular haemolysis - paroxysmal nocturnal haemoglobinuria

ANSWER:
C. Paroxysmal nocturnal haemoglobinuria

EXPLANATION:

Please see Haemolytic Anaemia: By Site

Q-127

Each one of the following is seen in Wiskott-Aldrich syndrome, except:

A. Thrombocytopenia
B. Recurrent chest infections
C. X-linked recessive inheritance
D. Mutation in the WASP gene
E. Psoriasis

ANSWER:
E. Psoriasis

EXPLANATION:

Please see Wiskott-Aldrich Syndrome

Q-128

A 34-year-old man who is known to have glucose-6-phosphate dehydrogenase deficiency presents with symptoms of a urinary tract infection. He is prescribed an antibiotic. A few days later he becomes unwell and is noticed by his partner to be pale and jaundiced. What drug is mostly likely to have been prescribed?

A. Co-amoxiclav
B. Trimethoprim
C. Ciprofloxacin
D. Cefalexin
E. Erythromycin

ANSWER:
C. Ciprofloxacin

EXPLANATION:
The sulfamethoxazole in co-trimoxazole causes haemolysis in G6PD, not the trimethoprim

Please see G6PD Deficiency

Q-129

Which one of the following is least recognised as a treatment modality in idiopathic thrombocytopenic purpura?

A. Plasma exchange
B. Splenectomy
C. IV immunoglobulin
D. Cyclophosphamide
E. Oral prednisolone

ANSWER:
A. Plasma exchange

EXPLANATION:

Please see ITP: Investigation and Management

Q-130

A 46-year-old man with a history of alcoholic liver disease presents with tense ascites.

Urgent bloods tests demonstrate the following:

Hb	**90 g/L**	**Male: (135-180)**	**Female: (115 - 160)**
Platelets	**31 *109/L**	**(150 - 400)**	
WBC	**4.4 *109/L**	**(4.0 - 11.0)**	
Neuts	**2.0 *109/L**	**(2.0 - 7.0)**	
Lymphs	**2.0 *109/L**	**(1.0 - 3.5)**	
Mono	**0.2 *109/L**	**(0.2 - 0.8)**	
Eosin	**0.2 *109/L**	**(0.0 - 0.4)**	

Prothrombin time (PT) 15 secs(10-14 secs)
Activated partial thromboplastin time (APTT) 34 secs(25-35 secs)
Fibrinogen 2 g/L (2 - 4)

The gastroenterology team advises an ascitic drain and advises that a platelet transfusion is required given the patient's thrombocytopenia.

The haematology team advises a pool of platelets should be administered prior to the procedure and a further pool during the procedure to ensure optimal clotting as far as possible.

The patient undergoes an uneventful transfusion of one pool prior to his procedure, however, during the procedure, it is noted that he is very warm to touch and after drain insertion, he begins to experience rigors.

Which of the following is the most likely cause of this patient's deterioration?

A. Spontaneous bacterial peritonitis
B. Perforation of abdominal viscera with ascitic drain insertion
C. Bacterial contamination of platelet transfusion
D. ABO incompatibility of platelet transfusion
E. None of the above

ANSWER:
C. Bacterial contamination of platelet transfusion

EXPLANATION:
Platelet transfusions have the highest risk of bacterial contamination compared to other types of blood products

Spontaneous bacterial peritonitis is unlikely given the patient has a normal white cell count on presentation.

Perforation of abdominal viscera with ascitic drain insertion is a rare complication and occurs in less than 1 in 1000 drain insertions when performed in accordance with good clinical practice.

ABO incompatibility of platelet transfusion is very rare and would typically present with haemolysis rather than fever.

Rates of bacterial contamination of platelet transfusion are relatively speaking high, given that platelets are stored at between 20-24ºC. Risk of bacterial contamination of the platelet pool increases with increasing time ex vivo and is the main factor contributing to the short shelf life of platelets.

Please see Platelet Transfusion: Active Bleeding

Q-131

A 35-year-old woman who is 16 weeks pregnant has attended the acute medical unit after her first seizure. Her pregnancy has been uncomplicated thus far. Her temperature is 39.4ºC, pulse rate 86, blood pressure 125/86 mmHg. Bloods are as follows:

Hb 69 g/l
Platelets 43 * 109/l
WBC 7.4 * 109/l

Na+ 137 mmol/l
K+ 4.9 mmol/l
Urea 18 mmol/l
Creatinine 278 µmol/l

Urine dip was negative for protein and ketones. The laboratory phone you to inform you schistocytes have been seen on the blood film.

Which of these best describes the pathogenesis of this condition?

A. Dysregulation of coagulation and fibrinolysis, resulting in widespread clotting
B. An acquired inhibition of ADAMTS13, preventing the cleavage of von Willebrand Factor multimers
C. Bacterial toxin initiation of apoptosis and thrombogenesis
D. Abnormal placental perfusion and vascularisation
E. Parasitic infiltration of red blood cells

ANSWER:

B. An acquired inhibition of ADAMTS13, preventing the cleavage of von Willebrand Factor multimers

EXPLANATION:

Acquired inhibition of the protein ADAMTS13 which cleaves vWF multimers is the most common cause of TTP

This woman has presented with the classical pentad of thrombotic thrombocytopenic purpura - fever, neurological dysfunction, evidence of haemolysis (blood film), renal injury and thrombocytopenia.

Acquired inability to cleave vWF multimers is the most common cause of TTP. This can occasionally be prompted by pregnancy. This results in platelet deposition and widespread coagulation. ADAMTS13 is the protein responsible for this cleavage and can be inhibited by numerous causes. A congenital deficiency in this protein is a rare cause (Upshaw-Schulman Syndrome).

1 - Describes disseminated intravascular coagulation. This has a similar haemolytic picture, but fever, neurological dysfunction and AKI are less common.

3 - Describes haemolytic-uraemic syndrome which is classically associated with E coli O:157; however no prodromal history of diarrhoea is mentioned. The blood results would however be rather similar.

4 - Describes pre-eclampsia. This can cause both seizures (eclampsia) and a microangiopathic haemolytic anaemia. However, it would be uncommon to occur so early in pregnancy. a negative urine dip also suggests this is not the diagnosis.

5 - This is malaria. Whilst it can also cause haemolysis, it is uncommon for it to do so with this history. For malaria to be severe enough to cause seizures, one would expect the blood film to show some parasites and not just schistocytes.

Please see Thrombotic Thrombocytopenic Purpura

Q-132

A 36-year-old woman attends the emergency department with a 2 hour history of left sided arm and leg weakness. She reports a 5 day history of fatigue, dizziness and nausea. She has never had anything like this before.

She has no relevant medical history, or family history of autoimmune disease.

On examination, she had multiple petechiae on her legs bilaterally. She is able to talk in full sentences and shows no signs of higher cognitive deficit. She has 4/5 power on her left arm and leg, with no sensory deficit. She has no cranial nerve abnormalities.

Her observations were as follows:
Blood pressure - 161/93mmHg, heart rate - 75bpm, temperature - 38.2ºC, oxygen saturations - 97% on air, respiratory rate - 18/min.

Hb	82 g/L	Female: (115 - 160)
Platelets	21 * 10^9/L	(150 - 400)
WBC	8.7 * 10^9/L	(4.0 - 11.0)
Prothrombin time (PT)	12 secs	(10-14 secs)
Activated partial thromboplastin time (APTT)	25 secs	(25-35 secs)
Reticulocytes	6 %	(0.5 - 1.5)
Urea	20.1 mmol/L	(2.0 - 7.0)
Creatinine	201 µmol/L	(55 - 120)

Blood film showed schistocytosis.

What is the most likely diagnosis?

A. Haemolytic uraemic syndrome
B. Antiphospholipid syndrome
C. Disseminated intravascular coagulation
D. Thrombotic thrombocytopenic purpura
E. Malignant hypertension

ANSWER:
D. Thrombotic thrombocytopenic purpura

EXPLANATION:
TTP presents with a pentad of fever, neuro signs, thrombocytopenia, haemolytic anaemia and renal failure

Thrombotic thrombocytopenic purpura (TTP) is a thrombotic microangiopathy that arises from reduced von Willebrand factor-cleaving proteases (ADAMTS13). This process is autoimmune in 95% of cases and is labelled as acquired.

Thrombi that form from platelets in the small vessels cause resultant thrombocytopenia with a risk of occlusion of end-organ vasculature, which may result in neurological, gastrointestinal, renal and cardiac symptoms. The classic pentad only occurs in 5% of cases. Mechanical sheering results in haemolytic anaemia.

Option 1. Incorrect - haemolytic-uraemic syndrome (HUS) is an important differential as it is also thrombotic microangiopathy, and so can present with multi-organ dysfunction, thrombocytopenia and haemolytic anaemia. However, is typically preceded by a period of diarrhoea and abdominal pain. If the diagnosis is unclear, ADAMTS13 assays should be done.

Option 2. Incorrect - antiphospholipid syndrome is an autoimmune procoagulant state characterised by venous and/or arterial thromboses. While it can cause stroke due to vascular occlusion, it does not cause purpura or schistocytosis.

Option 3. Incorrect - disseminated intravascular coagulation (DIC) is an important differential as it can cause similar symptoms, including renal failure, purpura, thrombocytopenia and neurological/GI/cardiac compromise. However, given the normal bleeding profile, it is less likely to be the case.

Option 4. Correct - TTP is typically diagnosed with a combination of clinical findings and ADAMTS13 testing. Schistocytosis on the blood film suggests erythrocyte fragment shearing and is secondary to TTP/DIC/HUS.

Option 5. Incorrect - malignant hypertension can cause a microangiopathic haemolytic anaemia, as well as a renal failure with thrombocytopenia, however, it is typically characterised by a blood pressure of >180/120mmHg, and would not cause purpura.

Please see Thrombotic Thrombocytopenic Purpura

Q-133

A 54-year-old woman presents to the Emergency Department with a five day history of back pain. Her past medical history includes breast cancer and osteoarthritis. The back pain is located in the lower thoracic region and is made worse by coughing and sneezing. There has been no change in bowel habit or urinary symptoms. On examination there is diffuse tenderness in the lower thoracic region. Peri-anal sensation is normal and lower limb reflexes are brisk. Which one of the following is the most appropriate management plan?

A. Organise outpatient MRI
B. Oral paracetamol + urgent MRI
C. Oral paracetamol + urgent thoracic/lumbar spine x-ray
D. Oral dexamethasone + urgent thoracic/lumbar spine x-ray
E. Oral dexamethasone + urgent MRI

ANSWER:
E. Oral dexamethasone + urgent MRI

EXPLANATION:
If neoplastic spinal cord compression is suspected, high-dose oral dexamethasone should be given whilst awaiting investigations

This woman has spinal cord compression until proven otherwise and should have urgent assessment.

Recent NICE guidelines suggest contacting the local metastatic spinal cord compression coordinator in this situation. This should hopefully prevent delays in treatment by ensuring the patient is admitted to the most appropriate place

Please see Neoplastic Spinal Cord Compression

Q-134

Which one of the following is associated with a high leucocyte alkaline phosphatase score?

A. **Myelofibrosis**
B. **Pernicious anaemia**
C. **Infectious mononucleosis**
D. **Paroxysmal nocturnal haemoglobinuria**
E. **Chronic myeloid leukaemia**

ANSWER:
A. Myelofibrosis

EXPLANATION:

Please see Leucocyte Alkaline Phosphatase

Q-135

A 23-year-old woman presents with lethargy. The following blood results are obtained:

Hb	**10.4 g/dl**
Plt	**278 * 109/l**
WCC	**6.3 * 109/l**
MCV	**68 fl**
Blood film	**Microcytic hypochromic RBCs, marked anisocytosis and basophilic stippling noted**
HbA2	**3.9%**

What is the most likely diagnosis?

A. **Lead poisoning**
B. **Sickle cell anaemia**
C. **Beta-thalassaemia trait**
D. **Hereditary spherocytosis**
E. **Sideroblastic anaemia**

ANSWER:
C. Beta-thalassaemia trait

EXPLANATION:
Disproportionate microcytic anaemia - think beta-thalassaemia trait

A microcytic anaemia in a female should raise the possibility of either gastrointestinal blood loss or menorrhagia. However, there is no history to suggest this and the microcytosis is disproportionately low for the haemoglobin level. This combined with a raised HbA2 points to a diagnosis of beta-thalassaemia trait.

Basophilic stippling is also seen in lead poisoning but would not explain the raised HbA2 levels.

Please see Beta-Thalassaemia Trait

Q-136

A 30-year-old woman is admitted to the Emergency Department following a suspected peanut allergy. On examination she has gross facial and tongue oedema. Her oxygen saturations are 97% on room air, pulse is 96 / min and blood pressure is 90/62 mmHg. The paramedics have already gained intravenous access. What is the most appropriate way to give adrenaline in this situation?

A. Nebulised
B. Subdermally
C. Intramuscularly
D. Intravenously
E. Subcutaenously

ANSWER:
C. Intramuscularly

EXPLANATION:
The Resuscitation Council guidelines only recommend giving adrenaline intramuscularly, regardless of whether the patient has intravenous access or not.

Please see Anaphylaxis

Q-137

A 59-year-old female patient presents with headache, lethargy, and a purpuric rash on her shins.

Hb	**89 g/l**
Platelets	**68 * 109/l**
WBC	**2.6 * 109/l**
Protein Electrophoresis	**paraprotein 2g/L**
Immunoprotein Electrophoresis	**monoclonal IgM**
C4	**low limit of normal**
Rheumatoid Factor	**elevated**

What is the most likely diagnosis?

A. Hepatitis C infection
B. Rheumatoid arthritis
C. Sjogren syndrome
D. Waldenstrom's macroglobulinaemia
E. Monoclonal gammopathy of unclear significance

ANSWER:
D. Waldenstrom's macroglobulinaemia

EXPLANATION:
Waldenstrom macroglobulinaemia is a lymphoplasmacytic lymphoma (lymphoplasmacytic infiltration in the bone marrow or lymphatic tissue) associated with an IgM monoclonal protein in the serum. It is essentially a bone marrow-based disease. Patients may develop constitutional symptoms, pancytopenia (especially anaemia and thrombocytopenia), organomegaly, neuropathy, and symptoms associated with immunoglobulin deposition or hyperviscosity.

Please see Waldenstrom's Macroglobulinaemia

Q-138

A 72-year-old man is admitted with a deep vein thrombosis. He is normally fit and well but has recently lost weight. Blood tests reveal the following:

IgG 889 mg/dl (range 600-1300 mg/dl)
IgM 1674 mg/dl (range 50-330 mg/dl)
IgA 131 mg/dl (range 60-300 mg/dl)

What is the most likely diagnosis?

A. Monoclonal gammopathy of undetermined significance
B. Acute promyelocytic leukaemia
C. Waldenstrom's macroglobulinaemia
D. Antiphospholipid syndrome
E. Multiple myeloma

ANSWER:
C. Waldenstrom's macroglobulinaemia

EXPLANATION:
IgM paraproteinaemia - ?Waldenstrom's macroglobulinaemia

Waldenstrom's macroglobulinaemia is more likely than monoclonal gammopathy of undetermined significance given the weight loss and deep vein thrombosis (evidence of hyperviscosity).

IgG and IgA and the most common type of immunoglobulins produced in myeloma.

Please see Waldenstrom's Macroglobulinaemia

Q-139

A 4-year-old girl with sickle cell anaemia presents with abdominal pain. On examination, she is noted to have splenomegaly and is clinically anaemic. What is the most likely diagnosis?

A. Liver cirrhosis
B. Parvovirus infection
C. Sequestration crisis
D. Salmonella infection
E. Thrombotic crisis

ANSWER:
C. Sequestration crisis

EXPLANATION:
During a sequestration crisis, the sickle cells cause the spleen to become grossly enlarged causing the abdominal pain as present in this case. This is more common in early childhood as repeated sequestration

and infarction of the spleen during childhood gradually results in an auto-splenectomy. A sequestration crisis may result in severe anaemia, marked pallor and cardiovascular collapse due to loss of effective circulating volume.

Please see Sickle-Cell Crises

Q-140

A 68-year-old man presents to the acute medical ward following a referral from his general practitioner. The patient has experienced a 3 month history of weight loss, lethargy and malaise, accompanied by headaches and blurred vision. On examination the patient has mild splenomegaly and some minor cervical lymphadenopathy.

Initial investigations are as follows:

Hb	**110 g/l**
Platelets	**95 * 109/l**
WBC	**14 * 109/l**
Bilirubin	**11 µmol/l**
ALP	**70 u/l**
ALT	**17 u/l**
γGT	**52 u/l**
Albumin	**20 g/l**
Urinary Bence Jones protein	**Positive**
Skeletal survey X-rays	**No lesions observed**

Given these initial results and the patient's presenting symptoms, what is the most likely diagnosis?

A. Acute myeloid leukaemia
B. Multiple myeloma
C. Burkitt's lymphoma
D. Waldenstrom's macroglobulinaemia
E. Myelodysplasia

ANSWER:
D. Waldenstrom's macroglobulinaemia

EXPLANATION:
Waldenstrom's macroglobulinaemia - Organomegaly with no bone lesions

Multiple myeloma - Bone lesions with no organomegaly

Differentiating between multiple myeloma and Waldenstrom's macroglobulinaemia can be difficult due to the considerable overlap seen in their presenting symptoms. However, key differences do exist.

In cases of multiple myeloma, bone pain in the hips, back or shoulders is present in the majority of patients. This kind of pain is absent in Waldenstrom's macroglobulinaemia, who usually will complain of pain secondary to hyperviscosity e.g. persistent headaches

Organomegaly is also more commonly seen in Waldenstrom's macroglobulinaemia.

Bence Jones protein, although classically associated with multiple myeloma, can be present in patients with Waldenstrom's macroglobulinaemia or patients with chronic B cell lymphocytic leukaemia.

Please see Waldenstrom's Macroglobulinaemia

Q-141

What is the main mechanism by which vitamin B12 is absorbed?

A. Passive absorption in the terminal ileum
B. Active absorption in the middle to terminal part of jejunum
C. Active absorption by the parietal cells of the stomach
D. Active absorption in the terminal ileum
E. Passive absorption in the proximal ileum

ANSWER:
D. Active absorption in the terminal ileum

EXPLANATION:
Vitamin B12 is actively absorbed in the terminal ileum

A small amount of vitamin B12 is passively absorbed without being bound to intrinsic factor.

Please see Vitamin B12 Deficiency

Q-142

A 71-year-old woman with no significant past medical history is investigated for lymphocytosis. She has recently lost 7kg in weight and complains of lethargy. The following blood results are obtained:

Hb 9.8 g/dl
Plt 104 * 109/l
WBC 70.3 * 109/l
Blood film: Lymphocytosis. Smudge cells seen

Four months previously her white cell count was 30.5 * 109/l. What is the most appropriate management?

A. Imatinib
B. Chlorambucil
C. No treatment, monitor full blood count
D. Fludarabine, cyclophosphamide and rituximab
E. Allogeneic stem cell transplantation

ANSWER:
D. Fludarabine, cyclophosphamide and rituximab

EXPLANATION:

CLL - treatment: Fludarabine, Cyclophosphamide and Rituximab (FCR)

This patient has chronic lymphocytic leukaemia. The lymphocyte doubling time is less than 6 months, the patient has some evidence of marrow failure and also has systemic symptoms. She should therefore be treated and of the options given a combination of fludarabine, cyclophosphamide and rituximab (FCR) is the most appropriate treatment. Chlorambucil used to be the first-line treatment of choice but studies have shown it not to be as effective as FCR.

As with many haematological cancers such patients are often entered into randomised trials

Please see Chronic Lymphocytic Leukaemia: Management

Q-143

A 38-year-old female patient presents to the emergency department with severe abdominal pain, nausea and vomiting. She also reports reduced sensation in the bilateral lower limb extremities. She appears highly agitated and labile in mood. Her partner reports that this has happened about 6 times before and various suspected diagnoses were made for these past episodes but no definite diagnosis was ever made. She reports that her mother also gets such episodes. These past suspected diagnoses include acute appendicitis, renal calculi, acute intestinal obstruction. They were all found to be negative.

What is the likely diagnosis to account for this clinical presentation?

A. Acute intermittent porphyria
B. Porphyria cutanea tarda
C. Lead poisoning
D. Neurotic disorder
E. Multiple sclerosis

ANSWER:

A. Acute intermittent porphyria

EXPLANATION:

Acute intermittent porphyria typically presents with abdominal, neurological and psychiatric symptoms

Acute intermittent porphyria (AIP) typically presents with abdominal, neurological and psychiatric symptoms.

Porphyria cutanea tarda presents with photosensitive bullae.

Lead poisoning is possible to account for this presentation but it doesn't account for the family history. AIP is more likely given the family history.

Neurotic disorder may be possible but physical causes need to be ruled out before considering a psychiatric diagnosis.

Multiple sclerosis doesn't usually present with gastrointestinal symptoms.

Please see Acute Intermittent Porphyria

Q-144

A 15-year-old girl presents with abdominal pain. She is normally fit and well and currently takes a combined oral contraceptive pill. The patient is accompanied by her mother, who is known to have hereditary spherocytosis. The pain is located in the upper abdomen and is episodic in nature, but has become severe today. There has been no change to her bowel habit and no nausea or vomiting. What is the most likely diagnosis?

A. Inferior vena cava thrombosis
B. Acute pancreatitis
C. Renal vein thrombosis
D. Gastritis
E. Biliary colic

ANSWER:
E. Biliary colic

EXPLANATION:
This patient has hereditary spherocytosis resulting in chronic haemolysis and gallstone formation. An important differential in a poorly patient with hereditary spherocytosis would be splenic rupture

Please see Hereditary Spherocytosis

Q-145

A 54-year-old man is investigated for a chronic cough. A chest x-ray arranged by his GP shows a suspicious lesion in the right lung. He has no past history of note and is a life-long non-smoker. An urgent bronchoscopy is arranged which is normal. What is the most likely diagnosis?

A. Lung sarcoma
B. Squamous cell lung cancer
C. Lung adenocarcinoma
D. Small cell lung cancer
E. Lung carcinoid

ANSWER:
C. Lung adenocarcinoma

EXPLANATION:
Lung adenocarcinoma
most common type in non-smokers
peripheral lesion

The clues are the absence of a smoking history and normal bronchoscopy, which suggests a peripherally located lesion.

Please see Lung Cancer: Non-Small Cell

Q-146

A patient with lung cancer has a Positron Emission Tomography (PET) scan to evaluate possible metastatic disease. What does this type of scan demonstrate?

A. Cellular proliferation
B. Apoptotic activity
C. Glucose uptake
D. Vascular supply
E. Tyrosine kinase activity

ANSWER:
C. Glucose uptake

EXPLANATION:

Please see Positron Emission Tomography (PET)

Q-147

A 48-year-old female presents to her family physician complaining of post-coital pain. She initially thought that this was related to her age but recently she has been feeling a constant dull pain in her pelvis. She also reports having a foul-smelling discharge from her vagina. Her past medical and surgical history reveal nothing significant along but she says that she has had several sexual partners in her early teenage years and twenties. She currently smokes about 10 cigarettes a day for the past 10 years and does not consume alcohol. On examination, the doctor finds an irregular mass on her cervix. Which of the following best describes the mechanism for the strongest risk factor for this patient's condition?

A. Human papilloma virus 16 and 18 produces oncoproteins which causes inhibition of the tumor suppressor genes causing cervical carcinoma
B. Cigarette smoking produces dysplasia of the squamocolumnar junction leading to cervical cancer
C. Having multiple sexual partners increase the risk of getting HIV which then expresses viral proteins leading to cervical dysplasia and carcinoma
D. Human papilloma virus 16 and 18 produces oncoproteins which then activate oncogenes causing cervical carcinoma
E. The patients age is the strongest risk factor as the cervical cells lose their repair capacity and then progress on to dysplasia and carcinoma

ANSWER:
A. Human papilloma virus 16 and 18 produces oncoproteins which causes inhibition of the tumor suppressor genes causing cervical carcinoma

EXPLANATION:
This patient has presented with the signs and symptoms typical of a cervical carcinoma. The onset of a constant dull pelvic pain indicates a possible invasion of pelvic structures and nerves. The strongest risk factor in this patient is having several sexual partners at a very young age, which then puts her at risk of being infected with the human papilloma virus.

1: Having multiple sexual partners is the strongest risk factor for the development of cervical carcinoma. This is because having multiple sexual partners greatly increases the chance of being infected with the human papilloma virus. The 16 and 18 viral strain then triggers the carcinogenesis by inhibiting the tumor suppressor gene p53 and RB.
2: Although cigarette smoking will have an oncogenic effect, it is not the strongest risk factor here.

3: HIV is a risk factor for cervical carcinoma. However, it is a lesser risk factor than the human papilloma virus which is much more common.
4: Although the human papilloma virus does represent the strong risk factor, it does not cause the activation of oncogenes. Instead, it causes the inhibition of tumor suppressor genes.
5: Age in itself has not been reported to be a risk factor for the development of cervical carcinoma. An older person is more likely to develop cervical carcinoma if that person has for instance been exposed to the human papilloma virus, which then has more time to induce the process of carcinogenesis via the inhibition of tumor suppressor genes.

Please see Cervical Cancer: Human Papilloma Virus Infection

Q-148

A 62-year-old woman who is known to have metastatic breast cancer presents with increasing shortness of breath. She is currently receiving a chemotherapy regime. On examination she has a third heart sound and the apex beat is displaced to the 6th intercostal space, anterior axillary line. Which one of the following chemotherapeutic agents is most likely to be responsible?

A. Paclitaxel
B. Docetaxel
C. Bleomycin
D. Dactinomycin
E. Doxorubicin

ANSWER:
E. Doxorubicin

EXPLANATION:
Anthracyclines (e.g. doxorubicin) may cause cardiomyopathy

Please see Cytotoxic Agents

Q-149

A 60-year-old woman is investigated for painful fingers and toes in cold weather. She has previously been diagnosed with Raynaud's phenomenon but she is now experiencing significant purplish discolouration of her peripheries and nose as well as generally feeling tired and lethargic. Blood tests shows the following:

Hb	**99 g/l**
Platelets	**156 * 109/l**
WBC	**5.9 * 109/l**
Blood film	**Spherocytes seen**

What is the next best investigation?

A. Complement levels
B. Osmotic fragility test
C. Anti-nuclear antibody
D. Flow cytometry of blood
E. Direct antiglobulin test

ANSWER:
E. Direct antiglobulin test

EXPLANATION:
This lady is likely to have cold agglutinin disease, a form of autoimmune hemolytic anemia.

Please see Autoimmune Haemolytic Anaemia

Q-150

A patient is started on cyclophosphamide for vasculitis associated with Wegener's granulomatosis. Which of the following is most characteristically associated with cyclophosphamide?

A. Haemorrhagic cystitis
B. Cardiomyopathy
C. Ototoxicity
D. Alopecia
E. Weight gain

ANSWER:
A. Haemorrhagic cystitis

EXPLANATION:
Cyclophosphamide may cause haemorrhagic cystitis

Please see Cytotoxic Agents

Q-151

A 30 year-old man presents with recurrent abdominal pain. This is not associated with food, heartburn, indigestion or dysphagia. He has had no weight loss. His blood tests have been normal and he has been given a diagnosis of irritable bowel syndrome. Despite lifestyle modifications and laxatives, he has still had recurrent pain. He then presents with swelling of his lips and tongue. This is not itchy and he is systemically well, but does have a stridor.

What would be the most successful management out of the following options?

A. Supportive care
B. Adrenaline
C. Prednisolone
D. Fresh frozen plasma
E. Chlorphenamine

ANSWER:
D. Fresh frozen plasma

EXPLANATION:
This patient has a history and acute presentation in keeping with hereditary angioedema. This is caused by a deficiency of C1-esterase inhibitor. It is normally treated with C1-INH concentrate, however when this is

unavailable, fresh frozen plasma is the next best treatment. The lack of itching in this case and the fact that he is systemically well point away from anaphylaxis as a cause. Hereditary angioedema rarely responds to treatment with adrenaline or antihistamines. In a real life situation this patient would probably be treated as anaphylaxis, but the question asks what the most successful treatment would be, and in this case it would be FFP.

Please see Hereditary Angioedema

Q-152

Which one of the following therapeutic options is least recognised in the treatment of aplastic anaemia?

A. Interferon-alpha
B. Stem cell transplantation
C. Anti-lymphocyte globulin
D. Anti-thymocyte globulin
E. Platelet transfusion

ANSWER:
A. Interferon-alpha

EXPLANATION:

Please see Aplastic Anaemia: Management

Q-153

Regarding the Ann-Arbor classification of Hodgkin's lymphoma, which one of the following would be staged as IIIB?

A. Nodes on both sides of diaphragm with pruritus
B. Two or more lymph nodes on the same side of the diaphragm with pruritus
C. Nodes on both sides of diaphragm with night sweats
D. Two or more lymph nodes on the same side of the diaphragm with night sweats
E. Two or more lymph nodes on the same side of the diaphragm with no systemic symptoms

ANSWER:
C. Nodes on both sides of diaphragm with night sweats

EXPLANATION:

Please see Hodgkin's Lymphoma: Staging

Q-154

A 24-year-old man is diagnosed with a deep vein thrombosis of his right leg. He is initially treated with low-molecular weight heparin but is switched after three days to warfarin. He then develops necrotic skin lesions on his lower limbs and forearms. Which one of the following conditions is characteristically associated with this complication?

A. Protein S deficiency
B. Antiphospholipid syndrome
C. Antithrombin III deficiency
D. Activated protein C resistance
E. Protein C deficiency

ANSWER:
E. Protein C deficiency

EXPLANATION:

Please see Protein C Deficiency

Q-155

Which one of the following translocations is associated with acute promyelocytic leukaemia?

A. t(15;17)
B. t(9;17)
C. t(9;22)
D. t(15;22)
E. t(17;22)

ANSWER:
A. t(15;17)

EXPLANATION:
Acute promyelocytic leukaemia - t(15;17)

Please see Acute Promyelocytic Leukaemia

Q-156

A 64-year-old woman with metastatic breast cancer is brought in by her husband. Over the past two days she has developed increasingly severe back pain. Her husband reports that her legs are weak and she is having difficulty walking. On examination she has reduced power in both legs and increased tone associated with brisk knee and ankle reflexes. There is some sensory loss in the lower limbs and feet but perianal sensation is normal. What is the most likely diagnosis?

A. Spinal cord compression at T10
B. Cauda equina syndrome
C. Guillain Barre syndrome
D. Hypercalcaemia
E. Paraneoplastic peripheral neuropathy

ANSWER:
A. Spinal cord compression at T10

EXPLANATION:
The upper motor neuron signs point towards a diagnosis of spinal cord compression above L1, rather than cauda equina syndrome.

Please see Neoplastic Spinal Cord Compression

Q-157

Which one of the following is the most common inherited thrombophilia?

A. Protein S deficiency
B. Antithrombin III deficiency
C. Protein C deficiency
D. Activated protein C resistance
E. Von Willebrand's disease

ANSWER:
D. Activated protein C resistance

EXPLANATION:
Activated protein C resistance (Factor V Leiden) is the most common inherited thrombophilia

Activated protein C resistance is due a point mutation in the Factor V gene, encoding for the Leiden allele. Heterozygotes have a 5-fold risk of venous thrombosis whilst homozygotes have a 50-fold increased risk

Von Willebrand's disease is the most common inherited bleeding disorder

Please see Thrombophilia: Causes

Q-158

A 48 year old nurse presents with a short history of epistaxis and bleeding gums. You request urgent bloods, the results of which are shown in the table below:

Haemoglobin	**86 g/L**
White cells	**2.3 x 10^9/L**
Platelets	**18 x 10^9/L**
Clotting	**deranged**
Blood film	**bilobed large mononuclear cells**

What is the most likely diagnosis?

A. Von Willebrand's disease
B. Acute lymphoblastic leukaemia
C. Lymphoma
D. Acute myeloid leukaemia
E. Surreptitious warfarin overdose

ANSWER:
D. Acute myeloid leukaemia

EXPLANATION:
This is a picture of bone marrow failure secondary to acute myeloid leukaemia.

In acute leukaemia a malignant expansion abnormal white cells accumulate in the bone marrow, replacing normal haemopoietic cells.

Acute expansion of the myeloid stem line (acute myeloid leukaemia) is more common over the age of 45, in comparison with acute lymphoblastic leukaemia which is mostly seen in children.

Lymphoma does not tend to present in this way, but more so with rubbery enlargement of lymph nodes.

Von Willebrand's disease may present with epistaxis and bleeding gums in severe cases, but it is rare that there are abnormalities on blood results.

Please see Acute Myeloid Leukaemia

Q-159

Interferon alpha is a recognised treatment for which one of the following haematological disorders?

A. Acute lymphoblastic leukaemia
B. Myelofibrosis
C. Burkitt's lymphoma
D. Hairy cell leukaemia
E. Acute myeloid leukaemia

ANSWER:
D. Hairy cell leukaemia

EXPLANATION:
Interferons (IFN) are cytokines released by the body in response to viral infections and neoplasia. They are classified according to cellular origin and the type of receptor they bind to. IFN-alpha and IFN-beta bind to type 1 receptors whilst IFN-gamma binds only to type 2 receptors.

IFN-alpha is produced by leucocytes and has an antiviral action. It has been shown to be useful in the management of hepatitis B & C, Kaposi's sarcoma, metastatic renal cell cancer and hairy cell leukaemia

Please see Hairy Cell Leukaemia

Q-160

A 24-year-old male is admitted with difficulties breathing. He states that he was at a restaurant having dinner when he noticed a rash on his arms, followed by nausea and difficulties with taking in a breath. On examination, there is generalised urticaria and swelling of his tongue and pharynx. There is audible inspiratory stridor. You treat him with intramuscular adrenaline, intravenous hydrocortisone, and intravenous chlorphenamine. He responds well to treatment.

You decide to monitor him on the ward thereafter. How long will you monitor the patient for?

A. 1 hour
B. 2 hours
C. 8 hours
D. 48 hours
E. 1 week

ANSWER:
C. 8 hours

EXPLANATION:
In anaphylaxis, biphasic reactions can occur in up to 20% of patients

The patient has clearly had an anaphylactic reaction which has been treated appropriately. A biphasic reaction includes a recurrence of symptoms that develops after apparent resolution of the initial reaction. Biphasic reactions have been reported to occur in 1%-20% of anaphylaxis episodes and typically occur about 8 hours after the first reaction, although recurrences have been reported up to 72 hours later.

Although there is no definite consensus on monitoring post anaphylaxis, most clinicians and local policies advise monitoring for a period of 6-8 hours after resolution of symptoms. Patients should be advised of the possibility of biphasic reactions and told to seem emergency medical care if they develop any of the symptoms or signs.

Please see Anaphylaxis

Q-161

Each one of the following is associated with hyposplenism, except:

A. Sickle-cell anaemia
B. Liver cirrhosis
C. Systemic lupus erythematous
D. Coeliac disease
E. Splenectomy

ANSWER:
B. Liver cirrhosis

EXPLANATION:

Please see Hyposplenism

Q-162

Which one of the following is not a recognised feature of methaemoglobinaemia?

A. Dyspnoea
B. 'Chocolate' cyanosis
C. Anxiety
D. Reduced pO2 but normal oxygen saturation on pulse oximetry
E. Acidosis

ANSWER:
D. Reduced pO2 but normal oxygen saturation on pulse oximetry

EXPLANATION:
Normal pO2 but decreased oxygen saturation is characteristic of methaemoglobinaemia

Please see Methaemoglobulinaemia

Q-163

A 68-year-old man who has small cell lung cancer is admitted onto the ward for chemotherapy. He has experienced severe nausea and vomiting due to the chemotherapy in the past. The consultant asks you to prescribe a neurokinin 1 (NK1) receptor blocker.

What agent will you choose?

A. Aprepitant
B. Dexamethasone
C. Metoclopramide
D. Domperidone
E. Haloperidol

ANSWER:
A. Aprepitant

EXPLANATION:
Aprepitant is an anti-emetic which blocks the neurokinin 1 (NK1) receptor

Aprepitant is an anti-emetic which blocks the neurokinin 1 (NK1) receptor. It is a substance P antagonists (SPA). It is licensed for chemotherapy-induced nausea and vomiting (CINV) and for prevention of postoperative nausea and vomiting. It is also been shown to be effective in treating clinical depression.

Dexamethasone is a glucocorticoid. It is useful for preventing the delayed emesis phase of CINV.

Metoclopramide, domperidone, and haloperidol can all be used as anti-emetics due to their dopamine blocking effects.

Please see Chemotherapy Side-Effects: Nausea and Vomiting

Q-164

A man presents with an area of dermatitis on his left wrist. He thinks he may be allergic to nickel. Which one of the following is the best test to investigate this possibility?

A. Skin patch test
B. Radioallergosorbent test (RAST)
C. Nickel IgG levels
D. Skin prick test
E. Nickel IgM levels

ANSWER:
A. Skin patch test

EXPLANATION:

Please see Allergy Tests

Q-165

A 30-year-old female presents to the Emergency Department with epistaxis, which has now terminated. Her boyfriend reports she has a recent history of mucosal bleeding and has at times been very disorientated. On examination, she has a low-grade fever and appears confused and jaundiced. There is bruising over her legs and arms. A urine pregnancy test is negative. You receive the following blood results from the laboratory:

Hb	**85 g/l**
Platelets	**8 * 109/l**
WBC	**4.5 * 109/l**
MCV	**92 fl**
Na+	**138 mmol/l**
K+	**4.9 mmol/l**
Urea	**10.2 mmol/l**
Creatinine	**182 µmol/l**

Clotting studies are normal. Given the most likely diagnosis, what is the most appropriate management of this patient?

A. Platelet transfusion
B. Intravenous immunoglobulin
C. Plasma exchange
D. Intravenous methylprednisolone
E. Intravenous argatroban

ANSWER:
C. Plasma exchange

EXPLANATION:
This question requires you to identify correctly the haematological emergency and be aware of the correct management.

Thrombotic thrombocytopenic purpura (TTP) is classically characterised as a pentad of: thrombocytopenia, microvascular haemolysis, fluctuating neurological signs, renal impairment and fever.

Also in the differential diagnosis for severe thrombocytopenia is immune thrombocytopenic purpura (ITP). ITP is more common than TTP however would not present with the range of symptoms seen in this scenario.

TTP has an untreated mortality of up to 90% and therefore rapid plasma exchange (PEX) may be a life saving intervention. Platelet transfusion in TTP is only indicated if there is an on-going life-threatening bleed. Intravenous methylprednisolone is indicated after treatment with PEX has been completed.

There is no current role for intravenous immunoglobulin in the routine management of TTP, however there have been reports of its successful use in PEX- and steroid-refractory cases.

Intravenous argatroban is indicated in heparin-induced thrombocytopenia (HIT), however there is no history of recent heparin administration or hospitalisation in this patient, nor are the clinical signs consistent with HIT.

Please see Thrombotic Thrombocytopenic Purpura: Management

Q-166

Which one of the following statements regarding the aetiology of venous thromboembolism (VTE) is correct?

A. Third generation combined oral contraceptive pills are safer than second generation ones
B. VTE develops in around 5% of patients with Goodpasture's syndrome
C. Female gender is a risk factor recurrent VTE
D. The second trimester of pregnancy is associated with a greater risk than the puerperium
E. Tamoxifen therapy increases the risk of VTE

ANSWER:
E. Tamoxifen therapy increases the risk of VTE

EXPLANATION:

Please see Venous Thromboembolism: Risk Factors

Q-167

A 17-year-old man is reviewed in the haemato-oncology multi-disciplinary meeting with a diagnosis of Acute lymphoblastic leukaemia, (ALL). The results of bone marrow testing, immunophenotyping, and chromosomal analysis are reviewed.

Which of the following features is associated with a poor prognosis?

A. Hypodiploidy
B. Translocation t(12:21)
C. Precursor B ALL
D. Translocation t(1:19)
E. Trisomy 4

ANSWER:
A. Hypodiploidy

EXPLANATION:
Hypodiploidy is seen as an unfavourable feature in ALL, with the opposite, hyper diploidy associated with a good prognostic outcome.

Trisomy 4, 10 and 17 is associated with a good prognostic outcome in ALL.

The t(12;21) translocation associated with a fusion protein formerly known as TEL-AML1 is associated with a good prognostic outcome in ALL, The t(1:19) translocation is associated with low levels of resistance to

chemotherapy intervention in ALL, and thus a good prognostic outcome. The t(9:22) or Philadelphia translocation, is associated with a poor prognosis.

Precursor B-ALL is more responsive to chemotherapy than that involving more mature B lymphocytes.

Please see Acute Lymphoblastic Leukaemia: Prognostic Features

Q-168

A 65-year-old man comes for review. He has a history of small cell lung cancer and ischaemic heart disease. His cancer was diagnosed five months ago and he has recently completed a course of chemotherapy. From a cardiac point of view he had a myocardial infarction two years ago following which he had primary angioplasty with stent placement. He has had no angina since.

For the past week he has become increasingly short-of-breath. This is worse at night and is associated with an occasional non-productive cough. He has also noticed that his wedding ring feels tight. Clinical examination is of his chest is unremarkable. He does however have distended neck veins and periorbital oedema. What is the most likely diagnosis?

A. Heart failure secondary to chemotherapy
B. Tumour lysis syndrome
C. Nephrotic syndrome secondary to chemotherapy
D. Superior vena cava obstruction
E. Hypercalcaemia

ANSWER:
D. Superior vena cava obstruction

EXPLANATION:

Please see Superior Vena Cava Obstruction

Q-169

What is the most useful marker of prognosis in myeloma?

A. Calcium level
B. Urine Bence-Jones protein levels
C. Alkaline phosphotase
D. ESR
E. B2-microglobulin

ANSWER:
E. B2-microglobulin

EXPLANATION:

Please see Myeloma: Prognosis

Q-170

A 27-year-old woman presents to the Emergency Department with a sudden onset of swelling of the hands and face. She describes multiple similar episodes over the past few years, but this episode is the most severe. She cannot recall any obvious precipitant. On previous occasions, the symptoms have subsided within thirty minutes but on this occasion they have worsened over the course of an hour. On examination, there is significant swelling of the lips which are dry and shiny. The tongue is not enlarged. There is no stridor and the chest is clear. Respiratory rate is 22 and oxygen saturations are 96% on air. The hands are swollen and slightly erythematous but there is no pain or itching and no lymphadenopathy. Heart rate is 106bpm and blood pressure is 118/79mmHg. Tympanic temperature is 36.7°C. A diagnosis of hereditary angioedema is suspected.

Which one of the following is not implicated in the pathogenesis of hereditary angioedema?

A. C1-esterase inhibitor
B. Bradykinin
C. Histamine
D. Kallikrein
E. High molecular weight kininogen

ANSWER:
C. Histamine

EXPLANATION:
Hereditary angioedema (HAE) is pathophysiologically separate from anaphylaxis and is treated differently. Therapeutic options are: intravenous infusion of human C1-esterase inhibitor or subcutaneous injection of the bradykinin receptor inhibitor icatibant

Hereditary angioedema (HAE) is an autosomal dominantly inherited immune condition characterised by episodic swelling of the extremities, intra-abdominal viscera and mucous membranes. Often attacks are unprecipitated although sometimes exogenous oestrogens in the form of contraception can be traced, as well as exposure to angiotensin-converting enzyme inhibitors. The primary pathophysiological defect is in the complement cascade and deficiencies in factors C4 and C1-esterase inhibitor are seen in type I. In type II HAE C1-esterase inhibitor levels are normal but the enzyme is dysfunctional and activity is low. An acquired form of HAE is described in which all complement levels are low. In type III HAE the clinical features of angioedema are present but immunological testing reveals normal levels and activity of complement factors. Ultimately, failure of C1-esterase inhibitor leads to upregulation of the rest of the complement system and membrane attack complex, but also it leads to activation of the signalling protein kallikrein which acts directly on the vascular wall to increase permeability, and it cleaves high molecular weight kininogen to release bradykinin, again a potent peripheral vasodilator giving rise to the symptoms of HAE.

HAE should be recognised as a separate entity from anaphylaxis since the clinical signs are different, as is the pathophysiology of the condition and its treatment. Anaphylaxis is an IgE mediated immune phenomenon related to a specific allergen causing massive mast cell degranulation and histamine release. HAE is driven by complement dysregulation and consequent release of the inflammatory cytokines bradykinin and kallikrein. Anaphylaxis is characterised by rapidly progressive, itchy, erythematous, oedematous rash, swelling of the lips, tongue and airways with accompanying hypovolaemic hypotension and cardiovascular collapse due to increased tissue permeability. Anaphylaxis is a medical emergency and

death can ensue in minutes unless treated properly. HAE in comparison may present recurrently and often with no obvious precipitant. Usually, its course is more insidious with the evolution of symptoms over minutes to hours. Swelling will often only affect an isolated limb and it is not itchy or painful and minimally erythematous. Hypotension is rarely seen and cardiovascular instability is extremely unlikely. HAE can be fatal however if swelling of the upper airways causes obstruction, and in some cases, prophylactic intubation and mechanical ventilation may be appropriate. Since the driving mechanism is not histamine in HAE, steroids and antihistamines are of no value. Where there is no haemodynamic compromise, adrenaline is not warranted and may even worsen the situation due to increased plasma glucose load and risk of capillary rupture.

Knowledge of the cytokine cascade in HAE allows for knowledge of its management. Since the initiating pathophysiological hallmark is a deficiency or reduced effectiveness of C1-esterase inhibitor, exogenous administration of synthetic or reconstituted inhibitor should be effective.

National guidelines released in 2013 recommend treatment of episodes of HAE with the administration of reconstituted human C1-esterase inhibitor. In the UK two brands are available; either Cinryze which is dosed at 1000 unit administration or Berinert at 20 units/kg. Both are administered as slow intravenous infusions. Interestingly, a good clinical response is often seen to these drugs even in HAE type III where C1-esterase levels are normal.

An alternative to exogenous C1-esterase inhibitor is icatibant which is a specific antagonist at B2 bradykinin receptors in vascular smooth muscle. The 30mg dose may be repeated up to three times in 24 hours but a rapid resolution of symptoms is often seen. Many patients with HAE are supplied with their own icatibant autoinjectors for use in the pre-hospital setting at the onset of symptoms.

Ecallantide is a selective inactivator of the cytokine kallikrein. It is highly effective in the treatment of HAE in the United States but has no European licence at this current time.

Please see Hereditary Angioedema

Q-171

Which one of the following may be associated with an increased risk of venous thromboembolism?

A. Fluoxetine
B. Selegiline
C. Diazepam
D. Amitriptyline
E. Olanzapine

ANSWER:
E. Olanzapine

EXPLANATION:

Please see Venous Thromboembolism: Risk Factors

Q-172

A 56-year-old man is investigated for lethargy. A full blood count shows the following:

Hb **8.6 g/dl**
Platelets **42 * 109/l**
WBC **36.4 * 109/l**
*****Blood film shows 30% myeloid blasts with Auer rods - please liase with haematologist*****

Given the likely diagnosis, which one of the following is associated with a good prognosis?

A. Translocation between chromosome 9 and 14
B. Translocation between chromosome 15 and 17
C. 25% blast following first course of chemotherapy
D. Deletion of chromosome 5
E. Deletion of chromosome 7

ANSWER:
B. Translocation between chromosome 15 and 17

EXPLANATION:
Acute myeloid leukaemia - good prognosis: t(15;17)

A translocation between chromosome 15 and 17 is seen in acute promyelocytic leukaemia, which is known to carry a good prognosis.

Please see Acute Myeloid Leukaemia

Q-173

A 61-year-old man is referred by his family physician to a haematologist after he presented with a right-sided painless neck lump. The lump started small and has been slowly increasing in size. More recently a second lump has appeared which prompted the family physician to refer the patient.

The patient has also been complaining of lethargy, night sweats and has lost significant weight. Thyroid function tests are normal and the patient does not have a significant family history. There is no recent travel or contact history. Biopsy of the nodes and cytogenetic analysis show a translocation causing increased B-cell lymphoma 2 (BCL-2) transcription which confirms the diagnosis. Unfortunately, the patient's condition cannot be treated with imatinib.

Which of the following translocation does this patient have?

A. t(14;18)
B. t(11;14)
C. t(15;17)
D. t(12;15)
E. t(11;22)

ANSWER:
A. t(14;18)

EXPLANATION:

The t(14;18) translocation causes increased BCL-2 transcription and causes follicular lymphoma

This patient presented with the signs and symptoms suggestive of non-Hodgkin lymphoma. This is supported by the signs and symptoms of weight loss, night sweats, and painless lymphadenopathy. Non-Hodgkin lymphoma is one class of lymphoma, with the other class being Hodgkin lymphoma. There are several types of Hodgkin lymphoma which are actually neoplasms of mature B cells, and very rarely of T cell origin. In this case, a cytogenetic analysis revealed a translocation causing increased BCL-2 transcription. This is associated with the t(14;18) translocation which causes follicular lymphoma.

2: t(11;14) is associated with Mantle cell lymphoma, which is a type of non-Hodgkin lymphoma. There is a translocation of cyclin D1 on chromosome 11 and heavy-chain Ig on chromosome 14. Mantle cell lymphoma is characteristic of being CD5 positive. It is known to be an aggressive tumor with late presentation and therefore poor prognosis.

3: t(15;17) is associated with the acute promyelocytic leukemia (APL) subtype of acute myeloid leukemia (AML). AML usually presents in patients above 65 years of age. The therapeutic importance of knowing the APL subtype is that it responds to all-trans retinoic acid (vitamin A).

4: t(12;15) is associated with the development of breast cancer, more specifically secretory breast carcinoma. This type of breast cancer is known to be rare and the clinical outcome following is usually good.

5: t(11;22) is a translocation which occurs in Ewing sarcoma. This is a malignant bone tumour which often occurs in individuals under 15 years of age. The disease is known to be very aggressive and is associated with the development of early metastases.

Please see Haematological Malignancies: Genetics

Q-174

A 52-year-old woman with a history of hypothyroidism presents with lethargy and a sore tongue. Blood tests are reported as follows:

Hb	**10.7 g/dl**
MCV	**121 fl**
Plt	**177 * 109/l**
WBC	**5.4 * 109/l**

Further tests are ordered:

Vitamin B12	**64 ng/l (200-900 ng/l)**
Folic acid	**7.2 nmol/l (> 3.0 nmol/l)**

What is the most appropriate management?

A. **1 mg of IM hydroxocobalamin once every 3 months**
B. **1 mg of IM hydroxocobalamin 3 times each week for 2 weeks, then once every 3 months**
C. **1 mg of IM hydroxocobalamin once every 2 months + folic acid 5mg od**
D. **Give folic acid 5mg od one week then recheck bloods**
E. **1 mg of IM hydroxocobalamin 3 times each week for 2 weeks, then once every 3 months + folic acid 5mg od**

ANSWER:
B. 1 mg of IM hydroxocobalamin 3 times each week for 2 weeks, then once every 3 months

EXPLANATION:
If the patient was deficient in folic acid it would important to treat the B12 deficiency first to avoid precipitating subacute combined degeneration of the cord.

Please see Vitamin B12 Deficiency

Q-175

A 22-year-old female presents to the emergency department with angioedema on 5 occasions in a six month period. No obvious trigger was identified and she does not improve significantly when given IM adrenaline.

Her symptoms are caused by a deficiency of which substance?

A. Bradykinin
B. C1 esterase inhibitor
C. Eosinophil peroxidase
D. Kallikrien
E. Neutrophil elastase

ANSWER:
B. C1 esterase inhibitor

EXPLANATION:
Hereditary angioedema is caused by deficiency of C1 esterase inhibitor

Hereditary angioedema is caused by a deficiency of C1 esterase inhibitor.

Please see Hereditary Angioedema

Q-176

A 38-year-old woman presents with a 2-month history of symptoms of fatigue, pallor and palpitations. She also complains of breathlessness at rest as well as during exertion. She has an established diagnosis of systemic lupus erythematosus (SLE). On abdominal examination you notice the spleen is slightly enlarged. Blood tests reveal:

Hb 90 g/l (115-160 g/l)
MCV 90 fl (82-100 fl)
D-dimer 150 ng/ml (<400 ng/ml)
Direct Coombs test Pos

What is the most likely diagnosis?

A. **IgM-mediated autoimmune haemolytic anaemia**
B. **IgG-mediated autoimmune haemolytic anaemia**
C. **Paroxysmal nocturnal haemoglobinuria**
D. **Immune thrombocytopenic purpura**
E. **G6PD deficiency**

ANSWER:
B. IgG-mediated autoimmune haemolytic anaemia

EXPLANATION:
SLE is a risk factor for warm autoimmune haemolytic anaemia

SLE is an important risk factor for IgG-mediated, warm autoimmune haemolytic anaemia. This is associated with extravascular haemolysis which can lead to a hypertrophic spleen.

IgM-mediated autoimmune haemolytic anaemia is not specifically linked to SLE and would also present with cold-induced symptoms involving the hands and toes.

Paroxysmal nocturnal haemoglobinuria is a deficiency of GPI protein on red blood cells leaving them susceptible to complement-mediated destruction.

Immune thrombocytopenic purpura is an autoimmune condition characterised by thrombocytopaenia.

G6PD deficiency is an enzymatic deficiency within red blood cells rendering them prone to oxidative stress.

Please see Autoimmune Haemolytic Anaemia

Q-177

A 50-year-old woman is investigated for weight loss and anaemia. She has no past medical history of note. Clinical examination reveals splenomegaly associated with pale conjunctivae. A full blood count is reported as follows:

Hb	**10.9 g/dl**
Platelets	**702 * 109/l**
WCC	**56.6 * 109/l**
Film	**Leucocytosis noted. All stages of granulocyte maturation seen**

Given the likely diagnosis, what is the most appropriate treatment?

A. **Chlorambucil**
B. **Stem cell transplantation**
C. **Rituximab**
D. **Repeat full blood count in 3 months**
E. **Imatinib**

ANSWER:
E. Imatinib

EXPLANATION:

Please see Chronic Myeloid Leukaemia

Q-178

A 62-year-old woman presents after being advised by the chemotherapy helpline to come to a hospital. She has a past medical history of neuroendocrine cancer of the cervix treated with carboplatin and etoposide. Her last treatment was eight days ago. She has been feeling generally unwell with temperatures measured at home at 38.1C. Blood cultures are taken and she is started on neutropenic sepsis protocol. What is gram-staining of the blood cultures most likely to show?

A. Gram-negative cocci
B. Gram-positive cocci
C. Gram-negative rods
D. Anaerobic bacteria
E. Spores

ANSWER:
B. Gram-positive cocci

EXPLANATION:
The correct answer is gram-positive cocci. Gram-negative bacilli used to be the most common pathogen isolated in neutropenic sepsis, but over time the most common pathogens are now gram-positive organisms. These accounts for a majority of the identified organisms, and are most commonly endogenous organisms. The most frequent cause is Staphylococcus epidermidis, and following this are other staphylococci and streptococci species.

Source:

'Febrile Neutropenia.' BMJ Best Practice. 15 Sept. 2016.

Please see Neutropenic Sepsis

Q-179

Which one of the following is not a feature of paroxysmal nocturnal haemoglobinuria?

A. Haemolytic anaemia
B. Positive Ham test
C. Haemoglobinuria
D. Aplastic anaemia
E. Haemarthrosis

ANSWER:
E. Haemarthrosis

EXPLANATION:

Please see Paroxysmal Nocturnal Haemoglobinuria

Q-180

A 25-year-old female presents with recurrent sinopulmonary infections. What test is most likely to confirm a primary immunodeficiency?

A. IgG level
B. B cell level
C. T cell level
D. Complement (CH50) assay
E. IgM level

ANSWER:
A. IgG level

EXPLANATION:
The most common clinically significant primary immunodeficiency is common variable immunodeficiency or CVID. IgA deficiency is more common, but most are asymptomatic. CVID is characterized by reduced serum immunoglobulins and heterogeneous clinical features. A well-accepted definition of CVID includes three key features: the presence of hypogammaglobulinaemia of two or more immunoglobulin isotypes (low IgG, IgA, or IgM), recurrent sinopulmonary infections, and impaired functional antibody responses. However, IgG is more likely to be deficient than IgM.

The criteria for impaired functional antibody responses include absent isohaemagglutinins (eg. antibodies associated with blood transfusion reactions), poor responses to protein (diphtheria, tetanus) or polysaccharide vaccines (S pneumoniae), or both.

Mature B-cells are more likely to be absent in X-linked Bruton's agammaglobulinemia.

Good reference: doi:10.1016/S0140-6736(08)61199-X

Please see Primary Immunodeficiency

Q-181

Which of the following cytotoxic agents is most associated with ototoxicity?

A. Vincristine
B. Bleomycin
C. Cisplatin
D. Doxorubicin
E. Cyclophosphamide

ANSWER:
C. Cisplatin

EXPLANATION:
Cisplatin may cause ototoxicity

Please see Cytotoxic Agents

Q-182

Transmission of which type of infection is most likely to occur following a platelet transfusion?

A. Syphilis
B. Malaria
C. Hepatitis B
D. Bacterial
E. HIV

ANSWER:
D. Bacterial

EXPLANATION:
As platelet concentrates are generally stored at room temperature they provide a more favourable environment for bacterial contamination than other blood products.

Please see Blood Product Transfusion Complications

Q-183

A 42-year-old woman presented with sudden onset gait ataxia, intention tremor and nystagmus. CT head demonstrated a 4cm left cerebellar haematoma. She is discussed with the local neurosurgical unit and urgently transferred for intervention. She is repatriated a week later for further rehabilitation. Routine blood tests are notable for a platelet count of 1,700 * 109/l . Initially, you attribute this to a post-surgical rise. However, on closer examination of her results you realise that on initial presentation her platelet count was 1,300 * 109/l. What gene mutation is likely to be discovered in this lady?

A. JAK2
B. HFE
C. CFTR
D. WASP
E. BCR-ABL

ANSWER:
A. JAK2

EXPLANATION:
This lady has presented with a stroke at a young age, on a background of raised platelets. This is very suggestive of essential thrombocythaemia which is known to be a rare cause of stroke and is associated with a mutation in the JAK2 gene.

HFE mutation is seen in haemochromatosis, CFTR in cystic fibrosis and WASP in Wiskott-Aldrich. Mutations in BCR-ABL are associated with chronic myeloid leukaemia, and is known as the Philadelphia translocation.

Please see Thrombocytosis

Q-184

A 32-year-old male presents to your clinic for review. He has a history of hereditary spherocytosis and recently underwent splenectomy. Since the operation he's noticed a major improvement in his energy levels.

If a blood film was taken from the patient, what new histological finding would be observed which would have been absent prior to splenectomy?

A. Schistocytes
B. Bite cells
C. Heinz bodies
D. Spherocytes
E. Howell-Jolly bodies

ANSWER:
E. Howell-Jolly bodies

EXPLANATION:
Howell-Jolly bodies are present in hereditary spherocytosis post-splenectomy

Howell-Jolly bodies are remnants of the red blood cell (RBC) nucleus which are normally removed by the spleen. Post-splenectomy these Howell-Jolly bodies persist and can be observed on histology.

Spherocytes would also be present. However, they would have been observed on histology prior to splenectomy.

Schistocytes are sheared RBCs seen in microangiopathic haemolytic anaemia.

Heinz bodies and bite cells are characteristic of glucose-6-phosphate dehydrogenase (G6PD) deficiency.

Please see Hereditary Spherocytosis

Q-185

A 18-year-old man who is known to have hereditary spherocytosis is admitted to hospital with lethargy. Admission bloods show the following:

Hb 47 g/dL Male: (135-180)
Retics 0.3% 0.5-1.5%

What is the most likely explanation for these findings?

A. Haemolytic crisis
B. Recent ciprofloxacin therapy
C. Parvovirus infection
D. Sequestration crises
E. Angiodysplastic bowel lesions

ANSWER:
C. Parvovirus infection

EXPLANATION:
This man has had an aplastic crisis secondary to parvovirus infection. This is evidenced by the severe anaemia and reduced reticulocyte count.

Please see Hereditary Spherocytosis

Q-186

A 34-year-old man who is HIV positive is starting treatment for Burkitt's lymphoma. His chemotherapy regime includes cyclophosphamide, vincristine, methotrexate and prednisolone. Around 24 hours after starting chemotherapy he becomes confused and complains of muscle cramps in his legs. Which one of the following is most likely to have occurred?

A. Prednisolone-induced psychosis
B. Hypercalcaemia
C. Methotrexate pneumonitis leading to hypoxia
D. Haemorrhagic cystitis leading to acute renal failure
E. Tumour lysis syndrome

ANSWER:
E. Tumour lysis syndrome

EXPLANATION:
Burkitt's lymphoma is a common cause of tumour lysis syndrome

Tumour lysis syndrome occurs as a result of cell breakdown following chemotherapy. This releases a large quantity of intracellular components such as potassium, phosphate and uric acid.

Please see Burkitt's Lymphoma

Q-187

A 17-year-old man is investigated after he bled excessively following a tooth extraction. The following results are obtained:

Plt 173 * 109/l
PT 12.9 secs
APTT 84 secs

Which clotting factor is he most likely to be deficient in?

A. Factor VI
B. Factor VII
C. Factor VIII
D. Factor IX
E. Factor X

ANSWER:
C. Factor VIII

EXPLANATION:
This man is most likely to have haemophilia A, which accounts for 90% of cases of haemophilia.

Please see Haemophilia

Q-188

A 75-year-old male patient has metastatic colorectal cancer. He spends most of his day resting in bed or in his chair and requires assistance with his activities of daily living. What is his Eastern Cooperative Oncology Group (ECOG) score?

A. 0
B. 1
C. 2
D. 3
E. 4

ANSWER:
D. 3

EXPLANATION:

Please see ECOG score

Q-189

A 72-year-old man with longstanding Waldenström's macroglobulinemia presents to rheumatology clinic with joint pains and generalised weakness.

Which of the following would be most indicative of Type I cryoglobulinaemia?

A. Livedo reticularis
B. Raynaud's phenomenon
C. Arthralgia
D. Membranoproliferative glomerulonephritis
E. Low C4 levels

ANSWER:
B. Raynaud's phenomenon

EXPLANATION:
Raynaud's - Type I cryoglobulinaemia

Cryoglobulinaemia can be caused by paraprotein bands such as those in Waldenström's macroglobulinemia and multiple myeloma. Meltzer's triad of arthralgia, weakness and palpable purpura are common to all types of cryoglobulinaemia - as are membranoproliferative glomerulonephritis and low C4 levels.

Raynaud's occurs most commonly in type 1 cryoglobulinaemia and its presence can be helpful in ascertaining the underlying cause.

Please see Cryoglobulinaemia

Q-190

A 29-year-old man presented to the hospital after he had two episodes of bright red urine in the morning. He is very worried and tells the attending doctor that he has never had such an episode before. He has just started working at an engineering firm and is planning to get married in a few months. He reports feeling tired for the past few months but thought this was due to his job which required him to travel to construction sites every day. He has no significant family history. He had an appendectomy when he was a child but other than that he has never been admitted to the hospital. A blood test reveals a hemoglobin concentration of 11.5 g/dL and a reticulocyte of 14% of red blood cells. Which of the findings is the most likely to be reported upon flow cytometry of a blood sample from this patient?

A. C3 negative cells
B. CD55 negative cells
C. CD59 negative cells
D. C5 to C9 negative cells
E. CD55 and CD59 negative cells

ANSWER:
E. CD55 and CD59 negative cells

EXPLANATION:
This patient presented with the signs and symptoms consistent with a diagnosis of paroxysmal nocturnal hemoglobinuria (PNH). This condition is an acquired and chronic form of intrinsic hemolytic anemia. Patients can present with hematuria, or even simply symptoms of anemia. Venous thrombosis is also a common occurrence. The classic triad is hemolytic anemia, pancytopenia, and venous thrombosis. Flow cytometry is the gold standard laboratory investigations and shows CD55 and CD59 negative red and blood cells.

1: A deficiency of C3 is a complement deficiency disorder. Since C3 plays an important role in the activation of both the classical and alternative complement pathways, a C3 deficiency confers a higher risk of acquiring recurrent bacterial infections.
2: It is true that this will be present in this patient's cells. However, PNH patients will also have a deficiency of CD59.
3: It is true that this will be present in this patients' cells. However, PNH patients will also have a deficiency of CD55.
4: This would indicate terminal complement deficiency. This condition involves a deficiency of the complements forming the membrane attack membrane. C5 to C9 deficiency confers a high risk of infection with Neisseria organisms.
5: The gold standard in the diagnosis of PNH is flow cytometry, and patients usually have a deficiency of both CD55 and CD59 on their red as well as their white blood cells. Eculizumab is a humanized monoclonal antibody which has been approved for the treatment of PNH. It works mainly via the inhibition of the terminal complement cascade.

Please see Paroxysmal Nocturnal Haemoglobinuria

Q-191

A 54-year-old gentleman is diagnosed with diffuse large B-cell lymphoma and is started on chemotherapy. Two days following his first treatment, he presents to the emergency department with nausea, vomiting, and myalgia. On examination, he appears clinically dehydrated. A diagnosis of tumour lysis syndrome (TLS) is suspected. Which of the following would be in keeping with this diagnosis?

A. Low phosphate
B. Low uric acid
C. Low lactate dehydrogenase (LDH)
D. Low creatinine
E. Low corrected calcium

ANSWER:
E. Low corrected calcium

EXPLANATION:
Of the choices, low corrected calcium is the only biochemistry result which would be in keeping with TLS. All of the other biochemistry markers are elevated in TLS. TLS can occur when a large amount of cancer cells are destroyed, causing a release of their intra-cellular content into the bloodstream. This occur due to chemotherapy, but can also occur without chemotherapy. Potassium and phosphate are releasfed from the cells, causing both to be high. As phosphate precipitates calcium, the serum concentration of calcium becomes low.

Source:

Larson, Richard A., and Ching-Hon Pui. 'Tumor Lysis Syndrome: Prevention and Treatment.' UpToDate. 4 Oct. 2016. 5

Please see Tumour Lysis Syndrome

Q-192

During an on call you are bleeped to see a patient on a ward as the nursing staff are worried about her. The patient was receiving a transfusion when she suddenly developed a high fever, her blood pressure dropped to 85/55 mmHg and she is now shaking violently. You discuss her case with the medical registrar on call who advises you to stop the transfusion, take blood and urine cultures, and start broad-spectrum antibiotics.

Given this advice, what type of transfusion was she likely receiving?

A. Red blood cells
B. Fresh frozen plasma
C. Platelets
D. Whole blood
E. Human albumin solution

ANSWER:
C. Platelets

EXPLANATION:
Platelet transfusions have the highest risk of bacterial contamination compared to other types of blood products

This woman has had a transfusion reaction.

Transfusion reactions include:
- ***Acute haemolytic reaction***
- ***Anaphylaxis***
- ***Bacterial contamination***
- ***Transfusion-related acute lung injury***
- ***Non-haemolytic febrile transfusion reaction***
- ***Allergic reaction***
- ***Fluid overload***

Only acute haemolytic reaction and bacterial contamination would cause fever and low blood pressure. Anaphylaxis would cause a drop in blood pressure but no fever. Non-haemolytic febrile transfusion reaction would cause shivering and fever but not usually a change in blood pressure. Therefore acute haemolytic reaction and bacterial contamination are the most likely differentials.

Given the treatment includes taking cultures and giving broad-spectrum antibiotics we can assume the medical registrar is worried about bacterial contamination. Unless there is a significant worry of bacterial contamination, the treatment would not include antibiotics.

Red blood cell transfusions; fresh frozen plasma transfusions; whole blood transfusions and human albumin solution transfusions do not carry the highest risk of bacterial contamination.

Platelet transfusions carry the highest risk of bacterial contamination, therefore this is likely what she was receiving to cause the medical registrar to give this advice.

Please see Platelet Transfusion: Active Bleeding

Q-193

Which one of the following would most suggest a leukaemoid reaction rather than chronic myeloid leukaemia?

A. Raised packed cell volume
B. Right shift of neutrophils
C. A low leucocyte alkaline phosphatase score
D. Dohle bodies in the white cells
E. Positive osmotic fragility test

ANSWER:
D. Dohle bodies in the white cells

EXPLANATION:

Please see Leukaemoid Reaction

Q-194

You are reviewing a man who has metastatic small cell lung cancer. He has developed a progressively severe headache over the past week. As part of your differential diagnosis you consider superior vena cava obstruction. What is the most common feature of this condition?

A. Nasal stuffiness
B. Visual disturbance
C. Arm swelling
D. Facial swelling
E. Dyspnoea

ANSWER:
E. Dyspnoea

EXPLANATION:
SVC obstruction - dyspnoea is the most common symptom

Please see Superior Vena Cava Obstruction

Q-195

A 65-year-old man with metastatic lung adenocarcinoma attends clinic for routine blood tests prior to commencing his next cycle of chemotherapy.

Results are as follows:

Na	**140 mmol/L**	**(135 - 145)**
K	**4.0 mmol/L**	**(3.5 - 5.0)**
Magnesium	**0.39 mmol/L**	**(0.7-1.0)**
Phosphate	**0.78 mmol/L**	**(0.7-1.4)**
Urea	**4.5 mmol/L**	**(2.0 - 7.0)**
Creatinine	**65 µmol/L**	**(55 - 120)**

Which of the following chemotherapy agents is most likely responsible for the abnormality seen?

A. Bleomycin
B. Cisplatin
C. Cyclophosphamide
D. Docetaxel
E. Vincristine

ANSWER:
B. Cisplatin

EXPLANATION:

Cisplatin is associated with hypomagnesaemia

Cisplatin chemotherapy agents are associated with hypomagnesaemia.

Please see Cytotoxic Agents

Q-196

A 72-year-old woman is found to have a marked lymphocytosis associated with smudge cells on the blood film. A diagnosis of chronic lymphocytic leukaemia is suspected. Which one of the following is the investigation of choice?

A. Immunophenotyping
B. Bone marrow aspiration
C. Protein electrophoresis
D. White cell scan
E. Bone marrow trephine

ANSWER:

A. Immunophenotyping

EXPLANATION:

CLL - immunophenotyping is investigation of choice

Immunophenotyping will demonstrate the cells to be B-cells (CD19 positive). CD5 and CD23 are also characteristically positive in chronic lymphocytic leukaemia

Please see Chronic Lymphocytic Leukaemia

Q-197

A 67-year-old woman is referred to the haematology clinic. Her GP has noted that her platelet count is persistently elevated and no reactive cause can be found. Bloods taken a week before clinic are as follows:

Hb	**15.4 g/dl**
Platelets	**784 * 109/l**
WBC	**5.3* 109/l**
JAK2 kinase (V617F mutation)	**Positive**

What is the treatment of choice?

A. Imatinib
B. Stem-cell transplantation
C. Hydroxycarbamide
D. Vincristine
E. Venesection

ANSWER:

C. Hydroxycarbamide

EXPLANATION:

Please see Thrombocytosis

Q-198

A 64-year-old man is referred to the oncology clinic with progressively worsening lower back pain over the last 3 months. He also reports an 8-month history of weight loss. MRI lumbar spine confirms the suspicion of bone metastasis.

What is the most likely primary tumour?

A. Leukaemia
B. Breast carcinoma
C. Colorectal carcinoma
D. Prostate carcinoma
E. Lung carcinoma

ANSWER:
D. Prostate carcinoma

EXPLANATION:
Prostate cancer is the most common primary tumour that metastasises to the bone

Prostate cancer is the most common primary tumour that metastasises to the bone

It is unusual to have bone metastasis in leukaemia.

Breast, colorectal and lung cancers can all lead to bone metastasis but the question is asking for the most likely tumour and statistically speaking, prostate cancer is the most common primary tumour that metastasises to the bone.

Please see Bone Metastases

Q-199

Each one of the following is associated with polycythaemia vera, except:

A. Splenomegaly
B. Hyperviscosity
C. Raised ESR
D. Hypertension
E. Pruritus

ANSWER:
C. Raised ESR

EXPLANATION:
Polycythaemia rubra vera is associated with a low ESR

Please see Polycythaemia Vera: Features

Q-200

A 23-year-old woman is reviewed at the genetics clinic after a recent diagnosis of breast cancer. Her mother died at the age of 40 with osteosarcoma, her maternal aunt was diagnosed with breast cancer at the age of 28.

Which of the following is most likely to be affected?

A. HER2/Neu
B. p53
C. APC
D. HRas
E. BRCA 1

ANSWER:
B. p53

EXPLANATION:
Li-Fraumeni syndrome is caused by germline mutations to p53 tumour suppressor gene

The clinical diagnosis of Li-Fraumeni syndrome relies on personal and family history of associated malignancies. The diagnosis of breast cancer in this patient and her aunt, as well as a diagnosis of sarcoma in a first-degree relative strongly points to Li-Fraumeni syndrome. Li-Fraumeni syndrome is caused by germline mutations to the p53 tumour suppressor gene, therefore 2 is the correct answer.

HER2/Neu is associated with the development of several cancers including breast cancer. However, the history of sarcoma in a first-degree relative, in this case, makes p53 the most likely protein affected.

APC is associated with colorectal cancer.

HRas is mainly associated with bladder cancer.

BRCA 1 is associated with breast cancer as well as ovarian cancer. Again, the family history of sarcoma most implicates p53.

Please see Genetics and Surgical Disease

Q-201

A 38-year-old Pakistani female was admitted with shortness of breath and a syncopal episode. She describes a 2 week history of lethargy, malaise and dizziness. The patient had recently started anti-tuberculous therapy. History revealed she was not a vegetarian.

Hb 8.5g/dl
MCV 72fl
WCC 11 * 10^9/l
Platelets 225 * 10^9/l

TSAT 33%
Ferritin 600ng/ml
Haemoglobin electrophoresis normal

Which stain should be applied to a blood film?

A. Giemsa
B. Gram
C. Ziehl Neelsen
D. Perl's
E. India ink

ANSWER:
D. Perl's

EXPLANATION:
This 38 year old Pakistani female has presented with symptomatic anaemia. Blood tests reveal a microcytic anaemia, the causes of which can be broadly categorised into: 1, iron deficiency, 2, thalassaemia trait 3, sideroblastic anaemia.

Interpreting the iron studies shows a normal transferrin saturation and normal ferritin, ruling out iron deficiency anaemia. Normal haemoglobin electrophoresis rules out thalassaemia, therefore the likely cause is sideroblastic anaemia. This is also hinted at by the recent commencement of Isoniazid (anti tuberculous therapy) a cause of sideroblastic anaemia.

Sideroblastic anaemia when stained with Perl's stain shows ring sideroblasts. The disease is characterised by ineffective erythropoiesis leading to poor incorporation of iron into the nucleus of erythroblasts.

Please see Sideroblastic Anaemia

Q-202

A 26-year-old newly qualified nurse presents as she has developed a bilateral erythematous rash on both hands. She has recently emigrated from the Philippines and has no past medical history of note. A diagnosis of contact dermatitis is suspected. What is the most suitable to test to identify the underlying cause?

A. Radioallergosorbent test (RAST)
B. Latex IgM levels
C. Skin prick test
D. Urinary porphyrins
E. Skin patch test

ANSWER:
E. Skin patch test

EXPLANATION:
The skin patch test is useful in this situation as it may also identify for irritants, not just allergens

Please see Allergy Tests

Q-203

A 35-year-old female who is 34 weeks pregnant presents with a swollen, painful right calf. A deep vein thrombosis is confirmed on Doppler scan. What is the preferred anticoagulant?

A. Clopidogrel
B. Aspirin
C. Intravenous heparin
D. Warfarin
E. Subcutaneous low molecular weight heparin

ANSWER:
E. Subcutaneous low molecular weight heparin

EXPLANATION:
Although teratogenic effects of warfarin are greater in the first trimester most clinicians would use low molecular weight heparin in this situation. Another factor to consider is the risk of peripartum haemorrhage and potential problems reversing the effects of warfarin if this occurred

Please see Pregnancy: DVT/PE

Q-204

What are the most common types of transformations seen in patients with polycythaemia vera?

A. Myelodysplasia + chronic myeloid leukaemia
B. Myelofibrosis + chronic myeloid leukaemia
C. Myelodysplasia + myelofibrosis
D. Myelofibrosis + acute myeloid leukaemia
E. Myelodysplasia + acute myeloid leukaemia

ANSWER:
D. Myelofibrosis + acute myeloid leukaemia

EXPLANATION:
Polycythaemia rubra vera - around 5-15% progress to myelofibrosis or AML

Please see Polycythaemia Vera: Management

Q-205

Which one of the following is least associated with lead poisoning?

A. Peripheral neuropathy
B. Acute glomerulonephritis
C. Blue lines on gum margin
D. Abdominal pain
E. Microcytic anaemia

ANSWER:
B. Acute glomerulonephritis

EXPLANATION:

Please see Lead Poisoning

Q-206

A full blood count for a 38-year-old man is reported as follows:

Hb	**12.9 g/dl**
Platelets	**225 * 109/l**
WBC	**6.2 * 109/l**
Film	**Numerous Howell-Jolly bodies and pencil cells seen**

Which one of the following conditions is most likely to produce these results?

A. Coeliac disease
B. HIV infection
C. Sickle-cell trait
D. Autoimmune hemolytic anaemia
E. Liver disease

ANSWER:
A. Coeliac disease

EXPLANATION:
Howell-Jolly bodies are seen in hyposplenism and pencil cells are a feature of iron-deficiency. Both of these are seen in coeliac disease.

Please see Blood Films: Pathological Cell Forms

Q-207

A 52-year-old woman presents with a painless, enlarged lymph node in her neck. She has no other symptoms. Cytogenetic studies reveal a translocation which confirms a diagnosis of follicular lymphoma.

Which translocation was observed in the patient's cytogenetic studies?

A. t(9;22)
B. t(8;14)
C. t(11;14)
D. t(14;18)
E. t(15;17)

ANSWER:
D. t(14;18)

EXPLANATION:

Follicular lymphoma is characterised by a t(14:18) translocation

Follicular lymphoma is driven by a translocation involving Ig heavy chain on chromosome 14 and BCL2 on chromosome 18.

t(9;22) is associated with chronic myeloid leukaemia

t(8;14) is associated with Burkitt lymphoma

t(11;14) is associated with mantle cell lymphoma

t(15;17) is associated with acute promyelocytic leukaemia

Please see Non-Hodgkin's Lymphoma

Q-208

A 48-year-old man is diagnosed with acute myeloid leukaemia and cytogenics are performed. Which one of the following is associated most with a poor prognosis?

A. Deletions of chromosome 5
B. Translocation between chromosome 15 and 17
C. Deletions of chromosome 15
D. Translocation between chromosome 9 and 14
E. Deletions of chromosome 8

ANSWER:

A. Deletions of chromosome 5

EXPLANATION:

Acute myeloid leukaemia - poor prognosis: deletion of chromosome 5 or 7

Please see Acute Myeloid Leukaemia

Q-209

A 7-year-old boy who recently emigrated from Nigeria was seen in emergency department with a 6 week history of progressive swelling of his jaw, fevers, night sweats and weight loss. He had no past medical history but his mother describes a sore throat in the past, which was treated with antibiotics, but unfortunately developed a rash subsequently. On examination there was a painless 4x3cm mass that was fixed and hard. The only other examination findings of note was rubbery symmetrical cervical lymphadenopathy.

What translocation would most likely to found on biopsy karyotyping?

A. T9:22
B. T15:17
C. T8:14
D. T14:18
E. T11:14

ANSWER:
C. T8:14

EXPLANATION:
Burkitt's lymphoma - t(8:14)

Burkitt's lymphoma is an uncommon, very high grade non Hodgkin's lymphoma endemic to west Africa and the mosquito belt. There is a close association with contraction of Epstein Barr virus (EBV). Burkitt's lymphoma often presents with symmetrical painless lymphadenopathy, systemic B symptoms (fever, sweats and weight loss), central nervous system involvement and bone marrow infiltration. Classically in the textbooks the patient also develops a large jaw tumour.

T9:22 - Chronic myeloid leukaemia - 9 ABL (oncogene - an aberrant tyrosine kinase) + 22 B cell receptor

T15:17 - Acute pro-myelocytic leukaemia - 15 Promyelocytic gene + 17 Retinoid acid receptor alpha (Fusion protein binds retinoid acid receptor and promotes transcription).

T8:14 - Burkitt's Lymphoma - 8 c-myc (oncogene) + 14 Ig heavy constant region

T14:18 - Follicular Lymphoma - 14 Ig heavy constant region + 18 Bcl2 (anti-apoptotic gene)

T11:14 - Mantle Cell Lymphoma - 11 - Cyclin D (oncogene) + 14 Ig heavy constant region

Please see Burkitt's Lymphoma

Q-210

A 54-year-old man who has developed disseminated intravascular coagulation secondary to sepsis is reviewed. Twenty minutes ago he started to bleed per rectum. Blood products including packed red cells and fresh frozen plasma have been ordered. What is the single most important factor in determining whether cryoprecipitate should be given?

A. A low fibrinogen level
B. A high prothrombin time
C. A high activated partial thromboplastin time
D. A low platelet count
E. A low haemoglobin

ANSWER:
A. A low fibrinogen level

EXPLANATION:
A low fibrinogen level is the major criteria determining the use of cryoprecipitate in bleeding

Please see Blood Products: FFP, Cryoprecipitate and Prothrombin Complex

Q-211

A 54-year-old lady presents with shortness of breath, distended neck veins, and a swollen and red face. She had She undergoes a CT scan of her chest demonstrating obstruction of the superior vena cava (SVC). What is the most likely cause?

A. Fibrosing mediastinitis
B. Thrombosis
C. Syphilitic thoracic aortic aneurysm
D. Primary malignancy
E. Metastatic malignancy

ANSWER:
D. Primary malignancy

EXPLANATION:
The correct answer is a primary malignancy. Intrathoracic malignancy is responsible for up to 60-85% of SVC obstruction cases. Most common is non-small cell lung cancer, small cell lung cancer and non-Hodgkin lymphoma. Together these malignancies represent 95% of SVC syndromes caused by malignancy. This can be the presenting feature of a undiagnosed tumour. Thrombosis can occur following pacemaker wire insertion and central line placement. Syphilitic thoracic aortic aneurysm and fibrosing mediastinitis used to be common causes prior to widespread antibiotic use.

Source:

'Superior Vena Cava Syndrome.' BMJ Best Practice. 20 July 2016.

Please see Superior Vena Cava Obstruction

Q-212

A 53-year-old gentleman of Mediterranean descent presented to the GP surgery with increased fatigue, jaundice and abdominal discomfort. There is no history of rigor, vomiting or any bowel symptoms. He has a background of type 2 diabetes, gastro-oesophageal reflux disease, hypertension, glucose-6-phosphate deficiency and hyperlipidaemia. His regular medications include lansoprazole, ramipril, metformin, simvastatin and glimepiride. He drinks approximately 10 units of alcohol per week.

Examination shows mild scleral icterus, splenomegaly and mild abdominal tenderness in the left upper quadrant.
His recent blood results are as follow:

Hb	**122g/L**	**Male: (135-180)**
Female: (115 - 160)		
Platelets	**180* 109/L**	**(150 - 400)**
WBC	**6.2* 109/L**	**(4.0 - 11.0)**

Bilirubin	**34 µmol/L**	**(3 - 17)**
ALP	**90u/L**	**(30 - 100)**
ALT	**35u/L**	**(3 - 40)**
γGT	**60 u/L**	**(8 - 60)**
Albumin	**36 g/L**	**(35 - 50)**

Blood film shows bite cells and blister cells.

Which medication is the most likely to be responsible for his symptom?

A. Ramipril
B. Metformin
C. Glimepiride
D. Simvastatin
E. Lansoprazole

ANSWER:
C. Glimepiride

EXPLANATION:
G6PD deficiency: sulph- drugs: sulphonamides, sulphasalazine and sulfonylureas can trigger haemolysis

The correct answer is glimepiride. It belongs to the sulphonylurea class of diabetes medicine. It is used in the treatment of type 2 diabetes. It can trigger haemolysis in patients with G6PD deficiency. The finding of mild anaemia, raised bilirubin and the presence of bite cells and blister cells on blood film are suggestive of haemolytic anaemia.

Simvastatin can cause jaundice by inducing hepatitis. Normal alanine transaminase and alkaline phosphatase makes this unlikely.

Metformin, ramipril and lansoprazole are not known to cause haemolytic anaemia.

Please see G6PD Deficiency

Q-213

You are asked to review a 60-year-old Greek man with known glucose-6-phosphate dehydrogenase (G6PD) deficiency who was admitted with malaria and a chest infection. He has developed jaundice and haemolytic anaemia after starting some medications this morning.

Which of these medications are most likely to have precipitated his crisis?

A. Clarithromycin
B. Amoxicillin
C. Artesunate
D. Primaquine
E. Salbutamol

ANSWER:
D. Primaquine

EXPLANATION:
Malaria prophylaxis (e.g. primaquine) can trigger haemolytic anaemia in those with G6PD deficiency

Primaquine is a well known cause of haemolysis in G6PD deficiency and is used in the treatment of malaria. Artesunate is generally considered safe to use in G6PD deficiency. Penicillins and macrolides are safe antibiotics to use in G6PD deficiency.

Source: BNF

Please see G6PD Deficiency

Q-214

What is the underlying problem in methaemoglobinaemia?

A. The oxidation of Fe2+ in haemoglobin to Fe3+
B. The reduction of Fe2+ in haemoglobin to Fe+
C. The oxidation of Fe3+ in haemoglobin to Fe2+
D. The reduction of Fe2+ in haemoglobin to Fe3+
E. The reduction of Fe3+ in haemoglobin to Fe2+

ANSWER:
A. The oxidation of Fe2+ in haemoglobin to Fe3+

EXPLANATION:
Methaemoglobinaemia = oxidation of Fe2+ in haemoglobin to Fe3+

Please see Methaemoglobinaemia

Q-215

A 58-year-old woman is referred to breast clinic with a hard painless lump in her left breast. She is eventually diagnosed with breast cancer. She undergoes a series of tests and her clinician decides to prescribe anastrozole.

Which of the following side effects should she be warned about before this medication is prescribed?

A. Deep vein thrombosis
B. Endometrial cancer
C. Osteoporosis
D. Urinary incontinence
E. Vaginal bleeding

ANSWER:
C. Osteoporosis

EXPLANATION:
Aromatase inhibitors (e.g. anastrozole) may cause osteoporosis

Her breast cancer is ER-positive, meaning that it is responsive to oestrogen (about 80% of all breast cancers are). In postmenopausal women, this can be targeted with aromatase inhibitors such as anastrozole.

The most important side effect of this hormonal treatment is osteoporosis. Women should have their bone mineral density formally assessed at the beginning of treatment and at regular intervals thereafter.

Deep vein thrombosis, endometrial cancer, and vaginal bleeding are both side effects of another common drug used to treat breast cancer (tamoxifen).

Anastrozole has not been linked to urinary incontinence.

Please see Anti-Oestrogen Drugs

Q-216

Which one of the following is least associated with thymomas?

A. Syndrome inappropriate ADH
B. Myasthenia gravis
C. Red cell aplasia
D. Dermatomyositis
E. Motor neurone disease

ANSWER:
E. Motor neurone disease

EXPLANATION:

Please see Thymoma

Q-217

A blood film is reported as follows:

Howell-Jolly bodies, target cells and occasional Pappenheimer bodies are seen

What is the most likely underlying cause?

A. Iron-deficiency anaemia
B. Lead poisoning
C. Myelofibrosis
D. Sideroblastic anaemia
E. Post-splenectomy

ANSWER:
E. Post-splenectomy

EXPLANATION:

Please see Blood Films: Typical Pictures

Q-218

A 48-year-old female who has just completed a course of chemotherapy complains of difficulty using her hands associated with 'pins and needles'. She has also experienced urinary hesitancy. Which cytotoxic drug is most likely to be responsible?

A. Doxorubicin
B. Cyclophosphamide
C. Methotrexate
D. Vincristine
E. Bleomycin

ANSWER:
D. Vincristine

EXPLANATION:
Vincristine - peripheral neuropathy

Vincristine is associated with peripheral neuropathy. Urinary hesitancy may develop secondary to bladder atony.

Please see Cytotoxic Agents

Q-219

Of the following options, which one is the best diagnostic test for paroxysmal nocturnal haemoglobinuria?

A. Osmotic fragility test
B. FMC-7 staining
C. PAS staining of erythrocytes
D. Flow cytometry for CD59 and CD55
E. Immunophenotyping for CD19 and CD20

ANSWER:
D. Flow cytometry for CD59 and CD55

EXPLANATION:
Flow cytometry of blood to detect low levels of CD59 and CD55 has now replaced Ham's test as the gold standard investigation in paroxysmal nocturnal haemoglobinuria

Please see Paroxysmal Nocturnal Haemoglobinuria

Q-220

A 72-year-old woman is admitted with confusion and pallor. Her daughter reports that she has been getting more confused and tired for the past three months. Blood tests are reported as follows:

Hb 89 g/l
MCV 125 fl
Plt 148 * 109/l
WBC 4.4 * 109/l

In light of the macrocytic anaemia some further tests are ordered:

Intrinsic factor antibodies Negative
Vitamin B12 94 ng/l (200-900 ng/l)
Folic acid 1.1 nmol/l (> 3.0 nmol/l)

What is the most appropriate management?

A. Oral folic acid + blood transfusion
B. Oral folic acid + start Intramuscular vitamin B12 when folic acid levels are normal
C. Intramuscular vitamin B12 + start oral folic acid when vitamin B12 levels are normal
D. Blood transfusion
E. Oral prednisolone

ANSWER:
C. Intramuscular vitamin B12 + start oral folic acid when vitamin B12 levels are normal

EXPLANATION:
It is important in a patient who is also deficient in both vitamin B12 and folic acid to treat the B12 deficiency first to avoid precipitating subacute combined degeneration of the cord

Please see Macrocytic Anaemia

Q-221

Which of the following is most associated with thymomas?

A. Myelodysplasia
B. Thrombocytopenia
C. Acute myeloid leukaemia
D. Acute lymphoblastic leukaemia
E. Red cell aplasia

ANSWER:
E. Red cell aplasia

EXPLANATION:

Please see Thymoma

Q-222

Which of the following is deficient in patients with hereditary angioedema?

A. C1-INH
B. C3
C. Heat shock protein type 1
D. C6
E. Histamine degradation protein (HDP)

ANSWER:
A. C1-INH

EXPLANATION:
Hereditary angioedema - C1-INH deficiency

Please see Hereditary Angioedema

Q-223

A 22-year-old man with sickle cell anaemia presents with pallor, lethargy and a headache. Blood results are as follows:

Hb 4.6 g/dl
Reticulocytes 3%

Infection with a parvovirus is suspected. What is the likely diagnosis?

A. Thrombotic crisis
B. Sequestration crisis
C. Transformation to myelodysplasia
D. Haemolytic crisis
E. Aplastic crisis

ANSWER:
E. Aplastic crisis

EXPLANATION:
The sudden fall in haemoglobin without an appropriate reticulocytosis (3% is just above the normal range) is typical of an aplastic crisis, usually secondary to parvovirus infection

Please see Sickle-Cell Crises

Q-224

A 35-year-old woman presents with menorrhagia and a persistent sore throat. A full blood count shows the following:

Hb	**6.8 g/dl**
Platelets	**45 * 109/l**
WBC	**1.4 * 109/l**
Neutrophils	**0.8 * 109/l**

Which one of the following medications is most likely to account for this finding?

A. Trimethoprim
B. Rifampicin
C. Olanzapine
D. Montelukast
E. Clomifene

ANSWER:
A. Trimethoprim

EXPLANATION:
Trimethoprim may cause pantcytopaenia

Please see Drug-Induced Pancytopaenia

Q-225

A 65-year-old male patient presents to the oncology clinic with 6-months history of weight loss and anorexia. A tumour marker profile shows an elevated level of bombesin.

What is the most likely cancer to account for this result?

A. Rectal carcinoma
B. Prostate carcinoma
C. Breast carcinoma
D. Small cell lung carcinoma
E. Lymphoma

ANSWER:
D. Small cell lung carcinoma

EXPLANATION:
Bombesin is a tumour marker in small cell lung carcinomas

Small cell lung carcinomas are the only option which could cause a raised level of bombesin. Bombesin is a tumour marker in small cell lung carcinomas, along with gastric carcinomas and retinoblastomas.

Carcinoembryonic antigen(CEA) is a tumour marker of colorectal cancer.

Prostate-specific antigen(PSA) is a tumour marker of prostate carcinomas.

CA 15-3 is a tumour marker for breast cancer.

There is no specific tumour marker for lymphoma.

Please see Tumour Markers

Q-226

Which one of the following is least likely to precipitate haemolysis in a patient with G6PD deficiency?

A. Broad beans
B. Sepsis
C. Ciprofloxacin
D. Primaquine
E. Penicillin

ANSWER:
E. Penicillin

EXPLANATION:

Please see G6PD Deficiency

Q-227

An 80-year-old man is reviewed in the haematology clinic. He has been referred due to weight loss, lethargy and a significantly elevated IgM level. Recent bloods show the following:

Hb	**13.8 g/dl**
Platelets	**127 * 109/l**
IgM	**2150 mg/dl (range 50-330 mg/dl)**
ESR	**45 mm/hr**

Given the likely diagnosis, which one of the following complications is he most likely to develop?

A. Renal failure
B. Chronic lymphocytic leukaemia
C. Thrombocytopenia
D. Hyperviscosity syndrome
E. Hypercalcemia

ANSWER:
D. Hyperviscosity syndrome

EXPLANATION:
IgM paraproteinaemia - ?Waldenstrom's macroglobulinaemia

This patient has Waldenstrom's macroglobulinaemia. Hyperviscosity syndrome is present in around 10-15% of patients. Other common complications include hepatosplenomegaly.

Please see Waldenstrom's Macroglobulinaemia

Q-228

What is the mechanism of action of cisplatin?

A. Stabilises DNA-topoisomerase II complex
B. Causes cross-linking in DNA
C. Inhibits ribonucleotide reductase
D. Inhibits purine synthesis
E. Inhibits formation of microtubules

ANSWER:
B. Causes cross-linking in DNA

EXPLANATION:
Cisplatin - causes cross-linking in DNA

Please see Cytotoxic Agents

Q-229

Which one of the following features is characteristic of acute intermittent porphyria?

A. Photosensitivity
B. Increased urinary porphobilinogen between acute attacks
C. Hypernatraemia during attacks
D. Autosomal recessive inheritance
E. Increased faecal protoporphyrin excretion

ANSWER:
B. Increased urinary porphobilinogen between acute attacks

EXPLANATION:

Please see Acute Intermittent Porphyria

Q-230

A 60-year-old man is known to have renal cell carcinoma and is currently undergoing treatment. He presents to the medical take with a one month history of worsening central lower back pain which he cannot manage with analgesia at home and which is worse at night. He has no other new symptoms. Which investigation should be performed next?

A. X-ray whole spine
B. CT lumbar spine
C. MRI whole spine
D. MRI lumbar spine
E. X-ray lumbar and sacral spine

ANSWER:
C. MRI whole spine

EXPLANATION:
An MRI whole spine should be performed in a patient suspected of spinal metastases

Spinal metastases should be high on your list of differentials for this patient. He is known to have a type of cancer which readily metastasises to the bone, and has progressive back pain. He, therefore, needs urgent imaging of his spine. MRI whole spine is preferable because patients with spinal metastases often have metastases at multiple levels within the spine. Plain radiographs and CT should not be performed as they have a lower sensitivity for revealing lesions and cannot exclude cord compression.

Imaging should be performed within 1 week if there are symptoms suspicious for spinal metastases but no neurological symptoms, and within 24 hours if there are symptoms suggestive of malignant spinal cord compression.

NICE pathways:

https://pathways.nice.org.uk/pathways/metastatic-spinal-cord-compression#content=view-quality-statement%3Aquality-statements-imaging-and-treatment-plans-for-adults-with-suspected-spinal-metastases

Please see Spinal Metastases

Q-231

A 73-year-old woman is reviewed in the pre-op clinic prior to an elective hip replacement. Her past medical history includes polymyalgia rheumatica and ischaemic heart disease. Screening blood tests are ordered and the full blood count is reported as follows:

Hb 12.9 g/dl
Plt 158 * 109/l
WBC 19.0 * 109/l
Neuts 4.2 * 109/l
Lymphs 14.1 * 109/l

What is the most likely diagnosis?

A. Lymphoma
B. Nicorandil-related lymphocytosis
C. Transient viral illness
D. Chronic lymphocytic leukaemia
E. Secondary to steroid use

ANSWER:
D. Chronic lymphocytic leukaemia

EXPLANATION:
Such a lymphocytosis in an elderly patient is very likely to be caused by chronic lymphocytic leukaemia. Steroids tend to cause a neutrophilia. It would be unusual for a viral illness to cause such a marked lymphocytosis in an elderly person.

Please see Chronic Lymphocytic Leukaemia

Q-232

Which one of the following features is least associated with Waldenstrom's macroglobulinaemia?

A. Cryoglobulinaemia
B. Bone pain
C. Retinal vein thrombosis
D. Hepatosplenomegaly
E. Monoclonal IgM paraproteinaemia

ANSWER:
B. Bone pain

EXPLANATION:

Please see Waldenstrom's Macroglobulinaemia

Q-233

A 64-year-old women attends oncology clinic following a diagnosis of oestrogen receptor (ER) positive breast cancer. Her consultant decides to commence treatment with anastrozole, an aromatase inhibitor.

Of the following, which is a potential complication associated with this treatment?

A. Endometrial cancer
B. Hypercalcaemia
C. Ischaemic heart disease
D. Osteoporosis
E. Venous thromboembolism

ANSWER:
D. Osteoporosis

EXPLANATION:
Aromatase inhibitors (e.g. anastrozole) may cause osteoporosis

In the management of oestrogen receptor (ER) positive breast cancer, two classes of oral anti-oestrogen drugs are predominantly used.

Aromatase inhibitors (AIs) such as anastrozole and letrozole reduce peripheral oestrogen synthesis. This accounts for the majority of oestrogen synthesis in post-menopausal women, and therefore aromatase inhibitors are used in this group.

The major adverse effect of aromatase inhibitors is osteoporosis. In postmenopausal women, aromatase inhibitors increase bone loss at a rate of 1- 3%/year. Bone mineral density should be checked both prior to commencing and throughout treatment.

AIs are not associated with any of the other side effects listed.

The other class of anti-oestrogen medications is Selective oEstrogen Receptor Modulators (SERM), such as tamoxifen. This is used to treat both pre- and post-menopausal women with ER positive breast cancer.

Adverse effects include venous thromboembolism, endometrial cancer, cerebral ischaemia and hypertriglyceridaemia.

Please see Anti-Oestrogen Drugs

Q-234

A patient is due to start chemotherapy for metastatic colorectal cancer. What is the main advantage of using capecitabine instead of fluorouracil?

A. Current data shows increased survival
B. Less cardiotoxic
C. Oral administration
D. Less nausea
E. Not renally excreted therefore can be used in patients with chronic kidney disease

ANSWER:
C. Oral administration

EXPLANATION:

Capecitabine is an orally administered prodrug which is enzymatically converted to 5-fluorouracil in the tumour.

Please see Cytotoxic Agents

Q-235

You review a 24-year-old woman with a history of asthma in the Emergency Department. She has been admitted with acute shortness of breath associated with tongue tingling and an urticarial rash after eating a meal containing shellfish. Her symptoms settle with nebulised salbutamol and intravenous hydrocortisone. What is the most useful test to establish whether this episode was due to anaphylaxis?

A. Serum tryptase
B. Serum IgE
C. Plasma histamine
D. Eosinophil count
E. C-reactive protein

ANSWER:

A. Serum tryptase

EXPLANATION:

Anaphylaxis - serum tryptase levels rise following an acute episode

Serum tryptase levels may remain elevated for up to 12 hours following an acute episode of anaphylaxis.

Please see Anaphylaxis

Q-236

A 10-year-old boy is brought to the emergency department with acute onset pain in his hands for the past 2 hours. He has a history of recurrent infections. Physical examination shows tender diffuse swelling of his hands bilaterally.

His blood tests show:

Hb	**80 g/L**	**Male: (119-150)**	**Female: (119-150)**
Platelets	**200 * 109/L**	**(150 - 400)**	
WBC	**5 * 109/L**	**(4.0 - 11.0)**	
Mean corpuscular volume (MCV)	**86 fL**	**(80-100)**	

Peripheral smear examination shows numerous sickled red blood cells (RBC) and Howell-jolly bodies. Haemoglobin electrophoresis confirms sickle cell disease.

Which of the following is a beneficial prophylactic drug for him?

A. Hydroxyurea
B. Morphine
C. Acetaminophen
D. Methotrexate
E. Erythropoietin

ANSWER:
A. Hydroxyurea

EXPLANATION:
Hydroxyurea increases the HbF levels and is used in the prophylactic management of sickle cell anemia to prevent painful episodes

Management of sickle cell disease comprises of two different aspects. Acute episodes are treated with sufficient hydration using intravenous fluids and effective analgesia which may include morphine.

Chronic management attempts to prevent the occurrence of acute episodes and prevent or treat the complications that may arise from this condition. Hydroxyurea has been shown to reduce the frequency of painful crisis and reduce the need for blood transfusions. It acts by increasing the level of fetal haemoglobin (HbF) in the blood which has a higher affinity for oxygen than haemoglobin A. As HbF binds strongly to oxygen, it prevents desaturation of the red blood cells which is a precipitant of sickling. Another aspect to be considered is that HbF causes a left shift of the oxygen-haemoglobin dissociation curve which prevents sickling.

Acetaminophen is an analgesic that acts by inhibiting cyclooxygenase enzyme. It can be used in cases of mild pain and thus not useful in preventing attacks and unlikely very helpful alone for management of acute episodes which often present with severe pain. Methotrexate is a chemotherapeutic agent that competitively inhibits dihydrofolate reductase so reduces the synthesis of tetrahydrofolate. It is used in the treatment of several cancers but has no role in the management of sickle cell disease.

Erythropoietin is a naturally occurring hormone synthesised in the renal interstitium in response to hypoxia. It acts on the bone marrow to increase the production of red blood cells. It can also be used as a medication in certain conditions to raise the red blood cell count such as renal failure.

Please see Sickle-Cell Anaemia: Management

Q-237

Which one of the following is least likely to cause a warm autoimmune haemolytic anaemia?

A. Mycoplasma infection
B. Methyldopa
C. Chronic lymphocytic leukaemia
D. Lymphoma
E. Systemic lupus erythematous

ANSWER:
A. Mycoplasma infection

EXPLANATION:
Mycoplasma infection causes a cold autoimmune haemolytic anaemia. Systemic lupus erythematous can rarely be associated with a mixed-type autoimmune haemolytic anaemia

Please see Autoimmune Haemolytic Anaemia

Q-238

A 67-year-old woman is reviewed 6 months after she had a mastectomy following a diagnosis of breast cancer. Which one of the following tumour markers is most useful in monitoring her disease?

A. CA 125
B. CD 34
C. CA 15-3
D. CA 19-9
E. CD 117

ANSWER:
C. CA 15-3

EXPLANATION:
CA 15-3 is a tumour marker in breast cancers

Please see Tumour Markers

Q-239

A 40-year-old female has been diagnosed with haemolytic uraemic syndrome after an episode of severe diarrhoea. She has a haemoglobin of 84 mg/dL. Which of the following blood results is most likely to be found?

A. Low haptoglobin
B. Low bilirubin
C. Elevated magnesium
D. Low urea
E. Increased HbF

ANSWER:
A. Low haptoglobin

EXPLANATION:
Low haptoglobin levels are found in haemolytic anaemias

The patient has an intravascular haemolytic anaemia secondary to haemolytic uraemic syndrome. Haptoglobin levels are reduced in intravascular haemolysis because they bind to free haemoglobin released from lysed erythrocytes. The complexes are then removed from the plasma by the hepatic reticulo-endothelial cells. Haptoglobin levels decrease if the rate of haemolysis is greater than the rate of haptoglobin production.

Bilirubin levels are likely to be elevated because of increased metabolism of haem. Magnesium may be low because of diarrhoea or unaffected. Urea would be increased due to acute kidney injury. HbF is found in patients with inherited haemoglobinopathies and not in acquired haemolytic anaemias.

NICE Evidence search
https://www.evidence.nhs.uk/search?q=haemolytic+uraemic+syndrome

Please see Haemolytic Anaemia: By Site

Q-240

Which of the following may be used in the treatment of hereditary angioedema?

A. Anabolic steroids
B. Oral contraceptive pill
C. ACE inhibitors
D. Beta-blockers
E. Aspirin

ANSWER:
A. Anabolic steroids

EXPLANATION:

Please see Hereditary Angioedema

Q-241

A 26-year-old woman is diagnosed with coeliac disease after a 1 year history of weight loss and diarrhoea. Tissue transglutaminases are positive and she is commenced on a gluten free diet.

As part of her investigations she is noted to have a low haemoglobin and ferritin levels and a blood film is sent.

Which of the following blood film findings would be suggestive of hyposplenism?

A. Basophilic stippling and cabot rings
B. Rouleaux formation
C. Schistocytes and eosinophilia
D. Howell-Jolly bodies and siderocytes
E. Toxic granulation and Döhle bodies

ANSWER:
D. Howell-Jolly bodies and siderocytes

EXPLANATION:
Howell-Jolly bodies and siderocytes are typical blood film findings of hyposplenism

Hyposplenism is a feature of coeliac disease. Blood film findings include Howell-Jolly bodies and siderocytes.

Basophilic stippling and cabot rings are features of lead poisoning.

Rouleaux formation are chronic inflammation and myeloma.

Schistocytes are a feature of haemolytic anaemia.

Toxic granulation and Döhle bodies are a neutrophil response to infection.

Please see Hyposplenism

Q-242

A 7-year-old male presents with generalised lymphadenopathy. Which one of the following is least likely to result in this presentation?

A. Kawasaki disease
B. Cytomegalovirus
C. Acute lymphoblastic leukaemia
D. Phenytoin therapy
E. Infectious mononucleosis

ANSWER:
A. Kawasaki disease

EXPLANATION:
Kawasaki disease causes only cervical lymphadenopathy

Please see Lymphadenopathy

Q-243

A 26-year-old female is diagnosed with an unprovoked DVT and a thrombophilia screen is performed.

What abnormality is most likely to be found?

A. Factor V Leiden
B. Lupus anticoagulant
C. Protein C deficiency
D. Protein S deficiency
E. Waldenstrom's macroglobulinaemia

ANSWER:
A. Factor V Leiden

EXPLANATION:
Factor V Leiden is the commonest inherited thrombophilia

Factor V Leiden is the commonest inherited thrombophilia in European populations (approximately 5% prevalence of a heterozygous mutation).

Protein C and S deficiency are possible answers but both are less common than Factor V Leiden. Lupus anticoagulant is another possible answer and features in antiphospholipid syndrome but this is again less common.

Waldenstrom's macroglobulinaemia typically presents in elderly males with symptoms of hyperviscosity.

Please see Factor V Leiden

Q-244

A patient with glucose-6-phosphate dehydrogenase (G6PD) deficiency presents for advice about malaria prophylaxis. He is about to go on a 'gap year' during which he will be travelling abroad for 12 months. Which one of the following medications is it most important that he avoids?

A. Artemether with lumefantrine
B. Mefloquine
C. Proguanil
D. Doxycyline
E. Primaquine

ANSWER:
E. Primaquine

EXPLANATION:
Malaria prophylaxis (e.g. primaquine) can trigger haemolytic anaemia in those with G6PD deficiency

Please see G6PD Deficiency

Q-245

A 32-year-old female is noted to have a mild microcytic anaemia on routine blood tests. She is otherwise well with no major past medical history. She is originally from Turkey. You suspect that she might have a haemoglobin abnormality. Which of the following blood results is most likely to be elevated above the normal range?

A. Total haemoglobin
B. Haemoglobin A2
C. Haemoglobin H
D. Haptoglobin
E. White cell count

ANSWER:
B. Haemoglobin A2

EXPLANATION:
HbA2 is raised in patients with beta thalassaemia major

The correct answer is HbA2. This patient is most likely to have beta thalassaemia minor. She has no symptoms of disease other than a mild asymptomatic anaemia and is from an area of higher prevalence for this genetic condition. HbA2 levels are elevated in beta thalassaemia major and minor. It is a variant of haemoglobin A with two delta chains replacing the normal two beta chains. It is found in small amounts in healthy adults at around 1.5 – 3% of total haemoglobin. It is increased in beta thalassaemia because of reduced production of haemoglobin beta chains.

Total haemoglobin would be reduced because of low level haemolysis, leading to a mild anaemia. Haptoglobin would be normal or mildly reduced, as it binds to free haemoglobin released from

erythrocytes after haemolysis. Haemoglobin H is found in severe alpha thalassaemia and consists of four beta chains. The white cell count would not be affected in thalassaemia.

Beta thalassaemia. Genetics home reference
https://ghr.nlm.nih.gov/condition/beta-thalassemia

Please see Beta-Thalassaemia Major

Q-246

A 51-year-old female is referred to the haematology clinic with a haemoglobin of 19.2 g/dl. She is a non-smoker. Her oxygen saturations on room air are 98% and she is noted to have mass in the left upper quadrant. What is the most useful test to establish whether she has polycythaemia vera?

A. Bone marrow aspiration
B. Blood film
C. Red cell mass
D. Transferrin saturation
E. JAK2 mutation screen

ANSWER:
E. JAK2 mutation screen

EXPLANATION:
Polycythaemia rubra vera - JAK2 mutation

The discovery of the JAK2 mutation has made red cell mass a second-line investigation for patients with suspected JAK2-negative polycythaemia vera

Please see Polycythaemia Vera: Features

Q-247

A 21-year-old man attends the emergency department after noticing blood in his urine. He has been feeling fatigued and generally unwell for the last two days and has been finding himself getting out of breath easily. His housemates had commented yesterday that he was 'turning yellow', but he had assumed they were teasing him for being unwell and had ignored them.

He is normally fit and well and is not on any regular medications. He has however recently started taking primaquine in preparation for a volunteering trip to Tanzania next week.

On examination, he is clearly jaundiced and tachypnoeic. His urine sample is a dark brown and is positive for blood and bilirubin. He is afebrile and normotensive, though is requiring some supplemental oxygen.

You are awaiting the rest of his test results but have received the following from the lab so far:

Hb	**115 g/l**
MCV	**90 fL**
Haematocrit	**0.3 L/L**
Platelets	**250 * 109/l**

WBC **10.2 * 109/l**
Reticulocyte count **2.1%**
Peripheral blood film Presence of schistocytes, spherocytes and bite cells noted

What is the most likely reason for this presentation?

A. Sickle cell crisis
B. Post-infectious haemolytic anaemia
C. G6PD deficiency
D. Hereditary spherocytosis
E. Pyruvate kinase deficiency

ANSWER:
C. G6PD deficiency

EXPLANATION:
Malaria prophylaxis (e.g. primaquine) can trigger haemolytic anaemia in those with G6PD deficiency

This man is presenting with signs and symptoms of a haemolytic anaemia, the most likely cause of which is G6PD deficiency. A number of foods and medications can trigger haemolysis in individuals with G6PD deficiency, an important class of which are quinine-based anti-malarial medications. The temporal link between starting malaria prophylaxis and developing signs of haemolysis makes this the most likely cause.

While a sickle cell crisis can trigger haemolysis, there is nothing to suggest this patient has sickle cell disease, and no sickle cells are present on the blood film.

Post-infectious haemolysis can occur with atypical pneumonias such as Mycoplasma (cold-agglutinin disease) and infections that induce hypersplenism such as mononucleosis. There is nothing to suggest an infectious cause in this scenario, however.

Congenital haemoglobin defects such as spherocytosis can also cause haemolysis. While there are spherocytes on this man's blood film, these are present to different degrees in haemolytic anaemias of any cause and as such are not specific.

Pyruvate kinase deficiency is the next most common inherited metabolic disorder after G6PD deficiency. Haemolysis in these patients tends to be triggered in times of significant physiological stress.

Please see G6PD Deficiency

Q-248

A 45-year-old man attends ambulatory care with a 2-month history of worsening fatigue. On further questioning he states that whilst he has lost some weight recently, he had attributed this to reduced appetite, stating that he has been feeling full after eating relatively little. On direct questioning he states that on a few occasions over the last 2 weeks he has woken feeling sweaty with damp sheets. On examination the patient has pale conjunctiva and there is a large, firm mass in the left upper quadrant of the abdomen. He is haemodynamically stable, afebrile and there are no signs of respiratory distress.

Initial bloods show:

Hb	**105 g/l**
Platelets	**150 * 109/l**
WBC	**50 * 109/l**

The F1 clerking the patient requested an abdominal CT which has been reported by the radiologist as showing massive splenomegaly.

A blood film has been sent and the patient has been discussed with the on-call haematologist who has arranged a bone marrow biopsy and cytogenetics. However, the results of these investigations are not yet available.

Which of the following findings would support a diagnosis of chronic myeloid leukaemia (CML) rather than myelofibrosis?

A. t(15;17) translocation
B. t(8;21) translocation
C. Low leucocyte alkaline phosphatase score
D. Raised leucocyte alkaline phosphatase score
E. Massive splenomegaly

ANSWER:
C. Low leucocyte alkaline phosphatase score

EXPLANATION:
Leucocyte alkaline phosphatase is low in CML but raised in myelofibrosis

The correct answer here is a low leucocyte alkaline phosphatase (LAP) score.

LAP is found within mature white blood cells (WBCs).

Low LAP levels are found in conditions associated with immature/undeveloped WBCs (e.g. CML), whereas pathologies associated with mature WBCs (such as myelofibrosis) cause high LAP levels.

t(15; 18) translocation is associated with acute promyelocytic leukaemia (APML)

t(8;21) translocation is associated with acute myeloid leukaemia (AML)

the Philadelphia chromosome t(9;22) creates a BCL-ABL1 fusion gene that codes for a constitutively active tyrosine kinase receptor. This is associated with 95% of CML cases and is the target for imatinib (a tyrosine kinase inhibitor).

Massive splenomegaly is seen in both CML and myelofibrosis

Please see Leucocyte Alkaline Phosphatase

Q-249

Which one of the following causes of primary immunodeficiency is due to a defect in neutrophil function?

A. Wiskott-Aldrich syndrome
B. Common variable immunodeficiency
C. Bruton's congenital agammaglobulinaemia
D. Di George syndrome
E. Chronic granulomatous disease

ANSWER:
E. Chronic granulomatous disease

EXPLANATION:

Please see Primary Immunodeficiency

Q-250

A 39-year-old woman presents with a strange collection of symptoms over the past six months. She has been seen by multiple specialists, none of whom have been able to find a cause for her symptoms.

Her symptoms include worsening headaches, memory loss, low mood, lethargy, abdominal pain causing paroxysms of intermittent generalised pain, nausea, an unusual taste in her mouth and paraesthesia in her extremities.

She is irritable during your consultation and at times tearful complaining that no one is taking her seriously and confiding that her General Practitioner had referred her for counselling.

Routine blood tests show:

Hb	**101g/L**
WBC	**5.6 10*9/L**
Platelets	**350 10*9/L**
MCV	**77fL**
Na	**136mmol/L**
K	**4.3mmol/L**
Urea	**18.2mmol/L**
Creatinine	**408umol/L**

What is the likely cause of her symptoms?

A. Pick's disease
B. Hepatic encephalopathy
C. Lead poisoning
D. Early-onset Alzheimer's
E. Viral encephalitis

ANSWER:
C. Lead poisoning

EXPLANATION:

Lead poisoning is often occupational and comprises gastrointestinal and neuropsychiatric symptoms and anaemia due to interruption to the haem biosynthetic pathway.

It is important to keep lead poisoning in mind as a differential, particularly in someone for whom routine investigations are not providing an answer and who clearly has abnormal pathology (demonstrated by her kidney failure and microcytic anaemia).

It can cause a varied and often non-specific array of symptoms. Some more 'classical' features include an unusual taste in the mouth and paraesthesia of the extremities.

Questions may more obviously point to the route of exposure through industrial exposure or contact with lead-based products such as paint or contaminated water.

Please see Lead Poisoning

Q-251

A 31-year-old woman who is 25-weeks pregnant is brought to the Emergency Department by her husband. Over the past two days she has become increasingly confused. Her temperature is 37.8ºC and blood pressure is 104/62 mmHg. Blood tests show:

Hb	**8.3 g/dl**
Platelets	**88 * 109/l**
WBC	**15.1 * 109/l**
Blood film	**Fragmented red blood cells**
Sodium	**139 mmol/l**
Potassium	**5.2 mmol/l**
Urea	**19.4 mmol/l**
Creatinine	**296 µmol/l**

What is the most appropriate treatment?

A. Rituximab
B. Intravenous immunoglobulin
C. Methylprednisolone
D. Ceftriaxone + vancomycin
E. Plasma exchange

ANSWER:

E. Plasma exchange

EXPLANATION:

TTP - plasma exchange is first-line

This patient has thrombotic thrombocytopenic purpura, a condition associated with pregnancy

Please see Thrombotic Thrombocytopaenic Purpura: Management

Q-252

Acute intermittent porphyria is due to a defect in:

A. ALA synthetase
B. PPG oxidase
C. Uroporphyrinogen decarboxylase
D. Ferrochelatase
E. Porphobilinogen deaminase

ANSWER:
E. Porphobilinogen deaminase

EXPLANATION:
AIP - porphobilinogen deAminase; PCT - uroporphyrinogen deCarboxylase

Please see Porphyrias

Q-253

A 28-year-old female patient presents to the emergency department with abdominal pain, diarrhoea and progressive weakness and pain in the limbs. She looks low in mood and tearful at times. You ask for a urine sample and leaves it standing near the window. 20 minutes later, you notice that the urine has become darker.

What is the most likely diagnosis?

A. Porphyria cutanea tarda
B. Lead poisoning
C. Acute intermittent porphyria
D. Polymyalgia rheumatica
E. Guillain-Barré syndrome

ANSWER:
C. Acute intermittent porphyria

EXPLANATION:
In acute intermittent porphyria, the urine classically turns deep red on standing

This patient has recurrent gastrointestinal symptoms associated with neuropsychiatric features. This raises the suspicion of acute intermittent porphyria (AIP). In AIP, the urine classically turns deep red on standing following sun exposure.

Lead poisoning can present with similar presentation but the darkening of urine on sun exposure is only found in AIP.

Porphyria cutanea tarda presents with photosensitive skin bullae.

Polymyalgia rheumatica may present with proximal limb weakness but does not result in the urinary phenomenon described.

Guillain-barré syndrome can develop following gastrointestinal symptoms, however, it does not cause the urine to turn red.

Please see Acute Intermittent Porphyria

Q-254

A 62-year-old male presents with a 2-month history of symptoms of fatigue and dyspnoea. The patient is visibly jaundiced and on abdominal examination you notice the spleen is palpable. Blood tests reveal:

Hb 98 g/l
MCV 88 fl
Direct Coombs test Pos

An antibody specificity test is requested and a diagnosis of warm autoimmune haemolytic anaemia is made.

Which immunoglobulin is most likely mediating this?

A. IgM
B. IgG
C. IgA
D. IgE
E. IgD

ANSWER:
B. IgG

EXPLANATION:
Warm autoimmune haemolytic anaemia involves IgG-mediated haemolysis

Warm autoimmune haemolytic anaemia involves IgG-mediated red blood cell destruction at body temperature with work-induced splenomegaly due to extravascular haemolysis.

Episodes of IgM-mediated haemolysis are precipitated by the cold and characteristically present with symptoms involving the hands and feet.

IgA, IgE and IgD are not common antibody mediators of autoimmune haemolytic anaemia.

Please see Autoimmune Haemolytic Anaemia