

Round 1: Transfusion science

1 The McLeod syndrome is associated with a variant in which blood group?

Kell – it is an absence of the Kx antigen

2 Which microorganisms are screened for in all blood donations in Scotland?

Syphilis, Hepatitis B, Hepatitis C, Hepatitis E, HIV and HTLV (exactly the same as England, Wales and N Ireland)

3 What is the regulatory required temperature storage range for red cells intended for transfusion?

2C to 6C

4 What quantitation level of anti c in a pregnancy would indicate the risk of severe HDFN and require immediate referral to a specialist unit?

Greater than 20IU/ml

5 Which blood group system is allocated to ISBT number 033?

LAN

6 How does irradiation of blood components to prevent transfusion-associated GVHD work?

Inactivates donor lymphocytes preventing clonal proliferation

7 When were the BSH guidelines on the *Investigation and Management of Acute Transfusion Reactions* produced?

April 2023

8 In the Blood Stocks Management Scheme, what does VANESA stand for?

Vital Appropriate kNowledge Enhances Stock Analysis

Round 2: Clinical Chemistry

1 Low TSH, high FT3 and high FT4 is suggestive of which condition?

Hyperthyroidism

2 A sample contaminated with EDTA will affect which routine biochemistry analytes?

K, Ca, Mg and ALP

3 Why do we use eGFR over a stand-alone creatinine measurement to assess renal function?

Creatinine levels can be affected by sex, age, ethnicity

4 Which disorder of haem synthesis can cause skin to become sensitive to sunlight?

Porphyria

5 The hexokinase method can be used to measure what?

Glucose

6 Gilbert's syndrome is a condition associated with high levels of what in the blood?

Bilirubin

7 What is the name of the inherited disorder that causes copper to accumulate in the body, particularly in the liver, brain and eyes?

Wilson's disease

8 The pH of a buffer er system is calculated by which equation?

Henderson-Hasselbach

Round 3: Cytopathology

1 Name the intracytoplasmic eosinophilic inclusions seen in degenerate urothelial cells.

Melamed-Wolinska bodies

2 Who used vaginal smears to study the hormonal cycle of guinea pigs?

George Papanicolaou

3 A strawberry cervix is a finding upon physical examination where the cervix has an erythematous, punctate, and papilliform appearance. The strawberry cervix appearance is considered to be selectively associated with which sexually transmitted infection?

Trichomonas

4 Which of the 14 thoracic lymph node stations cannot be sampled by EBUS?

1, 3, 5, 6, 8, 9, 13, 14

5 True or false - *The International System for Reporting Serous Fluid Cytopathology* states the risk of malignancy for the “negative for malignancy” category is 66%?

True

6 True or false – in the MILAN classification, salivary gland neoplasm of undetermined malignant potential (SUMP) is placed in the atypia of undetermined significance (AUS) category?

False

7 Oncocytic changes are related to an excessive number of what?

Mitochondria

8 Hyperkeratosis would be most commonly associated with which underlying epithelium?

Squamous

Round 4: Haematology

1 What name can be ascribed to the blue-green materials found within neutrophils of critically ill patients that are associated with a high mortality rate?

Critical green inclusions (crystals of death)

2 In relation to myelodysplastic neoplasms (myelodysplastic syndrome, MDS), the mutation of which gene has diagnostic relevance and reduces the required percentage of ring sideroblasts from $\geq 15\%$ to $\geq 5\%$?

SF3B1

3 Which CD38-specific therapy used for the treatment of myeloma can adversely affect the accuracy of standard pre-transfusion testing approaches?

Daratumumab.

4 Which classification system was introduced in 2022 for the classification of haematological malignancy?

International Consensus Classification (ICC)

5 Why were blood transfusions banned for 300 years in the UK?

They killed a patient with an acute haemolytic transfusion reaction when they transfused the blood from a lamb.

6 Who discovered the ABO blood group system?

Karl Lansteiner

7 Name three conditions that a target cell is found in.

Haemoglobinopathies (including Thalassaemia), liver disease, hyposplenism

8 What is a common anticoagulant that is the most likely cause of a raised APTT?

Heparin.

Round 5: Virology

1 Orf is caused by which type of virus?

A Picornavirus

B Rhabdovirus

C Poxvirus

D Calicivirus

E Retrovirus

2 Which of the following is not an RNA virus?

A Retrovirus

B Enterovirus

C Rhabdovirus

D Adenovirus

E Rubella virus

3 Genetic variation in viruses contributes to their ability to evade the immune response. Select the principal means by which antigenic shift occurs in influenza A virus.

A Low fidelity of DNA-dependent DNA polymerase

B Low fidelity of RNA-dependent RNA polymerase

C Low fidelity of reverse transcriptase

D Reassortment of fragments of the RNA genome

E Recombination between RNA genomes

4 Many antiviral drugs act by inhibition of a viral DNA polymerase enzyme. Select the virus for which this class of drugs would be effective.

A Cytomegalovirus

B Influenza

C Measles

D Mumps

E Rabies

5 Name one common method used in virology service delivery to detect the presence of viral genetic material.

Polymerase Chain Reaction (PCR) is a common method used to detect viral genetic material in virology service delivery.

6 How do serological tests differ from molecular tests in virology service delivery?

Serological tests detect antibodies produced by the immune system in response to a viral infection, while molecular tests directly detect the virus's genetic material.

7 In virology service delivery, what does the term "viral load" refer to?

Viral load measures the quantity of virus present in a patient's blood or other bodily fluids. It is often used to monitor the progression of viral infections and the effectiveness of antiviral treatments.

8 What safety measures should be in place for the packaging and transport of infectious viral specimens in virology service delivery?

Specimens should be properly packaged, labelled, and transported in accordance with international guidelines to prevent contamination and ensure the safety of laboratory personnel and the public.

Round 6: Medical microbiology

1 Which of the following dermatophytes have an animal host?

A *Microsporum canis*

B *Microsporum persicolor*

C *Trichophyton erinacei*

D *Trichophyton verrucosum*

E *Trichophyton tonsurans*

2 Which of the following have been implicated in mucormycosis?

A *Exophiala dermatitidis*

B *Rhizomucor pusillus*

C *Saksenaea vasiformis*

D *Lichtheimia corymbifera*

E *Fusarium moniliforme*

3 For which of the following infections is the detection of beta- β ,3-glucan recommended?

A Mucoraceous mould infections

B Invasive *Aspergillus* infection

C Invasive *Candida* infection

D *Pneumocystis* infections

E Cryptococcosis

4 Which of the following investigations are useful in the diagnosis of invasive fungal infections in the immunocompromised host?

A Mannan detection

B Computer tomography

- C Fungal precipitin detection
- D Galactomannan detection**
- E X-ray**

5 Which of the following fungi are annellidic?

- A *Scedosporium apiospermum***
- B *Neoscytalidium dimidiatum*
- C *Scedosporium prolificans***
- D *Scopulariopsis brevicaulis***
- E All of the above

Round 7: Point-of-care testing

1 Capillary glucose is frequently measured by POCT in type 2 diabetics. Which other biochemical analyte is also frequently measured by POCT in this group of patients?

Ketones

2 What is the main difference between direct ion-selective electrodes (ISE) and indirect ISE? Which type of ISE is used in blood gas analysers?

Direct ISE, the specimen is brought to the electrode surface without dilution. Indirect ISE, the specimen is diluted with buffer prior to electrode contact. Direct ISE are used in blood gas analysers.

3 In thromboelastograph (TEG), which part of the POCT device is rotating whilst the other part is stationary during the testing?

The cup.

4 Which analytical methodology is used by the Hemocue device for POCT measurement of haemoglobin?

Modified azide methemoglobin reaction. Red blood cells are haemolysed to release haemoglobin, haemoglobin is converted to methemoglobin which is then combined to azide. Transmittance and absorbance are measured.

5 Why do some urine dipsticks test for ascorbic acid?

A high proportion of the populations have urine Ascorbic acid [vitamin C] levels sufficient to falsely lower urine blood and glucose results measured by the dipstick.

6 Which marker is frequently measured at the point of care for patients on warfarin treatment?

International Normalised Ratio [INR]

7 Some POCT for respiratory viruses (e.g.COVID-19) use a NAAT method. What is NAAT an abbreviation of?

Nucleic Acid Amplification Test

8 What does the international standard ISO/TS 22583 provide guidance for?

Guidance for supervisors and operators of point of care testing services where POCT is performed without medical laboratory training.

Round 8: Quality

1 What does "ISO" stand for?

ISO is a word chosen by the International Organization for Standardization to refer to a set of standards that apply to all users equally. "ISO" is taken from the Greek word "isos," meaning equal, which is found in the English word "isosceles" (triangle).

2 What is the normative standard on which ISO 15189:2022 is based?

ISO/IEC 17025 and ISO 9001

3 What is the date that accreditations to ISO 15189:2012 cease to be valid?

6th December 2025

4 ISO 22367:2020 defines which requirement for medical laboratories?

Application of risk management to medical laboratories

5 What does PDCA stand for?

Plan, Do, Check, Act

6 ISO 15189:2022 (section 4.1) introduces a new requirement for medical laboratories. What is this requirement?

Impartiality

7 The ability to repeatedly get the same results is?

Precision

8 There are two types of measurement uncertainty, type A and type B. Which of these considers non-numeric data?

Type B

Round 9: Genomics and molecular pathology

1 To the nearest 1000, how many genes are there in the human genome?

Approximately 20,000 (number is debatable).

2 Who developed the dideoxy-method for sequencing DNA?

Fred Sanger and colleagues

3 Why was the discovery of *Thermus aquaticus* so important?

Isolation of thermostable Taq polymerase. Enabled PCR to be used within the mainstream for research, clinical testing and application.

4 How does FISH hybridisation work?

short section of target DNA linked to a fluorescence molecule searches for its complementary section in a sample of DNA from an individual presumed to carry a particular abnormality.

5 Which oncogene is most commonly identified in human tumours?

KRAS

6 What is the hallmark translocation of chronic myeloid leukaemia?

BCR::ABL1 t(9;22)(q34;q11)

7 According to *the International Standard of Cytogenetic Nomenclature*, what do we mean by 15p12.2?

This describes locus 12.2 on the short (p) arm on chromosome 15

8 How has next generation sequencing revolutionised healthcare?

Enables us to look at a large number of genes at one time (rather than single genes). Era of personalized medicine i.e. can examine the entire genome to identify rare and inherited diseases; sequence a large number of genes to look for multiple potential therapeutic targets simultaneously in cancer patients.

Round 10: Cellular pathology

1 It is estimated that a single type of which cell in the human body can secrete hundreds to thousands of antibody molecules per second, as part of the body's immune response?

Plasma cells

2 A primary transitional cell carcinoma originates from what cell in which organ?

Urothelial cells that line the inside of the bladder

3 What type of lymphoid structures, found primarily in the ileum, modulate intestinal immune and inflammatory responses?

Peyer's Patches

4 Is the term anisokaryosis used to describe the destruction of cells or tissues by their own enzymes, or a larger than normal variation in the size of the nuclei of cells?

Variation in nuclear size

5 German anatomist and histologist Joseph Hugo Vincenz Disse first described the Space of Disse in 1880. Is the Space of Disse found in the kidney, liver, or pancreas?

Liver

6 Which type of mucin is found in the surface epithelia of the stomach and stains positive with PAS?

Neutral

7 Which type of mucin is found in adenocarcinomas?

Acid complex sulphated

8 How do pathologists classify tumours in histopathology?

Pathology classifies tumours based on their origin, behaviour and microscopic characteristics into benign and malignant