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39	A	B	C	D	E

PRACTICE QUESTIONS

Canadian Alliance of Medical Laboratory Professionals Regulators (CAMLPR)

HIS

Histology

EDITION

Demo

QUESTIONS

9

FORMAT

Limited Edition PDF

Before you begin

What this is

9 practice questions for Canadian Alliance of Medical Laboratory Professionals Regulators (CAMLPR) **HIS**, each with its answer key and an explanation. Answer a question before you read its key — the explanation is worth more once you have committed.

If something looks wrong

Send us three things and we will check it:

- the exam code, **HIS**
- the question number
- the email address on your order

Write to **support@mometrix.net**. We reply within one business day.

QUESTION 1

SINGLE CHOICE

A skin biopsy is received in the histology laboratory for routine H&E processing. Which fixative is the most appropriate choice to preserve tissue morphology, prevent autolysis, and maintain antigenicity for subsequent immunohistochemistry?

- ☒ **A** 10% neutral buffered formalin (NBF)
- ☐ **B** Bouin's solution
- ☐ **C** Carnoy's solution
- ☐ **D** Absolute acetone

ANSWER A

WHY 10% neutral buffered formalin is the standard routine fixative in histology because it cross-links proteins, preserves cellular morphology, prevents autolysis, and maintains a broad range of antigens suitable for downstream immunohistochemistry. Bouin's solution is generally reserved for certain special stains and is not routine. Carnoy's solution is used for specific applications such as preserving glycogen and certain nuclear details but is not suitable for routine work. Absolute acetone causes precipitation fixation and is rarely used as a primary fixative.

QUESTION 2

SINGLE CHOICE

During paraffin sectioning at 4 μm on a rotary microtome, the histotechnologist notices the ribbon is curling and sections are showing chatter (alternating thick and thin bands). What is the most likely cause and corrective action?

- ☒ **A** The blade is dull or improperly angled and should be replaced or repositioned to the recommended clearance angle.
- ☐ **B** The water bath is set too cold; lower the temperature to harden the paraffin.
- ☐ **C** The block was over-dehydrated; rehydrate through graded alcohols to restore block consistency.
- ☐ **D** The paraffin wax melted too quickly; switch to a low-melting-point wax.

ANSWER A

WHY Curling ribbons and chatter are classic signs of a dull blade, incorrect blade angle, or loose blade/block holder. Repositioning the blade to the recommended clearance angle (typically 4–8°) or replacing a dull blade corrects these artefacts. A cold water bath causes wrinkling, not chatter. Over-dehydration produces crumbling sections, and wax melting is unrelated to these artefacts.

QUESTION 3

SINGLE CHOICE

Which histochemical stain is specifically used to demonstrate reticulin fibers in liver and lymphoid tissue?

- ☒ **A** Gordon–Sweets reticulin stain
- ☐ **B** Masson's trichrome stain
- ☐ **C** Verhoeff–Van Gieson stain
- ☐ **D** Periodic acid–Schiff (PAS) stain

ANSWER A

WHY The Gordon–Sweets silver impregnation technique specifically demonstrates reticulin (type III collagen) fibers and is widely used to evaluate liver architecture and lymphoid tissue framework. Masson's trichrome demonstrates collagen in general, Verhoeff–Van Gieson demonstrates elastic fibers, and PAS demonstrates glycogen, basement membranes and certain fungi.

QUESTION 4 SINGLE CHOICE

A formalin-fixed, paraffin-embedded (FFPE) section shows no nuclear staining on an ER (estrogen receptor) IHC control, despite previously staining well. Which step is most likely responsible for the loss of antigenicity and should be addressed first?

- ☒ **A** Inadequate or prolonged fixation in 10% NBF, resulting in over-fixation and excessive methylene bridge cross-links masking the epitope.
- ☐ **B** Use of a polymer detection system instead of a streptavidin–biotin system.
- ☐ **C** Application of Harris's hematoxylin counterstain for 30 seconds.
- ☐ **D** Mounting with a permanent synthetic resin.

ANSWER A

WHY Over-fixation in formalin creates excessive protein–protein methylene bridge cross-links that mask epitopes, abolishing antigen retrieval efficacy and producing false-negative IHC results. Recommended fixation in 10% NBF is typically 6–48 hours for small biopsies and 24–48 hours for larger specimens. Detection system choice, counterstain timing, and mounting media do not significantly affect ER antigenicity.

QUESTION 5 SINGLE CHOICE

On H&E-stained sections of small intestine, finger-like mucosal projections with a core of lamina propria and a central lacteal are seen. Which structure is being described?

- ☒ **A** Villi
- ☐ **B** Crypts of Lieberkühn
- ☐ **C** Peyer's patches
- ☐ **D** Brunner's glands

ANSWER A

WHY Intestinal villi are the finger-like projections of the mucosa that increase absorptive surface area. Each villus contains a core of lamina propria with capillaries and a central lacteal (lymphatic). Crypts of Lieberkühn are tubular glands at the base, Peyer's patches are lymphoid aggregates, and Brunner's glands are submucosal glands of the duodenum.

QUESTION 6

SINGLE CHOICE

What is the function of xylene (or a xylene substitute) in routine paraffin tissue processing?

- ☒ **A** To act as a clearing agent that is miscible with both alcohol and paraffin wax, allowing transition from dehydration to infiltration.
- ☐ **B** To dehydrate tissues by removing bound water from proteins.
- ☐ **C** To soften paraffin wax for easier sectioning.
- ☐ **D** To remove residual fixative from the tissue.

ANSWER A

WHY Xylene is a clearing agent that is miscible with both absolute ethanol and molten paraffin wax, enabling the transition between dehydration (alcohol steps) and paraffin infiltration. It does not dehydrate tissues, soften wax, or remove fixative. Clearing steps must be carefully timed to avoid tissue brittleness from over-clearing.

QUESTION 7

SINGLE CHOICE

A histotechnologist notices that the hematoxylin stain on a recent run of slides appears pale and washed-out, while the eosin appears acceptable. Which reagent is most likely the cause and what is the first corrective action?

- ☒ **A** The hematoxylin is oxidized or exhausted; filter and replace or re-oxidize according to the manufacturer's protocol.
- ☐ **B** The eosin is contaminated; replace the eosin working solution.
- ☐ **C** The slides were over-dehydrated before coverslipping; rehydrate and re-stain.
- ☐ **D** The mounting medium is incompatible with hematoxylin; switch to an aqueous mountant.

ANSWER A

WHY Pale, washed-out hematoxylin with acceptable eosin most commonly reflects an exhausted or over-oxidized hematoxylin (e.g., hematein precipitate depletion). Filtering and replacing the hematoxylin or re-oxidizing it restores staining intensity. Eosin contamination does not selectively weaken hematoxylin, and dehydration or mounting issues do not selectively pale nuclear staining in this pattern.

QUESTION 8

SINGLE CHOICE

Which special stain is the histologic method of choice for demonstrating acid-fast bacilli, such as *Mycobacterium tuberculosis*, in tissue sections?

- ☒ **A** Ziehl–Neelsen (carbol fuchsin) acid-fast stain
- ☐ **B** Gram stain (Brown–Brenn modification)
- ☐ **C** Grocott methenamine silver (GMS) stain
- ☐ **D** Mucicarmin stain

ANSWER A

WHY The Ziehl–Neelsen acid-fast stain uses carbol fuchsin with heat (or a modified cold method) to penetrate the waxy mycobacterial cell wall, demonstrating acid-fast bacilli as bright red rods against a blue counterstain. Gram stain differentiates gram-positive and gram-negative bacteria but is not specific for mycobacteria. GMS demonstrates fungi and *Pneumocystis*, and mucicarmin demonstrates mucin and the capsule of *Cryptococcus*.

QUESTION 9

MULTIPLE CHOICE

Which of the following are required safe practices when handling xylene in the histology laboratory? (Choose two.)

- ☒ **A** Use xylene in a properly functioning chemical fume hood to limit inhalation exposure.
- ☒ **B** Store xylene in a labeled, flammable-cabinet away from ignition sources and oxidizers.
- ☐ **C** Pour xylene waste down the sink after diluting with running water.
- ☐ **D** Heat xylene over an open flame to speed clearing of tissues.

ANSWER A - B

WHY Xylene is a volatile, flammable organic solvent and a health hazard by inhalation and skin absorption. It must be used within a fume hood and stored in a flammable-storage cabinet away from heat, sparks, and oxidizers. It must never be poured down the drain; xylene waste must be collected for hazardous-waste disposal. Heating xylene over an open flame is a serious fire risk and is prohibited.