

Advanced Forensic Biological Sciences

Forensic Science · Answer Key · 25 Questions

1. What is the specific temperature-dependent process occurring in the eyes that allows for the estimation of the post-mortem interval (PMI) via potassium concentration?

A) Vitreous humor sequestration

- B) Corneal clouding
- C) Aqueous humor evaporation
- D) Retinal detachment

2. Which physiological process is responsible for the phenomenon of 'tache noire' in an unburied corpse?

A) Bacterial putrefaction

B) Dehydration of the sclera

- C) Hemolysis of ocular capillaries
- D) Post-mortem hypostasis

3. In forensic toxicology, what is the 'post-mortem redistribution' phenomenon primarily associated with?

A) Drug movement from solid organs to the blood

- B) The evaporation of volatile poisons
- C) Rapid decomposition of bile
- D) The migration of skin cells into muscle

4. What is the primary cause of 'adipocere' formation in a decomposing body?

A) Hydrolysis of subcutaneous adipose tissue

- B) Calcification of muscle fibers
- C) Denaturation of collagen proteins
- D) Oxidation of skin lipids

5. During rigor mortis, what specific chemical depletion at the cellular level prevents the detachment of actin-myosin filaments?

A) Calcium ions

B) Adenosine triphosphate (ATP)

- C) Lactic acid
- D) Creatine phosphate

6. Which phase of decomposition is characterized by the presence of 'marbling' caused by the reaction of hydrogen sulfide with hemoglobin?

- A) Bloat
- B) Active decay
- C) Advanced decay

D) Putrefaction

7. What is the term for the pink staining of the inner walls of blood vessels that occurs post-mortem due to hemoglobin diffusion?

- A) Vascular engorgement

B) Imbibition of staining

- C) Arterial spasm
- D) Heme-fixation

8. Which organ exhibits the highest rate of post-mortem autolysis due to its high concentration of digestive enzymes?

A) Pancreas

- B) Liver
- C) Kidney
- D) Spleen

9. What is the clinical term for the mechanism where the blood pressure remains high at the moment of death, resulting in petechial hemorrhages?

- A) Asphyxial syndrome

B) Tardieu spots

- C) Vagal inhibition
- D) Capillary rupture

10. In forensic odontology, what is the most reliable method for estimating age in adult remains?

A) Gustafson's method

- B) Tooth eruption timing
- C) Dental caries index
- D) Enamel hypoplasia depth

11. What is the primary metabolite tested in hair to detect chronic heavy metal exposure in forensic investigations?

- A) Keratin sulfur complexes
- B) Chelated metallic ions
- C) Albumin-bound minerals

D) Melanin-sequestered elements

12. What physiological change occurs in the skin immediately surrounding an electrical entry wound, often referred to as 'metallization'?

- A) Thermal coagulation
- B) Epidermal vapor explosion
- C) Metallic ion transfer from the conductor**
- D) Carbonization of the dermis

13. Which skeletal feature is considered the most accurate for determining sex in an adult skeleton?

- A) Femur length
- B) Pelvis morphology**
- C) Skull circumference
- D) Sternum density

14. What is the significance of the 'diatom test' in cases of suspected drowning?

- A) Detection of algae in bone marrow**
- B) Identification of salt water in lungs
- C) Presence of plankton in the stomach
- D) Tracing riverbed silt in the pharynx

15. What substance is analyzed in the vitreous humor to differentiate between diabetic ketoacidosis and post-mortem ketosis?

- A) Glucose and beta-hydroxybutyrate**
- B) Insulin and glucagon
- C) Glycogen and lactate
- D) Pyruvate and urea

16. What is the characteristic 'cherry-pink' lividity of a corpse indicative of?

- A) Carbon monoxide poisoning**
- B) Cyanide toxicity
- C) Hypothermia
- D) High altitude edema

17. In forensic biology, what does the presence of 'spermine' in a stain confirm?

- A) The presence of semen**
- B) The presence of saliva
- C) The presence of vaginal fluid
- D) The presence of sweat

18. What does the 'Kelvin-Helmholtz' instability phenomenon relate to in the context of forensic fluid dynamics?

A) Blood spatter pattern geometry

- B) Gas bubble movement in tissues
- C) Decomposition fluid drainage
- D) Skeletal joint dislocation

19. Which type of cell is the first to arrive at a site of injury or trauma in a living person, and thus serves as a forensic indicator of vital reaction?

A) Neutrophil

- B) Lymphocyte
- C) Eosinophil
- D) Monocyte

20. What occurs to the body's pH levels immediately following death as a result of anaerobic glycolysis?

A) It increases to alkaline levels

B) It decreases towards acidic levels

- C) It remains neutral
- D) It fluctuates rhythmically

21. Which specific bone is most frequently used to estimate stature in forensic anthropology?

A) Femur

- B) Humerus
- C) Tibia
- D) Radius

22. What is the cause of 'scabbard trachea' often observed in cases of chronic upper airway compression?

A) Lateral compression of the tracheal rings

- B) Ossification of the thyroid cartilage
- C) Fibrosis of the cricothyroid membrane
- D) Hypertrophy of the tracheal smooth muscle

23. What is the fundamental basis of the 'supra-vital' reaction test used to determine time of death in skeletal muscle?

A) Response to electrical stimulation

- B) Reaction to chemical reagents
- C) Color change in muscle tissue
- D) Temperature decay rate

24. Which chemical compound is the primary byproduct responsible for the characteristic odor of decomposition?

A) Putrescine

B) Formaldehyde

C) Ethane

D) Acetone

25. What is the 'Haller's layer' in the context of forensic examination of the human eye?

A) The vascular layer of the choroid

B) The epithelial lining of the conjunctiva

C) The nerve fiber layer of the retina

D) The basement membrane of the cornea