

Maritime Health and Physiological Challenges

Maritime Technology And Human Physiology · Answer Key · 20 Questions

1. What is the primary physiological mechanism behind 'Mal de débarquement' syndrome occurring after returning to land from a long sea voyage?

- A) Dehydration of the inner ear fluid
- B) Dysfunction in the vestibular system's adaptation to stable ground**
- C) Severe vitamin D deficiency
- D) Increased blood pressure in the carotid sinus

2. Which condition, historically known as 'shipboard beri-beri', is caused by a deficiency in thiamine (Vitamin B1) often found in historical maritime diets?

- A) Scurvy
- B) Pellagra
- C) Wernicke-Korsakoff syndrome**
- D) Rickets

3. What is the specific atmospheric pressure limit below which a saturation diver must remain to avoid the onset of High-Pressure Nervous Syndrome (HPNS)?

- A) 100 meters equivalent
- B) 150 meters equivalent**
- C) 200 meters equivalent
- D) 300 meters equivalent

4. During prolonged periods at sea, what specific physiological change occurs to the circadian rhythm of mariners due to the 'blue light' exposure from modern LED bridge displays?

- A) Increased melatonin secretion
- B) Suppression of melatonin production**
- C) Enhanced cortisol degradation
- D) Stabilized adenosine levels

5. Which heavy metal exposure, historically associated with ship-breaking and legacy paint removal, leads to 'basophilic stippling' in red blood cells?

- A) Mercury
- B) Lead**
- C) Cadmium
- D) Arsenic

6. What is the primary cause of 'Immersion Foot' (or Trench Foot) when mariners are exposed to prolonged wet conditions in maritime environments?

A) Fungal infection of the dermis

B) Peripheral nerve damage due to cold-induced vasoconstriction

C) Severe potassium imbalance

D) Hyper-osmotic shock to skin cells

7. Which specific bone density biomarker is most commonly monitored in submarine crews due to the lack of natural sunlight and restricted physical movement?

A) Serum osteocalcin

B) Urinary hydroxyproline

C) Serum 25-hydroxyvitamin D

D) Alkaline phosphatase

8. What is the primary physical effect of 'whole-body vibration' (WBV) experienced by crew members on high-speed craft on the lumbar spine?

A) Degenerative disc disease

B) Bone spur formation

C) Ligament hypertrophy

D) Spinal canal stenosis

9. Which gas is commonly used as a diluent in deep-sea saturation diving to prevent nitrogen narcosis at depths exceeding 50 meters?

A) Neon

B) Argon

C) Helium

D) Xenon

10. The 'Bohr effect' is a critical physiological concern for divers using rebreather technology. What does this effect describe?

A) The reduction of hemoglobin's affinity for oxygen in the presence of CO₂

B) The increase in blood viscosity due to cold

C) The formation of nitrogen bubbles in joints

D) The rapid expansion of lung volume during ascent

11. In maritime radar operators, what is the documented physiological risk associated with long-term exposure to non-ionizing microwave radiation?

A) Cataract formation

B) Skin pigment changes

C) Bone marrow suppression

D) Reduced synaptic plasticity

12. Which hormone is typically suppressed in mariners working on 'watch' rotations that cross multiple time zones, leading to metabolic syndrome risks?

- A) Thyroxine
- B) Insulin
- C) Adiponectin**
- D) Ghrelin

13. What physiological phenomenon occurs when a diver ascends too quickly, causing dissolved nitrogen to form bubbles in the bloodstream?

- A) Hypercapnia
- B) Decompression sickness**
- C) Hypoxia
- D) Nitrogen toxicity

14. Which cardiovascular condition is specifically linked to the high-sodium diet historically prevalent in long-haul maritime catering?

- A) Left ventricular hypertrophy**
- B) Atrial fibrillation
- C) Pulmonary hypertension
- D) Myocarditis

15. What is the maximum safe exposure limit for noise-induced hearing loss in engine room environments without standard PPE, measured in decibels (dBA) over an 8-hour shift?

- A) 75 dBA
- B) 85 dBA**
- C) 95 dBA
- D) 105 dBA

16. Which specific neurotransmitter imbalance is hypothesized to contribute to 'sea-sickness' through excessive signaling in the area postrema?

- A) Dopamine
- B) Acetylcholine**
- C) Serotonin
- D) GABA

17. What is the main physiological purpose of the 'Isobaric Counter-diffusion' phenomenon in mixed-gas diving?

- A) Equalizing pressure in the middle ear
- B) Preventing gas bubble formation when switching inert gases**
- C) Reducing nitrogen absorption during descent
- D) Improving oxygen uptake in cold water

18. In the context of maritime occupational health, 'Noise Notch' is a diagnostic indicator found in which medical test?

- A) Electrocardiogram
- B) Audiometry**
- C) Spirometry
- D) Blood glucose profile

19. What is the primary risk of 'Hypercapnia' in closed-circuit rebreather systems?

- A) Respiratory alkalosis
- B) Central nervous system depression**
- C) Increased oxygen toxicity threshold
- D) Decreased carbon dioxide ventilation efficiency

20. Which muscle group is most frequently affected by repetitive strain injury (RSI) in deck hands performing high-tension manual line handling?

- A) Flexor digitorum**
- B) Biceps brachii
- C) Trapezius
- D) Gastrocnemius