

Astro-Public Health and Space Medicine

Public Health · Answer Key · 12 Questions

1. What is the primary physiological mechanism by which long-duration microgravity induces bone mineral density loss in astronauts?

- A) Increased osteoclast activity without compensatory osteoblast activity**
- B) Hypercalcemia-induced renal failure
- C) Inhibition of parathyroid hormone production
- D) Severe systemic alkalosis

2. Which specific biological radiation effect poses the greatest carcinogenic risk to astronauts during deep space missions?

- A) Infrared thermal damage
- B) HZE particle-induced DNA double-strand breaks**
- C) Low-frequency radio wave interference
- D) Ultraviolet photo-keratitis

3. What condition, formerly known as Visual Impairment Intracranial Pressure (VIIP) syndrome, is a major public health concern for astronauts in microgravity?

- A) Spaceflight Associated Neuro-ocular Syndrome (SANS)**
- B) Presbyopia-induced retinal detachment
- C) Orbital cellulitis
- D) Intraocular hypertension

4. Which microorganism has demonstrated increased virulence and resistance to antibiotics in spaceflight studies, posing a risk to ISS crew health?

- A) Staphylococcus aureus**
- B) Lactobacillus acidophilus
- C) Bifidobacterium bifidum
- D) Streptococcus thermophilus

5. In the context of planetary protection, what is the defined 'Forward Contamination' protocol for spacecraft?

- A) Preventing Earth microbes from contaminating target celestial bodies**
- B) Sterilizing returning extraterrestrial soil samples
- C) Quarantining astronauts upon planetary return
- D) Removing orbital debris from Earth's atmosphere

6. What is the primary physiological cause of the 'fluid shift' phenomenon observed in microgravity?

A) Cephalad shift of bodily fluids due to lack of hydrostatic pressure

- B) Excessive erythropoiesis in the bone marrow
- C) Dehydration-induced hypovolemia
- D) Peripheral vasodilation from solar radiation

7. Which organ system experiences the most rapid and significant muscle atrophy during prolonged exposure to microgravity?

A) Postural skeletal muscles

- B) Myocardium
- C) Smooth muscle of the esophagus
- D) Diaphragm

8. What role does the 'Vagus Nerve' play in space motion sickness during the initial adaptation to microgravity?

A) It mediates the vestibular-autonomic conflict triggering nausea

- B) It regulates oxygen saturation in the upper extremities
- C) It suppresses cortisol production in the adrenal glands
- D) It increases insulin sensitivity in the liver

9. What is the physiological consequence of the 'Space Anemia' phenomenon observed in astronauts?

A) Reduction in red blood cell mass via neocytolysis

- B) Hyperproliferation of leukocytes
- C) Excessive iron absorption in the gut
- D) Decreased production of erythropoietin in the kidneys

10. Which specific hormone response is typically attenuated in microgravity, contributing to altered metabolic regulation?

A) Insulin-like Growth Factor 1 (IGF-1)

- B) Melatonin secretion
- C) Thyroid-stimulating hormone
- D) Cortisol surge

11. What is the primary concern regarding 'circadian misalignment' on the International Space Station?

A) Disruption of sleep-wake cycles affecting cognitive performance

- B) Overproduction of vitamin D
- C) Increased risk of solar flare exposure
- D) Synchronization of human biomes with surface microbes

12. What happens to the human intervertebral discs during prolonged microgravity exposure that affects standing height?

A) They expand due to the absence of axial loading

B) They dehydrate and compress rapidly

C) They undergo calcification

D) They atrophy due to lack of physical movement