Space Medicine and Human Physiology

Space Medicine · Practice Test · 15 Questions

1. Which specific physiological adaptation occurs in astronauts due to the 'fluid shift' phenomenon during microgravity exposure?

A) Increased peripheral arterial blood pressure
B) Decreased intracranial pressure
C) Cephalad fluid shift causing facial edema and venous engorgement
D) Increased erythropoiesis in the lower extremities

2. What is the clinical term for the vision impairment caused by structural changes in the eye, such as optic disc edema, frequently observed in long-duration astronauts?

A) Spaceflight Associated Neuro-ocular Syndrome (SANS)
B) Microgravity Induced Glaucoma
C) Retinal Detachment Syndrome
D) Ocular Hypertension of Spaceflight

3. During prolonged space missions, what is the primary cause of the accelerated bone mineral density loss observed in the hip and lumbar spine?

A) Increased dietary intake of sodium
B) Lack of mechanical loading on the skeleton
C) Hypercalcemia caused by radiation
D) Decreased vitamin D production in the skin

4. Which hormone secretion pattern is notably disrupted in astronauts due to the frequent transitions between light and dark cycles on the International Space Station?

A) Adrenaline
B) Melatonin
C) Insulin
D) Thyroxine

5. What is the 'cardiovascular deconditioning' effect experienced by astronauts upon returning to Earth's gravity?

A) Tachycardia at rest
B) Orthostatic intolerance
C) Left ventricular hypertrophy
D) Increased plasma volume

6. Exposure to galactic cosmic radiation is primarily linked to an increased risk of which long-term health condition in astronauts?

A) Central nervous system degradation
B) Type 2 diabetes
C) Carcinogenesis
D) Autoimmune thyroiditis

7. Which specific muscle groups exhibit the most significant atrophy during extended stays in microgravity environments?

A) Biceps brachii
B) Antigravity postural muscles
C) Muscles of mastication
D) Extraocular muscles

8. What is the primary mechanism by which spaceflight influences the human immune system?

A) Increased production of white blood cells
B) Dysregulation of T-cell activation and cytokine production
C) Enhancement of natural killer cell activity
D) Destruction of bone marrow stem cells

9. In the context of planetary medicine, what is the 'Mars gravity' equivalent in terms of Earth's gravity (g)?

A) 0.16 g
B) 0.38 g
C) 0.83 g
D) 0.92 g

10. Which medical tool is essential for managing the increased risk of renal calculi (kidney stones) in astronauts due to bone demineralization?

A) Hyperbaric oxygen therapy
B) Hydration monitoring and calcium balance protocols
C) Intravenous immunoglobulin therapy
D) Regular hemodialysis

11. What is the biological consequence of 'space anemia,' which involves a decrease in red blood cell mass?

A) Increased bone marrow production of erythrocytes
B) Increased destruction of hemoglobin by the spleen
C) Decreased EPO production in the kidneys
D) Increased hemolysis during spaceflight

12. Which physiological system is most immediately affected by the transition from 1g to 0g, causing the 'space adaptation syndrome'?

A) Vestibular system
B) Renal system
C) Endocrine system
D) Respiratory system

13. What is the significance of the 'Sojourner' microbiome studies regarding long-term human space habitation?

A) The reduction of gut bacteria diversity
B) The increase in pathogenic fungal spores
C) The total elimination of the microbiome
D) The stability of probiotic supplements in orbit

14. How does microgravity affect pharmacokinetics in the human body?

A) Drug absorption becomes significantly faster
B) Drug metabolism in the liver remains strictly identical to Earth
C) Changes in fluid distribution alter drug distribution and clearance
D) Drugs become chemically unstable due to cosmic rays

15. What is the primary risk factor for 'Spaceflight-Induced Back Pain' related to the spine?

A) Increased intervertebral disc hydration and spinal lengthening
B) Compression of the vertebrae due to centrifugal force
C) Dehydration of the spinal ligaments
D) Micro-fractures from high G-force launches