

Environmental Science and Human Health: A Deep Dive

Environmental Science · Answer Key · 17 Questions

1. Which specific heavy metal is known to bioaccumulate in the food chain, leading to neurotoxic effects in humans, particularly impacting fetal development and causing peripheral neuropathy in adults?

- A) Lead (Pb)
- B) Cadmium (Cd)
- C) Arsenic (As)
- D) Mercury (Hg)**

2. Chronic exposure to which common indoor air pollutant, primarily from combustion of fossil fuels and tobacco smoke, is a leading cause of cardiovascular and respiratory diseases due to its ability to penetrate deep into the lungs and enter the bloodstream?

- A) Volatile Organic Compounds (VOCs)
- B) Ozone (O₃)
- C) Particulate Matter (PM_{2.5})**
- D) Nitrogen Dioxide (NO₂)

3. Endocrine-disrupting chemicals (EDCs) can interfere with the human endocrine system. Which of the following EDCs, commonly found in plastics, has been linked to reproductive abnormalities and increased risk of certain cancers due to its estrogenic activity?

- A) Polybrominated Diphenyl Ethers (PBDEs)
- B) Phthalates
- C) Per- and Polyfluoroalkyl Substances (PFAS)
- D) Bisphenol A (BPA)**

4. Exposure to elevated levels of ultraviolet radiation (UVR) from the sun is a significant environmental risk factor for which type of cancer, primarily due to DNA damage in skin cells?

- A) Lung Cancer
- B) Colorectal Cancer
- C) Melanoma**
- D) Leukemia

5. Which widespread environmental contaminant, often found in contaminated drinking water and rice, is a known human carcinogen and can cause skin lesions, cardiovascular disease, and diabetes?

A) Chromium (Cr)

B) Arsenic (As)

C) Nickel (Ni)

D) Selenium (Se)

6. Pesticides, particularly organophosphates, can exert neurotoxic effects in humans by inhibiting which enzyme essential for neurotransmission, leading to symptoms like muscle weakness, respiratory failure, and cognitive impairment?

A) Monoamine Oxidase (MAO)

B) Acetylcholinesterase (AChE)

C) Dopamine Beta-Hydroxylase (DBH)

D) Tyrosine Hydroxylase (TH)

7. What is the primary mechanism by which lead (Pb) exerts its toxic effects on the human nervous system, especially in developing children, leading to cognitive deficits and behavioral problems?

A) Interference with oxygen transport by hemoglobin

B) Disruption of calcium signaling and neurotransmitter release

C) Induction of oxidative stress and lipid peroxidation

D) Damage to mitochondrial DNA and energy production

8. Exposure to high concentrations of tropospheric ozone (O₃) can exacerbate pre-existing respiratory conditions like asthma by causing inflammation and damage to which part of the respiratory system?

A) Pleural lining

B) Alveoli and bronchioles

C) Trachea

D) Diaphragm

9. Which class of flame retardants, often found in furniture and electronics, has been linked to thyroid hormone disruption and neurodevelopmental issues in children due to their persistence and bioaccumulation?

A) Phthalates

B) Bisphenols

C) Polybrominated Diphenyl Ethers (PBDEs)

D) Glycol Ethers

10. The World Health Organization (WHO) identifies ambient air pollution as a major environmental health risk. What is the predominant pollutant responsible for increased mortality from cardiovascular and respiratory diseases globally?

- A) Ground-level ozone (O₃)
- B) Carbon monoxide (CO)
- C) Particulate matter (PM_{2.5})**
- D) Sulfur dioxide (SO₂)

11. Certain persistent organic pollutants (POPs) like dioxins and PCBs can accumulate in fatty tissues of the human body. What is a significant health consequence associated with long-term exposure to these compounds?

- A) Improved immune function
- B) Enhanced cognitive abilities
- C) Suppression of the immune system and endocrine disruption**
- D) Increased bone density

12. What is the primary biological target of polychlorinated biphenyls (PCBs) in the human body that contributes to their endocrine-disrupting effects?

- A) DNA
- B) Cell membranes
- C) Steroid hormone receptors**
- D) Mitochondria

13. Chronic exposure to noise pollution, defined as unwanted sound, has been scientifically linked to which physiological stress response in humans, beyond just annoyance?

- A) Increased metabolic rate
- B) Elevated blood pressure and heart rate**
- C) Enhanced REM sleep
- D) Decreased cortisol levels

14. Which specific vitamin deficiency is exacerbated by excessive consumption of certain organic pollutants that interfere with its absorption or metabolism, potentially leading to bone health issues?

- A) Vitamin C
- B) Vitamin D**
- C) Vitamin B12
- D) Vitamin K

15. The presence of certain bacteria and viruses in contaminated water sources is a major pathway for the transmission of infectious diseases. Which disease is primarily caused by the bacterium *Vibrio cholerae* found in fecally contaminated water?

- A) Typhoid fever
- B) Hepatitis A
- C) Cholera**
- D) Giardiasis

16. Exposure to high levels of airborne silica dust, often found in mining and construction, can lead to a chronic lung disease characterized by fibrosis and impaired gas exchange. What is this condition called?

- A) Asbestosis
- B) Silicosis**
- C) Emphysema
- D) Pneumoconiosis

17. Which man-made chemical compound, historically used as a refrigerant and propellant, has been largely phased out due to its ozone-depleting properties, which increase UV radiation reaching the Earth's surface and thus skin cancer risk?

- A) Dichlorodiphenyltrichloroethane (DDT)
- B) Polychlorinated Biphenyls (PCBs)
- C) Chlorofluorocarbons (CFCs)**
- D) Tetrachloroethylene