

Unit 12 - Week 10: Biological Effects of Radiation

Course outline

How does an NPTEL online course work?

Week 0 : Prerequisite

Week 1: Fundamentals of Nuclear Power

Week 2 : Radioactivity and nuclear Reactions

Week 3 : Nuclear Fission

Week 4: Chain Reaction in Reactors

Week 5 : Reactor Thermalhydraulics

Week 6: Reactor Control

Week 7: Thermal Reactors

Week 8: Breeder Reactors

Week 9: Nuclear Fusion

Week 10: Biological Effects of Radiation

● Lec 1: Radiation dose & gross biological effects

● Lec 2: Stochastic & deterministic effects of human cells

○ Quiz : Assessment 10

○ Feedback form

Week 11: Reactor Safety & Security

Week 12: Waste Management

Text Transcripts

Download Videos

Books

Assessment 10

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2020-04-08, 23:59 IST.

1) Among the following human organs, which one is the most sensitive to radiation? 1 point

- thyroid
- bone marrow
- ovary
- lung

No, the answer is incorrect. Score: 0

Accepted Answers: *ovary*

2) 1 Gray = 1 point

- 0.01 J/kg
- 0.1 J/kg
- 1 J/kg
- 10 J/kg

No, the answer is incorrect. Score: 0

Accepted Answers: *1 J/kg*

3) Among the following activities, which one is most likely to induce the largest effective radiation dose on a human? 1 point

- chest X-ray
- CT scan
- cross-country flight
- working in an uranium mine for a year

No, the answer is incorrect. Score: 0

Accepted Answers: *CT scan*

4) Among the following particles, which one has the largest LET? 1 point

-
- α -particles
- neutron
- electron
-
- γ -rays

No, the answer is incorrect. Score: 0

Accepted Answers: *α -particles*

5) Which of the following pairings of nucleobases are found in a normal human DNA? 1 point

- Adenine – Uracil and Thymine – Cytosine
- Adenine – Guanine and Thymine – Cytosine
- Adenine – Cytosine and Thymine – Guanine
- Adenine – Thymine and Guanine – Cytosine

No, the answer is incorrect. Score: 0

Accepted Answers: *Adenine – Thymine and Guanine – Cytosine*

6) In a human cell, the most sensitive intra-cellular component is 1 point

- Mitochondria
- Golgi apparatus
- Nucleus
- Lysosome

No, the answer is incorrect. Score: 0

Accepted Answers: *Nucleus*

7) Among the following statements, which one is not correct? 1 point

- Deterministic effect of radiation is observed only beyond a threshold level of radiation exposure.
- The extent of stochastic effect is directly proportional to the strength of radiation dose.
- Appearance of stochastic effect is more likely with increase in the radiation exposure.
- Deterministic effects generally refer to the immediate effect of radiation, whereas the stochastic effects can span over generations.

No, the answer is incorrect. Score: 0

Accepted Answers: *The extent of stochastic effect is directly proportional to the strength of radiation dose.*

8) A human cell is most affected by radiation during which phase of its life cycle? 1 point

- G₁-phase
- G₂-phase
- cytokinesis
- mitosis

No, the answer is incorrect. Score: 0

Accepted Answers: *mitosis*

9) Apoptosis is a 1 point

- highly regulated mechanism of cell death.
- catabolic mechanism of degrading dysfunctional cell components.
- cell death mechanism following aberrant mitosis
- tumour cell death process.

No, the answer is incorrect. Score: 0

Accepted Answers: *highly regulated mechanism of cell death.*

10) At lower radiation doses, most prevalent of cell killing mechanism is 1 point

- Apoptosis
- Necrosis
- Autophagy
- Senescence

No, the answer is incorrect. Score: 0

Accepted Answers: *Senescence*

11) A foetus is likely to develop the possibility of childhood leukaemia, if it is subjected to radiation during. 1 point

- first 2 weeks of gestational age.
- 2 – 8 weeks of gestational age.
- 8 – 15 weeks of gestational age.
- 15 – 24 weeks of gestational age.

No, the answer is incorrect. Score: 0

Accepted Answers: *2 – 8 weeks of gestational age.*

12) _____ is a cell division mechanism, which results in four daughter cells, each with half of the number of chromosomes of the parent cell. 1 point

No, the answer is incorrect. Score: 0

Accepted Answers: *(Type: String) Meiosis*

13) _____ is the part of human cell division, during which the cytoplasm of a single cell divides onto two daughter cells. 1 point

No, the answer is incorrect. Score: 0

Accepted Answers: *(Type: String) Cytokinesis*

14) Interaction of γ -ray with air leads to the formation of ions with charge equivalent to that of an electron. If the density of air at STP is 1.204 kg/m³, the rate of ion production in a 1 mR/hr γ -ray field is _____ cm³/s. 1 point

No, the answer is incorrect. Score: 0

Accepted Answers: *(Type: Range) 520,560*

15) A beam of 1-MeV γ -rays is depositing 5×10^{-7} J/kg.s of energy on a biological tissue sample. Considering the quality factor of 1 for γ -rays, the biological equivalent dose is _____ mSv/hr. 1 point

No, the answer is incorrect. Score: 0

Accepted Answers: *(Type: Range) 1.79,1.81*