BELARUSIAN STATE MEDICAL UNIVERSITY

Colloquium
on «Radiation Medicine and Ecology» for students of the Medical Faculty of Foreign Students studying at the specialty: 7-07-0911-01 General Medicine

«APPROVED»
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Questions for the colloquium
Section "Radiation Medicine"

1. Radiation medicine: definition of the concept, goals, objectives, methods. Nucleon, isotope, radionuclide: definition of the concept, main characteristics.

2. Ionizing radiation: definition of the concept, classification, main characteristics. The mechanism of formation and characteristics of X-ray and gamma radiation, their interaction with matter.

3. Radioactivity: definition of the concept, the main characteristics of the process. Activity as a characteristic of an ionizing radiation source: definition of the concept, types, units, ratio of systemic and non-systemic units.

4. The Law of radioactive decay: definition, formula, schedule; practical use to justify measures to protect the public in case of accidents at nuclear facilities.

5. Types of radioactive transformations of nuclei: alpha, beta, gamma transformations of nuclei. Examples of elements undergoing the corresponding types of radioactive transformations.

6. Characteristics of corpuscular types of radiation (alpha, beta particles); their interaction with matter. Linear energy transfer (LET): definition, unit of measurement, classification of radiation depending on the LET.

7. Radionuclides formed during the operation of a nuclear reactor. Features of interaction with matter of neutrons of different energies. The phenomenon of induced radioactivity.

8. General characteristics of the stages of formation of radiation damage. The general scheme of oxidative stress.

9. Radiolysis of water. Direct and indirect effects of ionizing radiation on biomolecules. Oxygen effect: definition of the concept, connection with LET, practical use for controlling tissue radiosensitivity.

10. Radiation biochemistry of nucleic acids, proteins, lipids. The main types of DNA repair. The effect of ionizing radiation on the membrane structures of the cell.

11. Types of cell responses to ionizing radiation exposure. Nowadays views on the mechanisms of interphase and mitotic cell death. Post-radiation recovery.

12. Methods of recording ionizing radiation, their characteristics, detectors and devices used.

13. Dosimetry. There are three types of quantities: physical, normalized, operational – definition of concepts, purpose.

14. Doses: absorbed, equivalent (including ambient dose equivalent) and effective – definition, formula, characteristics of weighing coefficients, dose units and their ratio, application features. Kerma, kerma in the air: definition, units, application features.

15. Radiation background of the Earth, its components. The contribution of various components of the radiation background to the formation of the average annual effective dose in humans.

16. Technogenically altered radiation background: definition of the concept, components and their contribution to the formation of effective doses of radiation to the population. Regulation of the exposure of personnel and the public in the situation of planned exposure.

17. The development of nuclear energy in the Republic of Belarus. The nuclear fuel cycle: definition of the concept, stages. Fission of heavy nuclei, a chain reaction of fission.

18. Natural radiation background: sources of terrestrial and extraterrestrial origin, their contribution to the formation of effective radiation doses to the population.

19. Radioactive series: definition of the concept and types. The contribution of daughter decay products of uranium-238 and thorium-232 to the formation of effective radiation doses to the population.

20. Radon and its decay products: characteristics, levels of public exposure, optimization of dose loads created by radon and its decay products.

21. The accident at the Chernobyl Nuclear Plant. Types of effects of radionuclides of the Chernobyl release on the population of the republic.

22. General patterns and characteristics of the ways of receipt, distribution and excretion of radionuclides from the human body.

23. Comparative characteristics of oral and inhalation routes of entry of radionuclides into the body.

24. The main dose-forming radionuclides: I-131, Cs-137, Sr-90 – characteristics, intake, distribution and excretion from the body, possible biological effects.

25. Dose-forming radionuclides: C-14, H-3, transuranic radionuclides (Pu-239, Am-241), "hot particles" – the mechanism of formation, characteristics, intake, distribution and excretion from the body, possible biological effects.

26. Radiometry: definition of the concept, types. Temporary permissible levels (TPL), and republican permissible levels (RPL), reference levels of radionuclides in food and water. Evaluation of radiometry results.

27. Direct radiometry. Indications for conducting an examination for the content of radiocesium in the body, the frequency of examinations; evaluation of the results and calculation of the approximate dose of internal radiation.

28. Radiosensitivity: definition of the concept, evaluation criteria, determining factors at different levels of organization of living matter.

29. The main radiation syndromes, characteristics, relationship with the radiation dose. Features of the formation of radiation lesions in different age groups of the population. The effect of radiation on the embryo and fetus.

30. Acute radiation sickness: classification (periods, phases, severity); clinical manifestations, principles of treatment.

31. Chronic radiation sickness (CRS): classification; conditions of development and features of various variants of CRS; changes on the part of the main body systems in CRS; principles of treatment.

32. Deterministic consequences of radiation: concept, dose dependence, characteristics of the effects.

33. Stochastic consequences of radiation: concept, dose dependence, characteristics of effects.

34. Comparative characteristics of deterministic and stochastic effects of irradiation.

35. Concept of «low-dose ionizing radiation». Radiation hormesis.

The present question list for the colloquium № 3 in the discipline «Radiation Medicine and Ecology» for the 3-nd year English medium students studying at the specialty 7-07-0911-01 «General Medicine» was reviewed and approved at the Department of Radiation Medicine and Ecology meeting. Minutes No 3 of October, 28, 2026

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