

Topology of distribution of natural radioactivity on the surface of the human body

Monday 20 September 2021 18:55 (5 minutes)

The main share of oncological diseases of the lungs and bronchi is caused by radon isotopes and their daughter decay products [1], therefore, the study of radiation damage to biological objects from radon isotopes ^{219}Rn , ^{220}Rn , ^{222}Rn and their decay products is an urgent task. In Kazakhstan, lung cancer is in second place (10.4%) among oncological diseases.

The aim of this work was to study the distribution of natural alpha, gamma and beta background over the surface of the human body as an indicator of cancer risk and cancer incidence. A method of measuring the topology of distribution over biological objects and the human body of local zones of background radiation using modern electronic radiometers was developed: RKS-01A-SOLO, RKS-01B-SOLO and RKS-01G-SOLO. The distribution of alpha, gamma, and beta activity over the human body was measured in a room with the lowest background by scanning along and across the body at the closest possible distance from it. Measurements were taken at the following control points: head-4, thyroid-3, left-1.9 and right side of the chest-2.1, stomach-1 and legs-0.

According to the results (Figure 1) of measurements of the radioactivity of the control points of the human body, it can be seen that the greatest background is found in the region of the thyroid gland and in the region of the brain. These results confirm the previously known facts [2] that the accumulation of radioactivity in the human body is concentrated in adipose tissues, as well as in muscle tissue accumulations. The well-known pattern of an increase in the natural radiation background with the age of a person is associated with the effect of accumulation of radioactivity due to long-lived radionuclides. The same pattern in medicine is diagnosed as an increase in diseases in the corresponding localizations. This pattern will be investigated in the future in the pool of age categories of the population due to the fact that the risk of cancer morbidity increases with age, as well as in cancer patients in the corresponding medical institutions.

This research is funded by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan (Grant No. AP09058404).

1. 2012 IARC Monographs on the Evaluation of Carcinogenic Risks to Humans // IARC. –Vol. 100D Radiation. –2012. –ISBN 978 92 832 1321 5.
2. Beckman I.N. Radiochemistry. Vol. 1. –Moscow: Yurayt Publishing House, 2020. –473 p.

Primary author: ZARIPOVA, Yuliya (al-Farabi Kazakh National University)

Co-authors: YUSHKOV, Alexander (al-Farabi Kazakh National University); BIGELDIYEVA, Mirgul (al-Farabi Kazakh National University, Almaty, Republic of Kazakhstan); GLADKIKH, Tatyana (al-Farabi Kazakh National University); DYACHKOV, Vyacheslav (al-Farabi Kazakh National University, Almaty, Republic of Kazakhstan)

Presenter: ZARIPOVA, Yuliya (al-Farabi Kazakh National University)

Session Classification: Poster session (Mixed)

Track Classification: Section 8. Nuclear medicine.