AMERICAN JOURNAL OF MULTIDISCIPLINARY BULLETIN
ISSN: 2996-511X (online) | ResearchBib (IF) = 9.512 IMPACT FACTOR
Volume-4| Issue-1| 2026 Published: |30-01-2026|

# THE EFFECT OF RADIOACTIVE RADIATION ON THE HUMAN BODY

https://doi.org/10.5281/zenodo.18227469

**Kuramatova Shahlo Azizjon qizi**
*"Central Asian Medical University"*

**Annotation**

This article analyzes the effect of radioactive radiation on the human body, their biological and biophysical mechanisms. The alpha, beta and gamma forms of radioactive radiation, as well as the properties of neutron radiation and the mechanisms of action in the body, are considered. The main attention is paid to the ionization processes occurring at the cellular level, structural changes and mutations in DNA and proteins, the development of cancer and hereditary changes. At the same time, the differences between the long-term effects of radiation in small doses and acute poisoning in large doses are highlighted. The article also highlights the importance of radiation protection measures, safety standards and modern biophysical research in protecting human health.

**Keywords**

Radioactive radiation, alpha rays, beta rays, gamma rays, neutron rays, ionizing radiation, DNA, mutation, radiation sickness, radiation safety, genetic changes, oncological diseases, apoptosis, cancer.

**Introduction.** The issue of radioactive radiation and its effects on living organisms began to be studied intensively in the 20th century. If the phenomenon of radioactivity, discovered in physics, initially aroused theoretical interest, then it became clear that its biological consequences are of direct importance for human health. Because radioactive rays - alpha, beta, gamma and neutron fluxes - collide with atoms and molecules in cells, ionize them and cause various physical and biochemical changes. Alpha rays (α) are helium nuclei, have a large mass, but are quickly absorbed in air and tissues, do not cause significant harm from the outside, but if they enter the body (through food, water, breathing), they are very dangerous. Beta rays (β) consist of fast-moving electrons or positrons and penetrate deeper into tissues. Gamma rays (γ) are electromagnetic waves and have high energy. They penetrate deep into the inner layers of the body and have ionizing properties. Neutron rays are mainly produced in nuclear reactions and have a strong biological effect on the body. The effect of radioactive rays on the human body is one of the most important topics in the fields of biophysics, medicine and

AMERICAN JOURNAL OF MULTIDISCIPLINARY BULLETIN
ISSN: 2996-511X (online) | ResearchBib (IF) = 9.512 IMPACT FACTOR
Volume-4| Issue-1| 2026 Published: |30-01-2026|

ecology. In the science of biophysics, such processes are studied under the name "biological effects of ionizing radiation". The mechanisms of action of ionizing radiation on the body occur in two main stages: first, at the physical stage, electrons are separated in molecules and free radicals are formed. At the next biological stage, these radicals affect DNA, proteins and cell membranes, disrupting their structure and function. As a result of these processes, changes may occur in cells that lead to mutations, apoptosis, inflammation or cancer. As is emphasized in biophysics books, radiation in small doses has a latent effect on the body for a long time, gradually causing hereditary changes. High doses of radiation can cause acute radiation sickness, decreased bone marrow function, blood disorders, and severe damage to the central nervous system in a short time. Therefore, it is important to comply with radiation safety rules, use protective equipment, and strictly monitor dose rates in protecting human health.

Radiation has a strong effect on all living objects, from the simplest (viruses, bacteria) to humans, causing them harm and even death. It turned out that a dose of radiation that can raise the body's temperature by only 0.001 degrees is enough to disrupt the vital activity of the body's cells. Later, scientists and engineers, as well as medical specialists, conducted continuous research to increase the effectiveness of X-rays and reduce their negative effects on patients and doctors through general research. Not all tissues are equally sensitive. Cells with a high reproduction rate are more susceptible. Blood-forming tissues (bone marrow), intestinal epithelium, skin epithelium and hair follicles, reproductive cells (spermatozoa, egg cells). Relatively resistant: nerve cells, muscle cells.

Modern biophysical research is developing new methods of radiation protection through in-depth study of the mechanisms of action of radiation at the cellular and molecular levels. Such research is of great importance not only in medicine (oncology, radiotherapy), but also in the fields of ecology, nuclear energy, space biology and genetic safety.

Stages of radiation sickness

1. Initial reaction (within a few hours) – headache, nausea, vomiting, hot flashes.

2. Latent period (1–2 weeks) – the patient feels well, but internal changes continue.

3. Main period – circulatory disorders, decreased immunity, disruption of the functioning of the intestines and bone marrow.

4. Recovery or death period – depending on the dose received, the body recovers or death occurs.

Long-term consequences

Oncological diseases (lung cancer, leukemia, thyroid tumors).

Genetic mutations – can be passed on from generation to generation.

Radiation cataract – clouding of the eyeball.

Effects on the fetus – developmental defects, congenital diseases.

**Conclusion.** The biological effect of radioactive radiation is based on complex biophysical processes. Ionizing particles damage cellular and molecular structures, primarily DNA and proteins, resulting in mutations, cell cycle disruption, and apoptosis or uncontrolled proliferation. This can cause acute radiation syndrome in the short term, and oncological and hereditary diseases in the long term. Nevertheless, radiation is effectively used in medicine for diagnostic and therapeutic purposes, serving the development of mankind. Thus, radioactive radiation has a dual nature, and reducing its risks and rational use of its benefits is an urgent task for modern biophysics and medicine.

## REFERENCES:

1. Ismailov E., Mamatkulov N. Biophysics and radiobiology. – Tashkent: Publishing House of the National University of Uzbekistan, 2018.

2. Ismailov E. Biophysics. – Samarkand: Samarkand State Medical Institute, 2013.

3. Mamazhanova L. A. Radiation safety. – Tashkent: Science and Technology, 2005.