



Role of Nuclear Physics in Cancer Treatment

Helin Nicholsan*

Department of Physics, University of California, Berkeley, USA

*Corresponding author: Helin Nicholsan, Department of Physics, University of California, Berkeley, USA; E-mail: nicholsanhelin@uc21.edu

Received date: 20 February, 2023, Manuscript No. JPRA-23-93795;

Editor assigned date: 22 February, 2023, PreQC No JPRA-23-93795 (PQ);

Reviewed date: 09 March, 2023, QC No. JPRA-23-93795;

Revised date: 16 March, 2023, Manuscript No. JPRA-23-93795 (R);

Published date: 23 March, 2023, DOI: 10.4172/Jpra.1000021

Description

Nuclear physics is a branch of physics that studies the behavior and properties of atomic nuclei and their interactions with other particles. The field has a profound impact on understanding of the natural world, including the origins of the universe, the structure of matter, and the way that energy is produced. It has a wide range of applications, including nuclear energy, nuclear medicine, and nuclear weapons. The study of nuclear physics began in the early 20th Century, it made a significant contributions to modern medicine, particularly in the field of cancer treatment. At its core, nuclear physics is concerned with the forces that hold atomic nuclei together, as well as the forces that cause them to break apart. The study of these forces has led to the development of technologies such as nuclear power plants, medical imaging, and radiation therapy. Radiotherapy, which uses ionizing radiation to destroy cancer cells, is one of the most common forms of cancer treatment. It is estimated that approximately 50% of all cancer patients receive some form of radiation therapy during the course of their treatment. Nuclear physics plays an important role in the development and delivery of this therapy. Radiation therapy works by damaging the DNA of cancer cells, preventing them from dividing and proliferating. However, it is important to deliver the radiation precisely to the tumor site to minimize damage to healthy tissue. This is where nuclear physics comes in. Some of the Advanced imaging techniques,

such as Computed Tomography (CT) and Magnetic Resonance Imaging (MRI), enable doctors to visualize the tumor in three dimensions and accurately target the radiation. In addition to imaging, nuclear physics is also essential for the development and production of the radiation sources used in therapy. One of the most commonly used sources is the medical linear accelerator, which produces high-energy X-rays that can penetrate deep into the body to target tumors.

Nuclear physics is also involved in the production of radioisotopes, which are used in a variety of imaging techniques to diagnose and stage cancer, as well as to deliver targeted radiation therapy. Another innovative approach to cancer treatment is proton therapy, a form of radiation therapy that uses protons instead of X-rays to target tumors. Proton therapy is particularly useful in treating tumors that are located close to sensitive organs or tissues, such as the brain, spine, and prostate. The precise targeting of protons enables doctors to deliver high doses of radiation to the tumor while minimizing exposure to healthy tissue. Nuclear physics has also played a role in the development of new cancer treatments, such as Boron Neutron Capture Therapy (BNCT) and targeted alpha therapy. BNCT involves the use of a boron compound that is selectively taken up by cancer cells. The cells are then exposed to a beam of neutrons, which react with the boron to produce high-energy particles that destroy the cancer cells. Targeted alpha therapy involves the use of alpha particles, which are highly effective at destroying cancer cells but have a short range. By attaching alpha-emitting isotopes to molecules that selectively bind to cancer cells, doctors can deliver targeted radiation therapy to the tumor while minimizing damage to healthy tissue.

Conclusion

Nuclear physics plays an essential role in the diagnosis and treatment of cancer. Nuclear physics has emerged as a effective field for the development of new cancer treatments. The use of targeted radiotherapy, radiopharmaceuticals, and advanced imaging techniques has the potential to improve cancer treatment outcomes, reducing the side effects. From the development of linear accelerators to the use of radioactive isotopes, nuclear physics has revolutionized the way to approach cancer therapy.

Citation: Nicholsan H (2023) Role of Nuclear Physics in Cancer Treatment. J Phys Res Appl 7:1.