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Current Advancements and Future Directions in Cancer and Radiation Therapy

Kuo Lee*

Department of Radiation Oncology, University of National Cancer Centre, 11- Hospital Drive, Singapore

Abstract

Cancer is a disease that is characterized by the uncontrolled growth and spread of abnormal cells in the body. There are various treatments available to combat this disease, including chemotherapy, surgery and radiation therapy. Radiation therapy is a form of cancer treatment that uses high-energy radiation to kill cancer cells or prevent them from growing and dividing further. Radiation therapy works by damaging the DNA inside the cancer cells, which causes the cells to die or stop growing. Radiation therapy can be delivered externally or internally, depending on the type and location of the cancer. In external beam radiation therapy, a machine called a linear accelerator is used to deliver the radiation from outside the body. In internal radiation therapy, also known as brachytherapy, radioactive sources are placed inside the body near the cancer.

Keywords: Cancer • Radiation therapy • Linear energy transfer

Introduction

Radiation therapy can be used alone or in combination with other treatments such as chemotherapy and surgery. The decision to use radiation therapy as a cancer treatment depends on several factors, including the type of cancer, the location of the cancer, the stage of the cancer and the patient's overall health. There are two main types of radiation therapy: external beam radiation therapy and internal radiation therapy. External beam radiation therapy is the most common type of radiation therapy. It uses a machine called a linear accelerator to deliver high-energy radiation to the cancer from outside the body. The radiation is targeted to the specific area where the cancer is located. The patient lies on a table while the machine rotates around the body, delivering the radiation beams [1].

Literature Review

This technique uses CT scans or MRI images to create a 3D model of the cancer and the surrounding tissue. The radiation beams are then shaped to conform to the shape of the cancer, reducing exposure to healthy tissue. This technique uses a computer-controlled machine to deliver precise radiation doses to the cancer while minimizing the radiation exposure to nearby healthy tissue. Image-guided radiation therapy (IGRT): This technique uses imaging technology such as CT scans and X-rays to guide the delivery of radiation to the cancer, ensuring accurate targeting. Stereotactic body radiation therapy (SBRT): This technique delivers a high dose of radiation to the cancer over a few sessions, while minimizing the radiation exposure to nearby healthy tissue.

Internal radiation therapy, also known as brachytherapy, involves placing radioactive sources inside the body near the cancer. This allows for a higher dose of radiation to be delivered to the cancer while reducing the exposure of nearby healthy tissue. The radioactive sources can be temporary or permanent, depending on the type of cancer. High-dose rate (HDR) brachytherapy: This technique uses a machine to deliver a high dose of radiation to the cancer over a short period of time. The radioactive sources are inserted into the body temporarily and removed after the treatment.

Discussion

Low-dose rate (LDR) brachytherapy: This technique uses radioactive sources that are inserted into the body permanently. The radiation is delivered slowly over a period of days or weeks, allowing for a continuous dose of radiation to be delivered to the cancer. Radiation therapy can cause side effects, which can vary depending on the type and location of the cancer being treated, the dose of radiation and the patient's overall health. Common side effects of radiation therapy include: Radiation therapy can cause fatigue, which can be severe in some cases. The fatigue may last for several weeks after the treatment is complete. Radiation therapy can cause skin changes such as redness

The understanding of proposed hallmarks of cancer development and treatment has made significant progress in recent years. However, despite its rising prevalence, cancer clinical management remains a challenge for the 21st century. Radiation therapy, surgery, chemotherapy, immunotherapy and hormonal therapy are some of the treatment options. Around half of all cancer patients receive radiation therapy during their illness, making it an important part of cancer treatment. It accounts for 40% of cancer curative treatment. The primary objective of radiation therapy is to prevent cancer cells from multiplying (dividing into new cells). In the United Kingdom, 2011 has been designated the Year of Radiation Therapy to commemorate a century of progress since Marie Curie won her second Nobel Prize for her work on radium. Patients with cancer can expect to live longer and experience fewer side effects from their treatments as a result of ongoing advancements in radiation therapy methods and knowledge of how cancer cells respond to radiation. The principles, applications and advancements of radiation therapy with regard to biological goals are discussed in this review.

Men's and women's cancer morbidity and mortality are expected to rise globally in the coming decades. In addition, it is anticipated that low- and middle-income countries (LMIC) will account for two thirds of these cancer-related deaths. Cancer is responsible for a significant financial burden as well as morbidity and mortality, particularly in developing nations. Chemotherapy, radiation therapy, surgery and palliative care are among the many cancer treatment and management options. Particularly for solid or localized cancers, radiation therapy (RT) can be an effective treatment; Radiation is used as a

***Address for Correspondence:** Kuo Lee, Department of Radiation Oncology, University of National Cancer Centre, 11- Hospital Drive, Singapore, E-mail: Lee.KA14@gmail.com*

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curative or palliative treatment for about half of cancer patients. RT may be the only option for LMIC patients with inoperable tumors due to its low cost. The need for more RT facilities has a greater impact on the economic growth of LMICs than just the overall increase in the number of cancer patients. As a result, improved worldwide access to cancer drugs and an advanced molecular-targeted and more integrated approach involving either RT alone or with surgery are urgently required for cancer treatment. Ionized radiation was first used to treat cancer at the end of the 19th century. The discovery of the x-ray by Roentgen on November 30, 1895, gave birth to the fields of radiation oncology and radiology. After that, in 1896, Grubbe was the first person to use therapeutic x-rays, experience x-ray dermatitis, use a sheet as a protective material and assert that radiation could cure cancer patients [2-5].

Conclusion

He was also the first person to use x-rays for medical purposes. Glver Lyon suggested in the same year that the radiation might be able to kill bacteria. However, in 1902, after conducting a number of experiments in the field, it was determined that the radiation did not kill bacteria. However, prior to the introduction of antibiotics, steroids and chemotherapeutics, it was used to help reduce inflammation in both bacterial and non-bacterial infections.

Acknowledgement

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Conflict of Interest

None.

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