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## REVIEW ON RADIATION TREATMENT OF CANCER

*Mr. Rohit Kumar<sup>1</sup>, Md. Zulphakar Ali<sup>2</sup>*

Student of B. Pharma. Mewar University Gangrar Chittorgarh 312901

Assistant Professor. Mewar University Gangrar Chittorgarh 312901

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### ABSTRACT

The treatment of several cancers depends on radiation therapy. Using high-energy radiation to kill or damage malignant cells slows their growth or eliminates them completely. The principles, methods, medical uses, and developments in radiation therapy are discussed here together with side effects and future possibilities.

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### INTRODUCTION

Worldwide, cancer is still a top cause of mortality and morbidity. With the aim of maximizing tumor control while limiting harm to surrounding healthy tissue, radiation therapy is employed in around fifty percent of all cancer patients either as a first treatment, adjuvant treatment, or palliative measure [1].

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### PRINCIPLE OF RADIATION THERAPY

Radiation therapy destroys the DNA inside cancer cells, thus causing cellular death or reproductive malfunction [3]. Radiation kind, dose, fractionation, and radiosensitivity of the tumor cells all affect the biological impact [4]. Critical to radiation planning is the therapeutic ratio, which is the ratio between tumor control and normal tissue toxicity. [5]

### TYPES OF RADIATION OF THERAPY

1. The most usual kind is External Beam Radiation Therapy (EBRT), given via linear accelerators (LINAC). [6]
2. With brachytherapy, radioactive sources are inside or close the tumor situated. [7]
3. For certain types of cancer, including thyroid cancer, radioisotopes including Iodine-131 are used in systemic radiation therapy [8].

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### TECHNIQUES AND ADVANCES

- Modern radiation methods have much improved.
- 3D Conformal Radiation Therapy (3D-CRT): Lets imaging data be exactly targeted. [9]
- With intensity-modulated radiation therapy, beam intensity shifts to more closely match tumor shape. [10]
- For little tumors, Stereotactic Body Radiotherapy (SBRT) administers high doses in lower fractions [11].
- Replacement of X-rays by protons in proton therapy enables more accurate preservation of usual tissues. [12]

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### CLINICAL APPLICATION

Many types of cancer are treated with radiation therapy.

- Breast cancer's risk of recurrence is often lessened after surgery using this approach. [13]
- For some cases of prostate cancer, it might serve as a curative option instead of surgery [14].
- Frequently seen together with chemotherapy, lung cancer [15].

- Head and neck tumors; in several instances helps to save organs [16].

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## SIDE EFFECT AND TOXICITY

Treatment site determines whether acute side effects include skin irritation, exhaustion, and mucositis. Late developments could include organ damage, fibrosis, or additional cancers. Improvements in radiation planning and delivery have reduced these risks [17],[18].

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## FUTURE DIRECTION

- Developing fields are
- With real-time imaging, Image-Guided Radiation Therapy (IGRT) raises precision.[19]
- Artificial Intelligence (AI): Improves personalization, results forecasting, and planning [20].
- When radiation teamed up with checkpoint inhibitors, it might strengthen immune reaction.[21]

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## CONCLUSION

Cancer treatments still depend heavily on radiation therapy. Its accuracy, effectiveness, and safety are gradually rising as it integrates with systemic treatments and keeps on technologically advancing. Further refinement of its use and expansion of its therapeutic possibilities are expected from ongoing clinical studies and research.

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