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# Radiation Therapy

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# Objectives

- ❖ **Discuss the connection of modalities to radiation therapy**
- ❖ **Understand the basics of radiation therapy treatments.**
- ❖ **Analyze the major roles of radiation therapists.**
- ❖ **Identify different types of radiation therapy.**

# Introduction

- ❖ Radiation therapy is a modality of radiology that specializes in the treatment of cancer by the use of high doses of radiation.
- ❖ It is often accompanied by chemotherapy, but can be used on its own for a course of treatment for cancer patients.
- ❖ The type of therapy and length of treatment used depends on:
  - The patient
  - The type of cancer being targeted
  - Past treatments
- ❖ There are multiple types of radiation therapy but they all have the same goal; to destroy cancer cells, shrink tumors and alleviate symptoms.

*It's safe to use skin creams before radiation therapy.*  
(2018, October 18). Washington University School of  
Medicine in St. Louis.  
<https://medicine.wustl.edu/news/its-safe-to-use-skin-creams-before-radiation-therapy/>

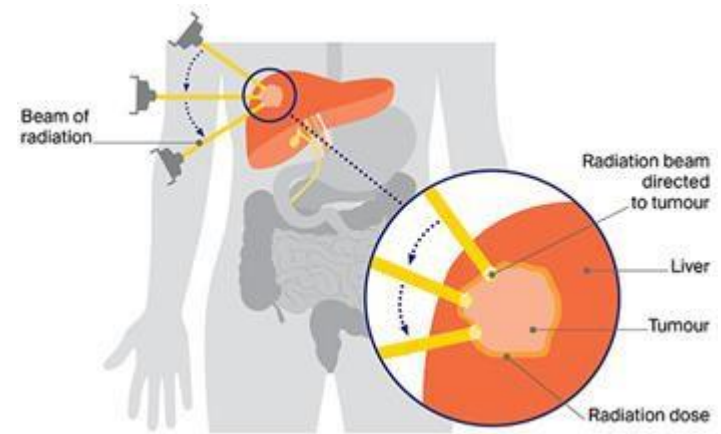


# What is Radiation Therapy?

- ❖ Radiation therapy is the use of high doses of radiation against cancer cells.
  - The radiation directly damages the DNA of the cancer cells and makes it unable to divide and multiply.
- ❖ The radiation used in the treatments is able to kill parts of the cells immediately, but can have the effect where the rest of the cells can slowly die over time even after the therapy ends (Donahue-Taylor, n.d.).
- ❖ Although it may not always be successful in destroying cancer cells to where the patient is cancer free, there are other outcomes where the therapy is able to slow the growth of the cells, stop the growth or prevent it from returning.
- ❖ Oftentimes, radiation therapy is used to shrink tumors to a size that allows surgeons to go in and remove the tumor.
  - 75% of patients using radiation therapy are being treated with the intent to cure their cancer. Berkey (2010)

# Internal Radiation Therapy:

- ❖ The internal treatment is where radiation is placed inside of the body close to cancer cells in either a solid or liquid form.
- ❖ Brachytherapy, or the solid form, is where a seed-like radioactive source is placed either inside or near a tumor.
  - These implants can release the radiation slowly over a time period of weeks, or they can release it within minutes.
- ❖ Systemic therapy is the liquid form.
  - This form of therapy includes radioimmunotherapy, where the cancer cells are specifically targeted by the radioactive proteins. The proteins are designed to recognize the cancer cells, attach to them and release the radiation (Donahue-Taylor, n.d)



*Radiation therapy: SIRT and SBRT. (n.d.). Cancer Council NSW.  
<https://www.cancercouncil.com.au/liver-cancer-secondary/treatment/radiation-therapy/>*

# External Radiation Therapy:

- ❖ Two of the most common external radiation therapies are 3D Conformal Radiation Therapy and Intensity-Modulated Radiation Therapy. Cleveland Clinic (2022)
- ❖ 3D Conformal Radiation Therapy:
  - A form of treatment that uses images from CT and MRI scans to plan the treatment.
  - The device forms the radiation to the shape and size of the tumor and delivers beams of radiation from multiple directions.
- ❖ Intensity Modulated Radiation Therapy is a form of 3-D conformal.
  - Also aims radiation beams at the tumor from multiple directions.
  - In this form of therapy, the intensity of the beams can be changed so they give higher doses to some parts of the tumor, and lower doses to other parts.



# Image Guided Radiation Therapy:



*MRI Guided.* (n.d.). [Www.henryford.com.  
https://www.henryford.com/services/cancer/treatments/radiation-oncology/mri-guided](https://www.henryford.com/services/cancer/treatments/radiation-oncology/mri-guided)

- ❖ The difference from Intensity Modulated Therapy to Image Guided Therapy is that Image Guided uses CT scans throughout the treatment procedure rather than only using CT to locate the tumor before treatment.
- ❖ The radiation treatment machine has a simplified CT scanner built into it that does repetitive imaging throughout the treatment (Cleveland Clinic, 2022).
  - This allows the healthcare team to watch changes in the tumor throughout the treatment process, and adjust the dosage or energy beams accordingly.
- ❖ This prevents them from over exposing a tumor that has shrunk, or radiating nearby tissues and organs that were not meant to receive it.

# Connection to Modalities:

- ❖ Radiation therapy uses x-ray beams to direct radiation towards tumors for treatments.
  - Sophisticated equipment pinpoints an area of the body that has cancer and uses a high level of radiation that is administered to the area to destroy the cancer cells.
- ❖ One specific form of radiation therapy called Tomotherapy uses a machine that is a combination of CT and external beam radiation machine to deliver treatments. It is able to take pre-treatment images used to map and plan the treatment (Cleveland Clinic, 2022)
- ❖ This is able to target the tumor from all angles while limiting the amount of radiation exposure to other tissues.



*Two of a Kind: VMAT Versus Tomotherapy.* (2014, July 3). Imaging Technology News. <https://www.itnonline.com/article/two-kind-v-mat-versus-tomotherapy>



# Radiation Safety:



*Radiation Oncology*. (2024, February 23).  
Orfit Industries.  
<https://www.orfit.com/radiation-oncology>

- ❖ Radiation treatments are often spread out over the course of weeks to give healthy cells and tissues time to recover and to lessen side effects that the patient may experience.
- ❖ Due to the precision needed with external radiation treatments, there are tools that are used to keep the patients in place during the treatment such as masks and casts.
  - These are fitted to each patient to ensure accuracy throughout each treatment (Cleveland Clinic, 2022).
- ❖ **Lifetime Dose Limit:** There are instances where a patient cannot be treated in the same area a second time because they have reached their lifetime dose limit for that particular area.
- ❖ This technology also makes it easier to track how much radiation the patient is receiving throughout each treatment, and if any adjustments need to be made to the treatment plan based on that information.
- ❖ These steps help ensure that the patient will be able to complete their radiation therapy without the risk of overexposure during their treatment.

# Role of Radiation Therapists:

- ❖ Often work directly with oncology nurses, medical physicists and radiation oncologists as a team to create a treatment plan for each patient, and to make sure the patient is informed, safe and comfortable.
- ❖ Radiation therapists are also involved with helping the oncologist with determining the location of the area that needs treatment and positioning the patient for their treatment.
- ❖ As a radiation therapist, the role also requires a lot of patient care.
  - Responsible for assessing the patient's physical and emotional state.
  - Interact with the patient's families and those who care for the patient outside of the treatment setting.
- ❖ It is crucial that the patient's family and care team are up to date on what needs to be done outside of treatment and things to look out for.



*Massachusetts Medical Society:  
Patient Care. (n.d.).  
Www.massmed.org.  
<https://www.massmed.org/Patient-Care/Patient-Care/>*

# Conclusion:



*New Guidelines for Radiation Therapy in Pancreatic Cancer.*  
(n.d.). Cancer Today .  
<https://www.cancertoday-mag.org/spring2020/new-guidelines-for-radiation-therapy-in-pancreatic-cancer/>

- ❖ Radiation therapy is a minimally invasive treatment option for those fighting cancer and can have amazing benefits that are not achievable with other treatment options.
- ❖ Although it is minimally invasive procedure-wise, it can have intense side effects on patients and can be very difficult for patients to deal with.
- ❖ Radiation therapy is dependent on other medical imaging modalities, as they can be the first steps to discovering a patient's cancer.

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