TEXAS ONCOLOGY
More breakthroughs. More victories.®

Radiation Therapy

Radiation therapy is a cancer-fighting treatment that damages or destroys cancerous cells by preventing them from growing or dividing while minimizing adverse effects on nearby healthy organs and tissues. Radiation therapy does not actually remove the tumor, but the radiation causes it to shrink.

Heat and Cancer Cells

Researchers have found that elevated temperatures within malignant tumors can disrupt and destroy a cancer cell's ability to repair DNA damage from radiation. As the cancer cells try to reproduce, they die, and the cancer tumor shrinks. Normal cells recover without long-term damage. Hyperthermia therapy uses heat applied directly to the cells to destroy cancer cells or make them more sensitive to enhance the effects of more conventional treatments, such as chemotherapy and radiation.

Simulation and Treatment Planning

Patient treatment is planned and simulated in advance. The first step is a patient CT scan. CT images help create an outline of the tumor to be targeted, and the normal structures to be spared, allowing physicians to design the most effective treatment plan. This plan is created to maximize radiation to the patient's tumor and minimize radiation to normal tissues.

Treatment Methods

Radiation therapy is delivered to patients externally or internally. External radiation therapy focuses high-energy X-ray (electron or photon) beams delivered by a linear accelerator or proton beams and aimed at specific points on the body where the tumor is located. Alignment of the radiation beams to the tumor is critical for accuracy of the treatment. Internal radiation therapy involves a low-energy radioactive implant placed inside the body in or near the tumor.

External Radiation Therapy

External radiation is the most common type of radiation therapy and can be delivered through a variety of technologies.

- **3D conformal radiation therapy (3D CRT)** follows the exact shape of the tumor, allowing for precise targeting. Using three-dimensional images of the tumor and the surrounding structures to develop a specialized treatment plan, the therapy uses multiple beams of radiation from varying angles. Each beam delivers a fraction of the dose. Where the beams join, the full dose is delivered. This technique allows delivery of high-dose radiation while limiting exposure to nearby healthy tissue.
- **Image guided radiation therapy (IGRT)** technologies increase the accuracy of the radiation delivery. IGRT can account for changes in the patient's body or position that may shift the exact location of the cancer. Imaging is taken before the treatment to compare previous imaging of a patient's tumor to current images to ensure the patient and the radiation beam are in alignment. Alignment changes are made immediately prior to or during treatment delivery if needed.
- **Intensity modulated radiation therapy (IMRT)** is an advanced form of noninvasive radiation treatment that precisely targets tumor cells. It uses computed tomography (CT) to create 3D images and treatment plans to deliver targeted radiation beams of varying intensity to cancerous tumors. By using image-guidance technologies, the physician can localize the patient's treatment and minimize damage to surrounding tissue.
- **Stereotactic radiosurgery (SRS)** and **stereotactic body radiation therapy (SBRT)** are non-surgical procedures that deliver precisely targeted radiation at very high doses with minimal damage to surrounding healthy tissue. SRS uses a computer-guided therapy system to treat tumors and other abnormalities of the brain. SRS is ideal for otherwise inoperable tumors, such as those that cannot be treated by traditional surgical methods. SBRT is used in areas of the body other than the brain to treat malignant or benign small to medium size tumors.
- **Proton beam therapy** is an advanced type of radiation therapy aimed at destroying cancerous cells using protons. The treatment offers sub-millimeter precision that delivers high-energy proton beams directly to

tumors, minimizing damage to surrounding healthy tissue. Proton therapy most often treats tumors in sensitive areas and is a beneficial option for treating pediatric cancers because it can minimize damage to their smaller and still-developing bodies.

Internal Radiation Therapy

Internal radiation is also referred to as brachytherapy. Depending on the patient's specific cancer and treatment plan, the patient receives a temporary or a permanent implant. The implant becomes inert over time. Internal radiation therapy delivers a higher dose of radiation directly to the cancerous area than external radiation treatments.

- **Low dose rate (LDR) brachytherapy** uses radioactive materials inserted into body tissue in close proximity to the tumor in a permanent or temporary application. LDR implants deliver lower dose rates of radiation over a longer period before becoming inert. This therapy is administered through long-term or short-term implants.
- **High dose rate (HDR) brachytherapy** uses radioactive material inserted into applicators placed within body cavities or tissues to deliver a high dose of radiation precisely to the tumor.

About Texas Oncology

Texas Oncology is an independent private practice with more than 525 physicians and 220 locations across the state and southeastern Oklahoma. Meeting the oncology needs of Texans for more than 35 years, the practice includes Texas Center for Proton Therapy, Texas Breast Specialists, Texas Colon and Rectal Specialists, Texas Oncology Surgical Specialists, Texas Urology Specialists, Texas Imaging & Infusion Center, and Texas Center for Interventional Surgery. As a lead participant in US Oncology Research, Texas Oncology has played a role in the development of more than 100 FDA-approved therapies. For more information, visit www.TexasOncology.com.

Sources: American Cancer Society, National Cancer Institute, and Pyrexar Medical

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