

TomoTherapy Hi-Art Helical Radiotherapy System®

Radiotherapy

Radiotherapy, together with conventional surgery, is one of the most common cancer treatment options available. Radiation can shrink a tumor by killing tumor cells or interfering with the tumor's ability to grow. With conventional radiotherapy the radiation dose needed to destroy the tumor is applied in low doses during many sessions (often over a period of 4-7 weeks).

An effective radiation delivery method used in radiotherapy is Intensity Modulated Radiation Therapy (IMRT). During IMRT the radiation dose is matched to the three-dimensional shape of a patient's lesion, focusing higher radiation doses on the tumor while minimizing exposure to healthy tissue surrounding the treatment area. IMRT utilizes multiple radiation beams from more than one direction that constantly adjust to achieve the three-dimensional shape of the tumor.

Radiation therapy stops tumor cells from growing and dividing. In many cases radiation therapy can effectively kill cancer cells by shrinking or eliminating the tumor all together.

Treatment with TomoTherapy Hi-Art System®

TomoTherapy Inc. has created a novel method for radiotherapy delivery known as the TomoTherapy Hi-Art System®. By developing a unique technique to deliver image-guided radiotherapy (IGRT), TomoTherapy® achieves a higher level of treatment precision than conventional radiotherapy units. TomoTherapy® uses an onboard computed tomography (CT) scanner which offers the advantage of a true 3D image of the patient's anatomy for image-guided treatment positioning. This is paired with a radiation treatment delivery system that uses a sophisticated form of Intensity Modulated Radiation Therapy (IMRT) delivered in a helical (from all angles around you) fashion. The combination of 3D image-guidance with helical IMRT allows high doses of radiotherapy to be delivered very accurately to tumors, even when tumors are close to important normal tissues.



The TomoTherapy Hi*Art System delivers highly effective radiotherapy by utilizing the precision of a CT scanner.

TomoTherapy® uses a two-step process which incorporates image-guided targeting of the tumor together with radiation treatment in one seamless progression. The two-step process usually takes 15 minutes and is as follows:

1. **Image-guided Positioning:** A diagnostic quality CT image is acquired on the Tomotherapy unit immediately before each treatment. This localizes a patient's anatomy (identifies the tumor size and shape) with the precision of a CT scan, resulting in a high accuracy of pretreatment positioning and tumor targeting. If the tumor's size or shape changes during treatment, radiotherapy parameters can be modified to adapt to this change.
2. **Tomo-Therapy:** After the targeting procedure has verified the target location by examining the anatomy of a patient's body, the TomoTherapy Hi-Art System uses a helical 360-degree rotating beam of radiation whereby the intensity of the radiation treatment beam is continuously modulated or controlled to conform to the shape of the tumor while minimizing radiation exposure to vital structures that may be nearby.

The TomoTherapy Hi-Art System® is capable of fractionated, stereotactic and single-dose radiotherapy, making it a very versatile technology. The TomoTherapy unit's large field-size capability allows it to treat areas other technologies cannot and is a significant complement to the Precision Radiotherapy's Novalis image-guided treatment unit, which treats smaller tumors of the brain, head and neck, spine, lung and liver. A patient's team of clinicians will help determine what technology is right for the individual.

Indications for treatment with TomoTherapy include:

- Lung and Breast Cancers
- Head & Neck Cancers
- Gynecologic Cancers
- Pancreatic and other Hepatobiliary tumors
- Sarcomas
- Rectal Cancers
- Multiple Metastases (more than one lesion)
- Re-treatment of previous "maximally-treated" tumors

Benefits for the Patient

- Verification of patient position prior to each therapy session via on-board CT scanner
- Large field size
- Radiation therapy with the precision and versatility of a CT scanner
- Advanced Intensity Modulated Radio Therapy (IMRT): radiation beam rotates around the patient constantly
- Minimized radiation exposure to healthy tissue

Benefits for the Physicians

- Pretreatment image verification (TomoImage™): gives the physician the confidence of knowing the size and shape of a patient's lesion each treatment day
- Combines a highly advanced treatment planning system with advanced conformal treatment delivery

A Doctor's Opinion



Dr. David Grisell, Associate Clinical Professor of Radiation Oncology, University of Cincinnati: "TomoTherapy will offer our patients the full benefit of Intensity Modulated Radiation Therapy (IMRT) with shorter treatment times, greater accuracy and enhanced ability to avoid critical normal tissues and organs. Conventional IMRT is well established for its ability to spare normal tissues and deliver high radiation doses safely. TomoTherapy is the next generation tool for Image Guided Radiation Therapy (IGRT). It further enhances IMRT by increasing the convenience for the patient, streamlining the technical process of planning and delivering complex treatment, and ensuring millimeter accuracy by using daily CT imaging prior to each treatment."

Where is this technology being used?

- UC Davis Cancer Center, Sacramento, California
- DePaul Health Center, St. Louis, Missouri
- University of Wisconsin Comprehensive Cancer Center, Madison, Wisconsin
- Cancer Therapy and Research Center, San Antonio, Texas
- The Methodist Hospital, Houston, Texas
- The Johns Hopkins Sidney Kimmel Comprehensive Cancer Center, Baltimore, Maryland
- M. D. Anderson Cancer Center, Orlando, Florida
- Cromwell Hospital in London, United Kingdom
- UCL – St-Luc University Hospital, Brussels, Belgium