

Image-Guided Radiation Therapy (IGRT)

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Image-Guided Radiation Therapy (IGRT) refers to the use of imaging, usually CT scans and X-rays, to help precisely target the cancer with radiation therapy. This is another important advance in the radiation therapy technology that improves the chance of killing a cancer whilst reducing the risk of damaging normal body tissues and structures. In IGRT, CT scans or X-rays, or both, are taken every day before each radiation treatment to ensure that the cancer or region to be treated lines up exactly as planned. IGRT is always used when Intensity-Modulated Radiation Therapy (IMRT) is being used.

The patient is 'set-up' (usually lying down) on the treatment machine 'couch' in the same position every day. A quick X-ray or CT scan is taken using special equipment mounted on the treatment machine. Sometimes small markers made of metal (e.g. gold) or other materials seen well on X-rays, are placed inside a cancer or organ. Adjustments can be made prior to each treatment to make certain the cancer is covered by the radiation beams, and to check that surrounding normal tissue or organs are not receiving too much dose.

For example, when radiation therapy is being given for prostate cancer, the position of the prostate gland can change inside the body depending on how full or empty the lower bowel (rectum) and bladder are. Any movements of the prostate can be seen prior to each daily treatment using a mini CT scanner (called a Cone Beam CT) which is built into the treatment machine.

For cancers located in the lung, the radiation therapists can take images during the delivery of the actual treatment so that they can compensate for the movement occurring during normal breathing. This has been called 4-dimensional radiation therapy (4D-RT) where the fourth dimension is 'time'. The only disadvantage of IGRT for the patient is that the delivery of each treatment is slightly longer – though still only a few minutes per treatment. This minor 'down-side' however, is far outweighed by the improved results using IGRT. This technique, very commonly in conjunction with IMRT, is now standard practice for all treatment centres around Australia and New Zealand.

How does IGRT work?

Before the radiation beam is turned on, ARC physicians use Image Guidance technology to provide precise and exact information on the specific location of any soft-tissue or bony target. Having more precise location information, means a smaller radiation field can be used; so there is less chance the radiation will zap healthy neighboring tissue near to the tumor. That means less damage to healthy tissue, less "collateral damage." Similar to the Cyber Knife, IGRT is like a "high-precision laser scope" that makes the radiation more precise and extremely accurate.

What types of cancers are treated with IGRT?

Of course, most cancers benefit from treatments that are more accurate and precise. Tumors of the brain, head and neck region fare well when treated using IGRT because the technology ensures that the delicate tissues, such as the spinal cord and salivary glands, remain away from the high dose region. Here, Image Guided Radiation Therapy is used in conjunction with other ARC technologies, such as Cyberknife radiation or Stereotactic Radiosurgery (SRS) and Intensity Modulated Radiation Therapy (IMRT).