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Image-guided Radiation Therapy

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Commentary

During a course of radiation treatment, image-guided radiation therapy is the process of using frequent imaging to direct the treatment, position the patient, and compare to pre-therapy imaging from the treatment plan. The patient is localised in the treatment room in the same position as planned from the reference imaging dataset just before or during a treatment portion. A comparison of a Cone Beam Computed Tomography (CBCT) dataset acquired on the treatment machine with a computed tomography (CT) dataset from planning is an example of IGRT. Matching planar kilovoltage (kV) Radiographs or Megavoltage (MV) pictures with Digital Reconstructed Radiographs (DRRs) from the planning CT would also be part of IGRT. This differs from the use of imaging to define targets and organs during the radiation therapy planning phase. However, there is a link between the imaging processes since IGRT uses the imaging modalities from planning as reference coordinates for patient localization.

X-ray Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and positron emission tomography (PET) are among the medical imaging technologies utilised in planning. IGRT can help to eliminate set-up and positioning errors, reduce margins around target tissue while planning, and alter therapy along its course, all with the goal of improving overall outcomes. The purpose of the IGRT technique is to improve the accuracy of radiation field deployment while reducing healthy tissue exposure during radiation treatments. To compensate for localization problems during treatment, wider planned target volume (PTV) margins were used in the past. As a result, during therapy, healthy human tissues received inappropriate dosages of radiation. The most generally used method for accounting for geometric uncertainties is PTV margins. Because IGRT improves precision, radiation to surrounding healthy tissues is reduced, allowing for more radiation to be directed at the tumour for control. Intensity-modulated radiotherapy is currently used in some radiation therapy procedures (IMRT). Computers and linear accelerators are used to create a three-dimensional radiation dose map that is particular to the target's position, shape, and motion characteristics. Because of the high level of precision necessary for IMRT, precise information on tumour sites must be acquired. The decrease of the planned goal volume margins surrounding the location is the single most important area of clinical practise innovation.

The capacity to avoid more normal tissue (and hence potentially use dosage escalation tactics) is a direct result of being able to execute therapy with the highest level of precision. Modern advanced radiotherapy techniques, such as proton and charged particle radiotherapy, allow for greater precision in dose delivery and effective dosage spatial distribution. Today, those possibilities present IGRT with new hurdles in terms of necessary precision and reliability. As a result, finding appropriate ways necessitates extensive investigation. IGRT increases the amount of information gathered over the course of treatment. This information will allow for continuing assessment and refinement of treatment procedures over time, whether for an individual or a group of patients. The ability to monitor and adjust to changes that may occur during radiation treatment is a clinical benefit for the patient. Tumor shrinkage or expansion, as well as changes in the tumor's form and surrounding anatomy, are examples of such changes. When technologies that were originally designed for image-guided surgery, such as the N-localizer and Sturm-Pastyr localizer, are employed in conjunction with these medical imaging technologies, the precision of IGRT is considerably increased.

Radiation therapy is a local treatment that is used to treat a specific tumour while avoiding dosages that are too high for the surrounding normal tissue. Differences between the anticipated dosage distribution and the delivered dose distribution can be caused by a variety of circumstances. Uncertainty over the patient's place on the treatment unit is one such factor. IGRT is a part of the radiation therapy procedure that uses imaging coordinates from the treatment plan to ensure the patient is properly aligned in the treatment room. The targeted treatment region is generally indicated by the radiation oncologist at the time of 'planning' (whether a clinical mark up or a full simulation). Marks were placed on the skin once the treatment area was chosen. The ink marks were used to align and position the patient for treatment on a daily basis in order to improve field placement repeatability. The correct positioning of the treatment field could be determined by aligning the markings with the radiation field (or its depiction) in the radiation therapy treatment room. With advancements in technology – light fields with cross hairs, isocentric lasers – and a shift to the practise of 'tattooing,' where ink markings are replaced with a permanent mark by applying ink just beneath the first layer of skin with a needle in documented locations – the reproducibility of the patient's setup improved [1-5].

The capture of images utilising a radiation beam that is being utilised to give radiation treatment to a patient is known as portal imaging. If the patient absorbs or scatters some of the radiation beam, the portion that passes through can be quantified and utilised to create pictures of the patient. It's challenging to figure out how to use portal imaging to determine radiation field placement in the first place. X-rays or gamma rays have been used to generate large scale radiographic films for inspection since the beginning of radiation therapy. Radiation went further inside the body with the development of cobalt-60 machines in the 1950s, but with lesser contrast and poor subjective visibility. Electronic portal imaging has evolved into a tool for proper field placement as well as a quality assurance tool for inspection by radiation oncologists during check film reviews, thanks to developments in digital imaging technology. Electronic portal imaging is the technique of creating a digital image with increased clarity and contrast over traditional portal imaging by using digital imaging devices such as a CCD video camera, liquid ion chamber, and amorphous silicon flat panel detectors. The system's advantage is the capacity to digitally collect photographs for inspection and advice. These systems are used in a variety of clinical settings. In most clinical practise, current studies of Electronic Portal Imaging Devices (EPID) demonstrate satisfactory outcomes in imaging irradiations and provide adequately large fields of view. kV is not a feature of portal imaging.

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References

1. Kupelian, Patrick A., Choonik Lee, Katja M. Langen and Omar A. Zeidan, et al. "Evaluation of image-guidance strategies in the treatment of localized prostate cancer." *Int J Radiat Oncol Biol Phys* 70 (2008):1151–1157.

2. Sterzing, Florian, Jörn Kalz, Gabriele Sroka-Perez and Kai Schubert, et al.

"Megavoltage CT in helical tomotherapy - clinical advantages and limitations of special physical characteristics." *Technol Cancer Res Treat*. 8 (2009): 343–352.

3. Allison, Ron R, Hiram A. Gay, Helvecio C. Mota, and Claudio H. Sibata. "Image-guided radiation therapy: current and future directions." *Future Oncol (*2006): 477–492.

4. Dawson, Laura A, and Michael B. Sharpe. "Image-guided radiotherapy: rationale, benefits, and limitations." *Lancet Oncol* 7 (2006):848–858.

5. Xing, Lei, Brian Thorndyke, Eduard Schreibmann, Yong Yang, et al. "Overview of image-guided radiation therapy." *Med Dosim* 31(2006): 91–112.

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