AbstractID: 7842 Title: In-room Imaging for Treatment of Lung and Breast Cancer

New in-room IGRT techniques for treatment of targets in and around the lungs allow margin reduction compared to the use of more traditional MV radiographic verification techniques. Unlike targets in the head & neck, liver or prostate, the lung is interesting in that tumors are frequently easily visualized so that the use of surrogates is not always necessary. This is particularly true for volume imaging devices that can produce thin sections through the patient in various different orientations. These devices include diagnostic quality helical CT scanners placed in the treatment room in close proximity to the treatment unit as well as various MV or kV Computer Tomography approaches that use the capabilities of or simply attach to the treatment unit structure. Devices that use kV photons to produce dual stereoscopic 2D views of the patient do not allow such easy visualization of lesions in the lungs, but they are extremely helpful when reliable anatomic surrogates can be identified, or when fiducial markers can be surgically placed to identify the target position.

Hypofractionated dose schedules are gaining popularity for treatment of some early diagnosed non-small cell lung cancers. Treating these tumors to a high dose in just a few fractions is challenging in that field placement is critical. In-room IGRT has played an important role in positioning these treatment fields with the required accuracy. Treating the breast, another structure in the thorax region, presents a somewhat different challenge in that this part of the patient's anatomy is hard to reproducibly position for each day of treatment. In-room IGRT can also be used to advantage to treat this structure. This is particularly true for the boost portion of the treatment.

Treating in or near the thorax is complicated by the fact that targets can move as a result of respiratory and/or cardiac motion. When breath hold, abdominal compression to damp a tumor's trajectory, target tracking, or treatment unit gating techniques are employed to control the effects of respiratory motion, using IGRT to verify patient positioning prior to treatment will not necessarily guarantee acceptable tumor targeting during dose delivery. However, the use of real time in-room kV and MV fluoroscopy can provide extra information that is useful for this level of verification.

Using the new IGRT techniques does not assure that apertures are correct in terms of either their shape or orientation. Thus, it is important to combine the new IGRT techniques with the older standard approach. That is, portal imaging using the MV beam and treatment apertures remains an important step in the overall QA process.

1. To understand the design, functioning, advantages, and limitations of the different IGRT systems used for treating in and around the thorax region.
2. To understand how different IGRT systems can be used to provide the information needed to target moving lesions in the thorax region.
3. To understand the workflow issues for IGRT used to treat targets in the thorax.