AbstractID: 7878 Title: Imaging for Planning/Verification: In-Room Imaging

Multi-modality imaging is improving the accuracy and precision in treatment planning by including more information in the initial model of the patient. The goals of imaging for treatment planning are to determine the boundaries and functional information of the tumor and critical normal structures. Quantification of physiological motion has also become increasingly important in highly conformal treatment planning. Obstacles for imaging include improving contrast, limiting artifacts, improving temporal and spatial resolution, and reducing or eliminating the interference of motion.

Combining the soft tissue imaging of MR, functional imaging of MR, CT, PET and SPECT with geometrically robust CT imaging improves the definition of the tumor and critical normal structures. In addition, dynamic information can be accurately quantified and incorporated into the treatment planning process through 4D imaging capabilities in CT and repeat MR imaging. Reducing motion artifacts allows improvement in tumor definition. Methods of reducing the interference of motion on image acquisition include suspending the motion, through voluntary or assisted methods, and reducing the imaging session length, through multi-slice acquisition and parallel imaging. Optimizing imaging sequences and contrast enhancement and timing improves the ability to define the tumor. The integration of these multi-modality images into one more complete model of the patient is evolving through the use of automatic registration methods.

The presentation will highlight the benefits of multi-modality imaging in the treatment planning of tumors in the thorax, abdomen, and pelvis. Image optimization strategies will be discussed for each modality and developments to improve image acquisition and integration into treatment planning will be described.

Educational Objectives:

1. Appreciate the benefits of including multi-modality imaging in treatment planning.
2. Understand methods to optimize the acquisition of multi-modality images for accurate treatment planning, including sequences, post-processing, and timing.
3. Identify technical developments to improve image acquisition and integration into treatment planning.