AbstractID: 4415 Title: Radiofrequency-based localization

Intra-fraction and inter-fraction motion have continued to be areas where much study is needed in order to accurately target areas for radiation treatment. Many modalities have been explored that allow the user to evaluate the patient location from day to day, as well as during a single treatment session. Most of these applications are image-related, including, both planar X-rays (either KV or MV), CT scanning (KV or MV), as well as ultrasound. Each imaging modality has its unique set of issues including, time involvement, radiation exposure, and subjectivity in registration).

Non-tomographic methods to deal with inter and intra-fraction motion have been explored. For many years optical tacking with the use of infrared cameras have been used for radiosurgery and radiotherapy. These systems will be discussed in brief, but they are limited to external information and offer little information on internal organ motion. They are important in many applications related to target motion in that they can be used to create a model between the patient surface and internal motion. They can also be useful in monitoring other devices within the room. Another non-tomographic method of aligning a patient relies on radiofrequency signals in order to track an implanted transponder. The Calypso® 4D tracking system is a system that provides RF tracking of Beacon® transponders that can be implanted or placed an immobilization device. Some befits of RF tracking include nearly real-time (10 HZ frequency) update in location, accurate and objective coordinate information, and non-ionizing radiation signals.

This lecture will provide an overview of non-tomographic patient alignment techniques that can allow real-time positioning. It will also discuss the strengths and weaknesses of such technology compared to tomographic modalities and specific concerns in radiation therapy.

Educational Objectives:

1.) Understand some common concerns in inter and intra-radiation fraction motion.
2.) Understand the differences between tomographic and non-tomographic means of patient motion evaluation.
3.) Understand the strengths and weaknesses of an RF tracking system in radiation therapy treatments.