

AbstractID: 11120 Title: A Calibration Method for Positioning Small Animal Radiotherapy Subjects Using MicroCT

Purpose: To establish an accurate positioning protocol to deliver dose to internal organs of mice using a microCT/RT system. This protocol employs microCT images acquired with the system as a guide to place a desired target at the scanner isocenter. **Methods and**

Materials: A 6x6x1.5 cm³ solid water phantom with a superficial iron ring and a gafchromic EBT film sandwiched at 3 mm from the front face was placed at the isocenter of a microCT/RT system so that the film was parallel to the plane of gantry rotation. The phantom was imaged using 400 70 kVp x-ray beams from directions equally spaced over 360°. The film in the phantom was irradiated with a 6 mm diameter beam from 8 different angles. The film was also irradiated perpendicular to the beam in the ring axis direction.

Analysis of the film image, images from the microCT detector, and reconstructed CT data were used to determine the isocenter projection on the detector and in the three-dimensional image obtained from the reconstructed data. **Results:** The coordinates of the central pixel of the detector image are (437, 238) but analysis of the CT detector images demonstrated that the coordinates of the pixel that represents the isocenter are (449, 245). The reconstructed volumetric CT images revealed that the isocenter of the microCT is located at the geometric center of the images obtained from the microCT scan.

Conclusion: Using external markers and film and detector images, targets in mice can be accurately positioned on the beam axis for irradiation. The reconstructed data from a brief microCT scan provides the information to place an arbitrary anatomic location at the scanner isocenter for dose delivery. In general, the microCT images capabilities can be used as a guide to precisely perform radiation treatments on internal targets in mice.