AbstractID: 9775 Title: Teletherapy microRT using a commercial 192Ir source

The prototype small-animal irradiator (microRT) developed at Washington University utilizes the commercial 192Ir high-dose rate (HDR) remote afterloader source in a teletherapy geometry. The system consists of a set of four Tungsten collimators (5.5 mm diameter hole) mounted to an Aluminum support tube. An HDR catheter is used to transport the source to the collimator and pre-determined dwell positions center the source at the collimator hole. The mouse is placed on a couch that contains a series of drilled holes that act as fiducial localization marks visible on computed tomography (CT) imaging. For most experiments, the mouse is first anesthetized and placed on a couch. The couch is imaged using a commercial CT scanner (spatial resolution approximately 0.6 mm). The couch geometry is automatically registered in the treatment planning software, which was written in the Computational Environment for Radiotherapy Research (CERR) platform. The treatment planner determines the dose and adjusts the source-to-target distance to achieve the required field size and the target dose, coupled with the source strength, determines the irradiation time. The couch is mounted to a computer-controlled three-dimensional stage that positions the mouse to sub-millimeter accuracy. Advantages of the system include its relatively high precision, low fabrication cost, and straightforward and robust operation. Disadvantages include the need for having a commercial HDR source and the associated complexities of scheduling experiments, the relatively poor penumbra, and the steep depth-dose behavior. The system works very well for parallel-opposed fields to either the whole brain or hemi-brain, and tumors grown on the mouse flank.