

**AbstractID: 7535 Title: Benchmarking a flexible Monte Carlo (MC) tool based on the Dose Planning Method (DPM) for use in evaluating Intensity Modulated Radiation Therapy (IMRT) treatment planning systems.**

**Purpose:** To benchmark a flexible Monte Carlo (MC) tool based on the Dose Planning Method (DPM) for use in evaluating Intensity Modulated Radiation Therapy (IMRT) treatment planning systems.

**Method and Materials:** A dose calculation tool based on a flexible machine model using the Dose Planning Method (DPM), a “fast” Monte Carlo (MC) computer code, is being developed. Initial benchmark testing included a simple 10cm X 10cm multileaf collimator (MLC) diamond shaped pattern, a 3D conformal lung plan with the MLCs fully retracted, and an IMRT lung plan. Irradiations were performed using a 6MV photon beam from a Varian linear accelerator. Measurements were made in slab and anthropomorphic phantom geometries using thermoluminescent detectors (TLDs) and radiochromic film. The DPM calculation was then compared to measurements and also the calculation from the Pinnacle treatment planning system.

**Results:** Profile comparisons from the MLC diamond pattern irradiation showed good agreement in the penumbra region where MLC inter and intra leaf transmission effects were present. The point dose comparisons between the DPM calculation and measurement of the tumor for the 3D conformal and IMRT lung plans were within 2%. For the heart and spinal cord, the calculation for the 3D conformal and IMRT lung plans were within 7.5% of measurement, except in the conformal plan where the calculated dose point to the heart was positioned in a steep dose gradient and was 25% lower than measurement. Dose profiles through the center of the tumor showed good agreement in the PTV region, penumbra, and low dose lung regions.

**Conclusion:** This work demonstrates the feasibility of a source model based the DPM computer code to calculate dose distributions as part of the quality assurance program for clinical trials.

**Conflict of Interest (only if applicable):** This work supported by PHS CA010953, CA081647, and CA085181 awarded by NCI, DHHS.