

AbstractID: 7131 Title: An intercomparison of RPC verified IMRT plans with ferrous xylenol orange gels and optical CT scanners

**Purpose:** To verify the dose distributions in an IMRT head and neck treatment in accordance with the RPC protocol by using ferrous xylenol orange (FX) gels and optical CT scanners.

**Method and Materials:** The RPC head phantom was x-ray CT imaged and an IMRT treatment plan was generated according to RPC prescribed doses. The phantom was irradiated using a Varian 2100EX linac. The RPC dosimetry insert was removed from the head phantom and replaced with an FX cylindrical gel dosimeter. The FX gel was positioned so that its isocentre coincided with the head phantom isocentre, and the residual volume was filled with water and sealed. The irradiation protocol was repeated with two independent FX gels in order to enable dose readout measurement with either Laser or cone beam (Vista™, Modus Medical Inc.) optical CT scanners, respectively. An FX gel from the same batch was irradiated with a 12 MeV electron beam (Varian Clinac 2100C) and absolute depth-dose curves were used to establish independent dose calibrations for the two gels and scanners.

**Results:** Computed and measured doses at equivalent locations within the RPC dosimetry insert and FX gels (scanned optically with Laser and Vista™ cone beam, respectively) are in agreement and meet the 7% RPC dose difference criteria. In comparable slices, the computed and measured FX gel dose distributions obtained with Laser and cone beam CT scans, respectively, pass the gamma function criteria (5% dose difference, 4 mm distance-to-agreement).

**Conclusion:** The RPC head phantom together with FX gels and optical CT can be used to verify dose efficiently in three-dimensional space to ensure that IMRT treatments are being safely and accurately delivered in line with established protocols.

**Conflict of Interest:** Two of the authors (KJ, JB) have a licensing agreement with Modus Medical Devices Inc. concerning the commercialization of Vista™.