AbstractID: 1936 Title: Dose Response Characteristics of Novel Higher Sensitivity Radiochromic Films

Two new models of radiochromic films of higher sensitivity, compared with existing model (HS film), were studied for dose response characteristics when exposed to 6MV photons. Films designed for single fraction IMRT dosimetry (referred as NHS) and films designed for kilovoltage dosimetry (referred as NXR-R) were concurrently irradiated with HS film. They were placed at the center of the beam of field size 10x10 cm, at 1.5 cm depth in a solid water phantom positioned at 100 cm SSD. The delivered dose ranged from 0.2 to 60 Gy based on ion chamber calibration. All films were scanned using red (665nm) and green (520nm) light sources in a CCD100 microdensitometer with 0.2 mm spatial resolution. The optical density (OD) averaged over 5x5 mm area of each film, including an unirradiated film for background, was determined. The net OD (NOD) values were obtained by subtracting the background OD. The calibration curves (NOD vs. dose) were established and plotted for both red and green light sources. The values of NOD/Gy at low dose of 2Gy, using green light were 0.127, 0.122 and 0.025 for models NHS, NXR-R and HS, respectively. Data reveals that the newer models are five times more sensitive than standard HS films. The sensitivity obtained using red light source also reveals a similar trend by a factor of two. Our results demonstrate that these novel radiochromic films show promise in improving the efficiency and accuracy of quality assurance measurements in the delivery of kilovoltage and IMRT beams.