

AbstractID: 9165 Title: Compensator based Intensity Modulated Radiation Therapy Dosimetry using EDR2 film

Introduction:

Radiographic EDR2 film is the most commonly used radiographic film for dose distribution measurement, quality assurance and treatment plan verification. The compensator is an alternative way to deliver intensity modulated treatment. The EDR2 film reliability was investigated for dosimetry and QA of compensator based IMRT.

Material and Methods:

MC-96 was used to fabricate the compensator blocks (10, 20, 30 and 50 mm thickness). For this study 6 and 25 MV photon beam qualities from an Elekta SL-25 were used. The transmission factors of the blocks were measured with a Farmer type ion chamber of 0.6cc for a 10x10cm field size. The film was placed at isocentric distance between the slabs of a polystyrene phantom in a perpendicular geometry. To determine the effect of block thickness on the dose response of EDR2 film for both beam energies, dose measurements were made for various field sizes and offsets and compared to Farmer chamber measurements. To obtain a similar exposure of the film, transmission factors were applied to adjust the MUs. An inverse pyramid intensity modulated beam, achieved with a compensator block, was dosimetrically investigated to assess the value of the EDR2 film in a more clinical setting.

Results and discussion:

The film showed a systematic under-response of maximally 1.3% for a 50mm thick block and 25 MV (10x10 cm) beam, which is within the 3% overall uncertainty of film dosimetry for perpendicular geometry. The field offset measurement showed also a film under-response in the order of 1.3% in the direction towards the gun, which might be due to spectral changes related to the beam bending system. The cross-sectional dose profiles by compensator blocks showed that the film is within 1.2% to the diamond detector. EDR2 film can be safely and easily used as a 2D dose detector in compensator based IMRT.