# AbstractID: 11194 Title: Comparison of the response of EBT emulsion to <sup>90</sup>Sr/Y beta particles and <sup>60</sup>Co gamma rays

**Purpose:** To test the hypothesis that GAFCHROMIC EBT emulsion responds the same to beta particles from $^{90}Sr/^{90}Y$ and gamma rays from $^{60}Co$. **Method and Materials:** Single emulsion layer EBT film with minimal covering layer was obtained and 1 $cm^2$ pieces were irradiated, 1) with the center of the film emulsion at a depth of 7 $mg/cm^2$ in a $^{90}Sr/^{90}Y$ reference radiation field of known absorbed dose rate (0.0911 mGy/s), or 2) with the films located at a depth of 5 cm in water in a $^{60}Co$ gamma ray beam of known absorbed dose rate (2.67 mGy/s). Six samples were irradiated in each radiation field at 15 logarithmically evenly spaced absorbed dose levels ranging from 30 mGy to 7 Gy. For the films irradiated in water, a commercially available food sealer was used to vacuum seal films in water-proof packs which were held perpendicular to the beam axis with a spring-loaded mounting jig. Irradiated films were read out between 6 and 9 days post irradiation in a 48-bit color photo scanner and the red component of the TIFF image data was extracted for analysis of the average optical density. **Results:** The average net optical density change per unit of absorbed dose delivered was evaluated for each of the 15 dose levels used in the study. Using the uncertainty in the delivered absorbed dose for each radiation (1.5% for $^{90}Sr/^{90}Y$ and 1% for $^{60}Co$, both 1$\sigma$) and the statistics of the six film replicates, a two-sided Student's t test was applied and no difference in the means in the net responses per unit absorbed dose was found at any of the applied absorbed dose levels. **Conclusion:** Within the measurement uncertainties (~4% at 1$\sigma$), the response of the EBT emulsion to beta particles from $^{90}Sr/^{90}Y$ and gamma rays from $^{60}Co$ is the same.