AbstractID: 12989 Title: Effects of Esophageal Stents on Radiotherapy Dose Perturbation Examined in an Experimental Model

Purpose: To investigate the radiotherapy dose perturbations caused by esophageal stents in patients undergoing x-ray beam therapy for esophageal cancer. **Method and Materials:** Four experimental esophageal stents from Boston Scientific were examined (three metallic stents: *Wallflex*, *Ultraflex* and *Alimaxx*, and one polymeric stent with limited radiopaque markers for visualization: *Polyflex*). All experiments were performed in a water phantom with a custom acrylic stent holder in order to closely model the scatter and absorption characteristics of human soft tissue. Gafchromic film was used to measure the dose distributions at locations above and below the stents, which were placed in an air-filled cavity to simulate the esophagus. Treatment plans were created and delivered for clinically relevant photon energies of 6 and 15 MV, and data analysis was performed on uniform regions of interest to quantify the dose perturbations. **Results:** The three metallic stents produced the largest dose fluctuations with distinct patterns of 'hot' spots (increased dose) measured above the stents (up to +15.4%) and both 'cold' (decreased dose) and 'hot' spots measured below the stents (range: -6.2 to +5.4%). The polymeric *Polyflex* stent produced similar dose alterations when the radiopaque markers were examined (range: -6.4 to +15.4%). However, when the markers were excluded from the analysis, the *Polyflex* stent produced significantly smaller dose fluctuations, with maximum 'hot' spots of +6.8% and cold spots of -2.5%. Minimal energy dependence was observed. **Conclusion:** The non-metallic *Polyflex* stent appears to be the most suitable for patients undergoing radiotherapy. The radiopaque markers would facilitate precise localization in the esophagus, while the polymeric composition would have the least affect on the dose distribution within the treatment volume. More work needs to be performed to determine the clinical significance of the observed 'hot' and 'cold' spots but is beyond the scope of this study.