

AbstractID: 12925 Title: Can Patient-Phantom Matching Improve the Accuracy of Dose Estimation in Interventional Fluoroscopy

Purpose: To investigate the benefits of patient-phantom matching for determining skin and organ dose in interventional fluoroscopy. **Method and Materials:** In this study, approximately 30 CT datasets representing patients of different sizes and genders were contoured and converted into patient-specific computational models. Each model was matched, based on height and weight, to a computational phantom selected from the UF hybrid patient-dependent series. In order to investigate organ dose, Monte Carlo methods were used to simulate several fluoroscopic projections. Organ dose conversion coefficients were calculated for each patient-specific and patient-dependent phantom, and also for a reference stylized and reference hybrid phantom. The coefficients were subsequently analyzed for any correlation between patient-specificity and the accuracy of the dose estimate. In order to investigate skin dose, a dose mapping program was developed and used to calculate local skin dose for a representative interventional procedure. Dose maps were produced for each phantom type and compared based on intensity and position. **Results:** In terms of organ dose, patient-phantom matching was shown most beneficial for estimating the dose to large patients. In these cases, the improvement over using a reference stylized phantom ranged from 65-115%, and for a reference hybrid phantom from 20-40%. For smaller individuals, patient-phantom matching was clearly superior to using a reference stylized phantom, but not significantly better than using a reference hybrid phantom for certain fields and projections. For skin dose, patient-phantom matching was shown to increase the accuracy of both the location and value of the dose estimate. **Conclusions:** These results indicate that patient-phantom matching can improve the accuracy of dose estimation, specifically for large patients. With increasing obesity rates, these patients will continue to make up a large portion of individuals undergoing interventional procedures. Thus, having phantoms that better represent the over-weight population represents a considerable improvement over previous methods.