

## AbstractID: 9466 Title: Quantitative Methods for Contouring on PET-CT Images

**Purpose:** FDG-PET imaging is routinely used to diagnose and stage cancer patients. It is also gaining wide acceptance as a tool to assist in tumor delineation in radiotherapy (RT) treatment planning. However, target volume definition is subject to inter-observer variability. The objective of this study was to evaluate several existing auto-contouring methods and develop a technique that would reduce inter-observer variability. **Method and Materials:** Eighteen rectal and anal cancer patients who had undergone PET-CT imaging and received RT were retrospectively reviewed. For each patient, a FDG-PET avid (AVID) region was contoured by an experienced clinician without the use of the CT scan. The AVID volume was compared to volumes derived by the automated methods. Three automated methods were used: a fixed SUV cutoff of 2.5, previously suggested in the literature, a percentage of the maximum SUV ( $\%SUV_{max}$ ), and an in-house derived mathematical technique. A 43% threshold was found for  $\%SUV_{max}$  using a phantom study with cylinders of known volumes filled with varying concentrations of FDG. The mathematical approach generated 3D volumes using a Confidence Connected Region Growing (CCRG) technique that calculated the mean and standard deviation from pixel intensities contained in a 3D volume grown from a seed pixel. **Results:** The class solution of using a single value of SUV or a  $\%SUV_{max}$  proved limited. These two methods depend on the correct threshold being applied and need to be different for each patient. The resulting volume differences ranged from 1%-129%. The CCRG based volumes were within 8% of the AVID volumes with a range of 1%-23%. **Conclusion:** Assuming that the same seed pixel is chosen, the CCRG method reduces inter-observer contouring variability on FDG-PET images and provides a viable clinical solution by always growing the same volume.

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