Purpose: To determine PET SUV values in Pinnacle TPS and to assess the accuracy and precision of the ITV according to SUV thresholds. The goal is to minimize errors in target definition by using SUV showing enhanced metabolic activity of the tumor and fast CT imaging with less motion artifacts.

Methods: Mean PET values in individual patients were obtained from statistics of body contours for whole body PET-CT scans. The SUVs were calculated by normalizing the PET values in any voxel by the mean body PET value. These clinically acquired SUVs were plotted against values reported at the time of the scan for verification. GTVs were contoured on petCT scans and the ITV's were contoured using three published methods of SUV thresholds at 2.5, at ratio of 40 percent of the maximum, and 30 percent of the maximum added to 60 percent of the mean body. GTV volumes were plotted against the 3 sets of ITVs to investigate their relationships.

Results: Examination of 11 patients showed a strong linear relationship between clinically determined SUVs and those reported; indicating the validity of our SUV definition. Plots of GTV volumes versus ITV volumes for each of the 3 thresholds revealed a less clear relationship. The effectiveness of each method to generate a reasonable ITV was highly patient dependent; in general the 2.5 threshold gave the best results, while the 40 percent maximum produced the worst.

Conclusions: While more data is required to make a definitive statement about the value of PET SUV threshold defined ITVs, the findings do seem to reveal a pattern between GTV and ITV size. If an appropriate SUV threshold is chosen, the GTV-ITV volume relationship is nearly linear, which suggests extending the GTV in volume rather than the margin distance as is common in ITV delineation.