# Gross tumor volume (GTV) target delineation: Comparison of expert and non-expert contouring with quantitative PET parameters

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## Purpose

Target delineation for lung radiotherapy is a highly operator dependent process.

PET-CT imaging has been demonstrated to improve inter-observer region of interest (ROI) variation in target delineation.

We sought to determine whether quantitative PET segmentation parameters for expert user-derived ROIs were substantially distinct from non-expert ROIs using quantitative analysis

## Methods

17 radiation oncologists (4 experts, 13 non-experts) were provided co-registered PET-CT dataset of a standardized lung radiotherapy case, allowing visual display of PET intensity map (e.g. without SUV values) and matching CT dataset.

GTV volumes were collected for central analysis.

Using TaCTICS, we created composite expert and non-expert ROIs using the STAPLE algorithm.

SUV threshold based segmentation was performed.

Non-parametric analysis was performed to evaluate volumetric SUV coverage by individual user and composite expert/non-expert ROIs.

## Results

PET SUV values in regions of high agreement were significantly higher than in regions of low agreement. Agreement between an automatically derived volume based on PET SUV and expert contours was not statistically different that those of non-expert users (P>0.05).

## Conclusions

Composite expert interobserver ROI variance in PET SUV coverage was substantial, and not distinct from non-expert composites in terms of volume, SUV coverage, nor PET-segmentation threshold. PET-based algorithms using SUV were at least as reproducible as expert users. These findings have significance, and point to potential difficulty for selection of expert priors for quantitative segmentation class solutions PET-CT for lung cancer automated target delineation.