Purpose:

The goal of this study is to evaluate the predictability of a novel method using a self background-corrected maximum Standard Uptake Value (cSUV_{max}) from 18F-FDG Positron Emission Tomography (PET) of the patients following lung cancer stereotactic body radiosurgery (SBRT).

Methods:

20 qualified patients treated out of 38 patients treated with SBRT for a single lung malignant lesion between May 2009 and December 2009 were enrolled in the cohort study. All had pre- and at least one post-treatment PET images available at the time of study. The mean normal tissue SUV from the descending aorta was sampled as baseline to divide SUV_{max} of tumor site. The resultant cSUV_{max} was used for assess the local control or possible recurrence. The result was then compared with that using SUV_{max} alone method.

Results:

The average follow-up length was 48.9 weeks ranging from 18.6 to 115.0 weeks. The mean SUV of aorta was measured as 1.821±0.364, ranging from 1.173 to 2.576. From the pre-treatment PET, 70% and 65% was indicated positive correspondingly when using SUV_{max} with 2.50 and cSUV_{max} with 1.52 thresholds. When PET was taken < 29 weeks post-SBRT, 75% and 67% respectively showed higher values in the locally controlled group. For PET = 29 weeks after SBRT, with cSUV_{max} both locally controlled and recurrent groups are accurately identified, while SUV_{max} shows 5% false positive and one possible false negative.

Conclusions:

The SUV_{max} in lung tumor site corrected by the mean SUV of descending aorta or cSUV_{max} provided a more reliable parameter than using SUV_{max} alone in predicting the local control and recurrence for follow-up PET of patients after lung SBRT. The method used in this study objectively displayed a strong correlation between low cSUV_{max} and local control following lung SBRT in this investigation, otherwise a local recurrence is suggested.