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Poster

Validity of pretreatment Specific Growth Rate in Stage I Non-Small Cell Lung Cancer treated with Stereotactic Body Radiotherapy (SBRT)

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Abstract

We have previously demonstrated that tumor growth rate (GR) is an important predictor of local-regional control and survival in early lung cancer patients (pts) treated with SBRT using specific growth rate (SGR), as a metric for pretreatment tumor growth rate, and its median (0.43x10-2) as a cut off to group pts into two cohorts (high and low SGR).

The aim of this study was to:

1) Validate SGR value of 0.43x10-2 as a metric for GR and 2) Determine the influence of pre-treatment tumor SGR on outcomes of early stage NSCLC pts treated with SBRT at a second institution.

Methods:

An REB approved retrospective chart review of 158 pts with pathologically confirmed T1-2 N0 NSCLC pts treated with SBRT between June 2010 and December 2012 was undertaken. Demographic and clinical data were collected from an institutional database. Time between diagnostic and simulation CT scans was calculated (t). Diagnostic CT was uploaded to Focal planning software v.4.70. Gross tumor was contoured on each slice using lung window to calculate Gross Tumor Volume at time of diagnosis (GTV1). The pre-treatment planning CT images were uploaded from archived files to record the pre-treatment GTV (GTV2). SGR was calculated using the equation: SGR = ln (GTV2/GTV1)/t). The median SGR (0.43x10-2) from our previous data was used to group pts into low and high SGR. Kaplan Meier curves were constructed for both overall (OS) and failure free survivals (FFS), and the log rank for comparison between high and low SGR groups. Multivariate analyses were performed using a Cox proportional hazard model with SGR and other relevant clinical factors.

Results:
Median time interval between initial diagnostic and planning CT scans was 85.5 days (d) (IQR,

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63;118 d). The median SGR was 0.412 x 10-2 (range -1.1x10-2; 23.1x10-2). Median GTV1 was 3.5 cm3 (range: 0.18; 51.8 cm3) and median GTV2 was 6.2 cm3 (range: 0.22; 79.1 cm3).
At median follow up period of 35.8 months (ms), the median OS was 54 ms. Three years OS was 60%. Pts were grouped into high and low SGR using previously reported SGR median as a cut off (0.43x10-2). The median survival was 30.3 ms for high SGR vs. 44.6 ms for low SGR (p=0.02). The median FFS was 36 ms for high SGR vs 51.9 ms for low SGR groups respectively (p< 0.01). On univariable analysis, gender (p=<0.01), stage T2 (p<0.01), and GTV2 (p<0.01) were also predictive for OS and FFS. On multivariate analysis only male gender (p=0.01) was predictive for OS and high SGR (p=0.01), and male gender (p=<0.01), were independent predictors for poorer FFS.

Conclusion:
This analysis of an independent data set confirmed the validity of pre-treatment SGR. High SGR was associated with poorer outcome in patients with early stage NSCLC treated with SBRT. Further work to correlate and combine its use with biological markers is ongoing.

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