

## **Factors Affecting the Impact of Neoadjuvant Radiation on Survival in Locally Advanced NSCLC. A SEER Database Analysis**

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**Purpose/Objective(s):** Locally advanced non-small cell lung carcinoma remains a therapeutic challenge for clinicians. Currently the standard of care is multimodality therapy, but sequencing of multimodality therapy is unclear. Population based studies suggest that neoadjuvant radiation (N-RT) offers an overall and cause-specific survival benefit over adjuvant radiation (A-RT) in the treatment of Stage III NSCLC. The goal of this study was to identify the factors which affect the survival benefit of neoadjuvant radiation in Stage III NSCLC.

**Materials/Methods:** The Surveillance, Epidemiology, and End Results (SEER) database was used to select 13,842 patients diagnosed between 1995 and 2007 who received any type of surgery and either N-RT or A-RT. Overall and cause-specific survival was calculated using the Kaplan-Meier method, and log-rank test was used to estimate differences in survival. All statistical tests were two-sided and significance was assessed at the 0.05 level. Multivariate Cox regression analysis was utilized to determine potential variables affecting survival. TNM stage subgroup analyses were conducted with patients staged by AJCC 6th edition criteria at time of diagnosis.

**Results:** Median overall survival for patients treated with N-RT or A-RT was 27 and 22 months respectively ( $p < 0.001$ ). In patients who received oncologic surgeries without lymph node dissection (LND), N-RT conferred a survival benefit over A-RT (median survival 42 vs. 30 months,  $p < 0.001$ ). This benefit was lost in patients receiving LND as component of surgery (44 vs. 39 months,  $p < 0.177$ ). In N2 disease subgroup, patients receiving any type of oncologic surgery without LND had a benefit from NRT vs. A-RT (28 months vs. 21 months,  $p < 0.003$ ). There was no difference in median survival with respect to sequence of RT in patients who underwent LND. Benefit was seen for N-RT in all patient age groups except patients greater than 70 years of age (age  $< 60$ : 29 vs. 25 months,  $p < 0.001$ ; age 60 – 69: 27 vs. 20 months,  $p < 0.001$ ; age  $> 70$ : 21 vs. 18 months,  $p < 0.08$ ). Multivariate analysis identified age, gender, T-Stage, N-Stage, radiation sequence, and type of surgery as factors affecting survival.

**Conclusions:** The overall survival benefit of N-RT therapy in Stage III NSCLC is dependent upon multiple factors including age, nodal status, and type of surgery performed. In particular, the survival benefit of N-RT is seen in patients who do not receive lymph node dissection during oncologic surgery, and in patients younger than 70 years of age.