**Variations in Initiation Dates of Chemotherapy and Radiation Therapy is Associated With Decreases in Overall Survival**

M.P. Deek,1 S. Kim,1 R. Beck,2 J. Malhotra,1 O.M.E.E. Mahmoud,3 J. Aisner,1 and S.K. Jabbour1;

*1Rutgers Cancer Institute of New Jersey, New Brunswick, NJ, 2Rutgers Cancer Institute of New Jersey, Department of Radiation Oncology, New Brunswick, NJ, 3Rutgers Newark University Hospital, Newark, NJ*

**Purpose/Objective(s):** The standard of care for unresectable Stages II and III non-small cell lung cancer (NSCLC) is concurrent chemoradiation therapy (CRT). In trials evaluating concurrent CRT, the national oncology cooperative group protocols historically have dictated that concurrent CRT begins on the same day. However, logistical barriers sometimes make it difficult for patients to begin CRT simultaneously, which can result in variations in the start dates of each therapy. We hypothesized that differences in initiation of chemotherapy and radiotherapy would show an adverse effect upon overall survival (OS) for NSCLC.

**Materials/Methods:** Cases of Stage II and III NSCLC treated with CRT were obtained from the National Cancer Data Base participant user file from 2003 to 2011. Kaplan-Meier curves were computed for subjects. Curves were stratified to compare those who started CRT within six days of each other versus those who started seven to 13 days of each other. Curves were also stratified to compare those who started therapy within three days of each other versus those who started therapy within four to six days of each other. Survival analysis was carried out with Cox Proportional Hazards models. Propensity score matching was conducted in an attempt to reduce bias.

**Results:** A total of 11,119 patients were available for analysis. Median OS for patients who started dual therapy within six days of each other was 18.3 months (95% CI [17.8 - 18.8]) compared to 16.5 months (95% CI [15.3 - 17.6]) in those who started dual therapy 7-13 days apart (P = 0.006). On multivariate analysis, starting dual therapy seven or more days apart remained significantly associated with worse OS. In a propensity matched population, median OS in those who started treatment within six days was 18.3 months (95% CI [17.6 - 19.0]) compared 16.5 months (95% CI [15.4 - 17.6]; P = 0.028) for those who started treatment within seven to 13 days of each other. Furthermore, patients who started dual therapy on the same day to up to three days apart (18.5 months; 95% CI [17.97 - 19.03]) had superior survival rates compared to patients starting therapy 4 to 6 days apart (17.4 months; 95% CI [16.13 - 18.73]; P = 0.032). On multivariate analysis, starting dual therapy within 4-6 days of each other continued to be associated with worse mortality (HR 1.07; 95% CI [0.999, 1.137]; P = 0.054) compared to starting therapy within 0-3 days. In a matched cohort, the median OS difference between those who started treatment within 0-3 days (18.4 months; 95% CI [17.51 - 19.32]) compared to 4-6 days (17.5 months; 95% CI [16.13 - 18.73 months]) was marginally significant (P = 0.078).

**Conclusion:** Relatively minor variations in non-simultaneous initiation of both chemotherapy and RT can affect the OS of patients undergoing definitive CRT for NSCLC. Further efforts to understand mitigating factors and barriers that interfere with timely delivery of concurrent CRT are needed.