patients managed in the chest departments of French general hospitals.

Keywords: non-small cell lung cancer, thoracic surgery department, mortality, Surgery

P1.01-040
Long-Term Survival in Metastatic Non-Small-Cell Lung Cancer: An Investigation Using Surveillance, Epidemiology and End Results Data

Topic: Prognostic Factors, Treatment

Eva Szabo,[1] Erin Prophet,[2] Ho-Lan Peng,[3] Hwa Lee,[3] Shine Chang,[3] Jennifer Davis[3] *[1]Division of Cancer Prevention, National Cancer Institute, Bethesda/MD/United States of America, [2]Rice University, Houston/TX/United States of America, [3]MD Anderson Cancer Center, Houston/TX/United States of America*

Background: The introduction of new effective modalities for the treatment of metastatic non-small cell lung cancer (NSCLC), such as targeted therapies and immunotherapy, has resulted in reports of long-term survival in small sub-groups of patients treated with these therapies. It is therefore important to understand the frequency and characteristics of long-term survivors in large cohorts of advanced-stage lung cancer patients who were diagnosed and treated prior to the advent of these new therapies.

Methods: A survival analysis of data from the Surveillance Epidemiology and End Results database was performed. The cohort was limited to patients diagnosed with stage IV NSCLC, squamous and adenocarcinoma histology only, between 1991 and 2007, with follow-up through 2012. Outcomes and factors associated with extended survival were evaluated in the 10% of patients with longest survival (long-term survivors, $\geq$21 months) vs. 90% short-survival patients ($<$ 21 months). Patients surviving $\geq$ 5 years were compared with those surviving $<$5 years and $\geq$21 months. Demographic, tumor characteristic, and treatment differences between long-term and short-survival patients were compared using chi-square and Student's T-test for categorical and continuous variables, respectively. For descriptive analyses unadjusted for confounders, Kaplan Meier curves and log-rank tests were used to compare survival by histology and long-term survival status.

Results: Among the 44,387 patients diagnosed at stage IV, long-term survivors (4,544) are distinguishable from short-survival patients (39,843) by younger age, female sex, Asian/ Pacific Islander race, lower tumor grade, adenocarcinoma histology, upper lobe site, and treatment with surgery. Among only long-term survivors ($\geq$ 21 months), predictors of longest survival are younger age, lower tumor grade, and treatment by surgery and radiation. Median survival increased over time from 3 to 4 months for short-survival patients versus 30 to 36 months for long-term survivors. Notably, 1.5% of patients survived $>$5 years even prior to modern combination chemotherapy regimens, targeted therapies, and immunotherapy.

Conclusion: Despite the poor overall survival of patients diagnosed with stage IV NSCLC, the top 10% of survivors have significantly longer survival than the rest and a sub-population of individuals with extraordinary survival is identifiable. The discrepancy in median survival between long-term survivors and the rest suggests that long-term survivors comprise a disproportionate percentage of clinical trial participants and provides a rationale for more detailed clinical and molecular analyses in order to improve therapeutic targeting and future study design.

Keywords: SEER, epidemiology, NSCLC long-term survival

P1.01-041
Quantitative Imaging Features Predict Response of Immunotherapy in Non-Small Cell Lung Cancer Patients

Topic: Prognostic Factors, Treatment

Ilke Tunali,[1] Jhanelle Gray,[2] Jin Qi,[3] Mahmoud Abdullah,[3] Yoganand Balagurunathan,[3] Robert Gillies,[3] Matthew Schabath[4] *[1]Biomedical Engineering, Namik Kemal University, Tekirdag/FL/Turkey, [2]Thoracic Oncology, Moffitt Cancer Center, Tampa/FL/United States of America, [3]Radiology and Cancer Imaging, Moffitt Cancer Center, Tampa/FL/United States of America, [4]Cancer Epidemiology, H Lee Moffitt Cancer Center and Research Institute, Tampa/FL/United States of America*

Background: Although immunotherapy has revolutionized the field of cancer treatment, response rates are only $\sim$20% in non-small cell lung cancer (NSCLC) patients and cost of this therapy is high. Predictive biomarkers are needed to identify patients likely to benefit.

Converting digital medical images into high-dimensional data ('*Radiomics*') contains information that reflects underlying pathophysiology and that can be revealed via quantitative analyses. We extracted radiomic imaging features from baseline CT scans (prior to initiation of immunotherapy) and identified features that predict response to immunotherapy in NSCLC patients. This work is an initial test of the hypothesis that radiomic data may predict who will respond favorably and who will not.

Methods: We curated a subset of data and images from 13 different institutional immunotherapy clinical trials. Patients were stage III/IV NSCLC and received PD-1, PD-L1, or doublet checkpoint inhibitors. All target nodules were identified on the CT prior scan prior to initiation of immunotherapy. RECIST guidelines 1.1 were used to measure patient response from baseline to last follow-up scan. Based on last follow-up, 43 patients had progressive disease (PD) and 28 patients with partial response (PR) or complete response (CR). Since we focused on extreme responses, stable disease (SD) patients were not included in the current analyses. We extracted 219 radiomic features including size, shape, location, and texture information from a total of 210 target nodules (lung, lymph nodes, or other). Backward-elimination analyses were utilized to generate parsimonious radiomic models associated with objective responses (PD vs. PR/CR) and post estimation computed performance statistics.

Results: There were no significant differences for the patient characteristics between patients with PD vs. CR/PR. Analysis of the radiomic features for all target nodules to differentiate PD patients vs. PR/CR patients resulted in a final model containing 2 features that provided an AUROC of 0.64 (95% CI 0.56—0.72). When we analyzed features for only lung target nodules, we identified a final model with 4 features that produced an AUROC of 0.79 (95% CI 0.68—0.89). When we analyzed the imaging features for lymph node target nodules, we found that a final model with 1 feature yielded an AUROC of 0.67 (95% CI 0.51—0.82).

Conclusion: Radiomic features of lung target nodules have better performance statistics for predicting response to immune therapies compared to target nodules from other organ sites. With this model, cutoffs can be chosen to reduce non-responders with high confidence. Change feature analyses following therapy are underway.

Keywords: Imaging Epidemiology, Radiomics, Immunotherapy, Quantitative imaging

P1.01-042
Molecular Epidemiology of Programmed Cell Death 1-Ligand 1 (PD-L1) Protein Expression in Non-Small Cell Lung Cancer

Topic: Prognostic Factors, Treatment

Matthew Schabath,[1] Tapashi Dalvi,[2] Hongyue Dai,[3] Alan Crim,[3] Anita Midha,[4] Norah Shire,[2] Jill Walker,[5] Danielle Greenawalt,[6] David Lawrence,[5] James Rigas,[7] Robert Brody,[2] Danielle Potter,[2] Naveen Kumar,[3] Shane Huntsman,[3] Jhanelle Gray[8]

[1]Cancer Epidemiology, H Lee Moffitt Cancer Center and Research Institute, Tampa/FL/United States of America, [2]Astrazeneca, Gaithersburg/MD/United States of America, [3]M2Gen, Tampa/FL/United States of America, [4]Astrazeneca, Cheshire/United Kingdom, [5]Astrazeneca, Hertfordshire/United Kingdom, [6]Astrazeneca, Waltham/MA/United States of America, [7]Astrazeneca, Hanover/NH/United States of America, [8]H. Lee Moffitt Cancer Center and Research Institute, Tampa/FL/United States of America

Background: Expression of programmed death-ligand 1 (PD-L1) in non-small cell lung cancer (NSCLC) patients might identify patients who would benefit from PD-L1 blocking antibodies. In a retrospective cohort of NSCLC patients, we characterized PD-L1 expression and other biomarkers to determine if PD-L1 expression is a prognostic biomarker and whether patient characteristics could be identified to determine those associated with high expression.

Methods: This was a retrospective analysis of 136 NSCLC patients diagnosed between 1997 and 2015 with stage IIIB and IV disease and treated at Moffitt Cancer Center and affiliated institutions. All patients had at least 2 lines of standard of care chemotherapy and sufficient archival tumor tissue for PD-L1 testing by the Ventana SP263 validated assay and mutation status testing by targeted DNA sequencing with the TumorCare Panel. High PD-L1 expression was defined as $\geq$ 25% of tumor cells with membrane positivity for PD-L1 at any intensity above background staining. Statistical analyses were performed comparing PD-L1 expression by patient characteristics. Survival analyses were performed using Kaplan-Meier survival curves and the log-rank statistic. All statistical tests were two-sided; P-value of less than .05 was considered statistically significant.

Results: Of the 136 tissues tested for PD-L1 expression, 116 (85.3%) were collected by surgical resection and 20 (14.7%) were collected by biopsy. Mean sample age was 7.2 years