Increased Real-World Biomarker Test Utilization in Patients with Early-Stage Non-Small Cell Lung Cancer in the United States, 2011 to 2021

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Background
- Biomarker testing is increasingly crucial for patients with early-stage non-small cell lung cancer (eNSCLC).
- A growing number of biomarker-based treatments, along with companion diagnostic devices, talk to patients with eNSCLC are now under development or have been approved by the US Food and Drug Administration.
- However, little is known about how biomarker tests are conducted and used to guide treatments in patients with eNSCLC in the real-world setting.

Objective
- This exploratory study aimed to understand the real-world utilization of biomarker tests and the subsequent treatment among patients newly diagnosed with eNSCLC.

Methods
- This retrospective observational study used COTA’s de-identified oncology electronic medical record (EMR) database.
- The study included adult patients ≥18 years old diagnosed with eNSCLC (organ stage 0-IV) between January 1, 2011, and December 31, 2021 (See Figure 1 for detailed patient identification).
- Patients with eNSCLC were identified using a combination of ICD-9/10-CM diagnosis codes, histology codes, and manual confirmation from medical abstractors.
- The date of the first eNSCLC diagnosis was the study index date.
- Descriptive statistics were reported for the study.
- To understand the biomarker test utilization over time, testing rates were reported by the index year for patients who received any biomarker test within 6 months of their eNSCLC diagnosis and by each molecular marker.
- In a subgroup of patients who received the five most commonly used biomarker tests, we reported the timing of initial diagnosis to biomarker testing, and timing of biomarker testing to first-line systemic treatment initiation.

Conclusions
- This study fills a gap in current knowledge by examining the real-world biomarker test utilization and subsequent treatment over 11 years in a national sample of adult patients with eNSCLC.
- The study suggests a high biomarker testing rate among patients with eNSCLC, indicating a continuous trend towards personalization of treatment decisions.
- Future research is needed to understand whether biomarker testing has improved optimal treatment decision making and long-term survival outcomes for patients with eNSCLC.

Results
- Of the 1031 eNSCLC patients included in the study (Table), the majority were aged 65 years and older, White (91.8%), and had a history of tobacco use (81.4%).

<table>
<thead>
<tr>
<th>Definition</th>
<th>Patients, n (%)</th>
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<tr>
<td>Adult patients ≥18 years old with eNSCLC extracted from COTA</td>
<td>1200 (100)</td>
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<tr>
<td>Patients with eNSCLC diagnosis in or after 2011</td>
<td>1120 (93.3)</td>
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<td>Excluding patients with cancer stage unspecified</td>
<td>1119 (93.3)</td>
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<td>Patients with biomarker tested on or after initial diagnosis date</td>
<td>1111 (92.6)</td>
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<tr>
<td>Patients who had at least one medical activity within 182 days after the initial diagnosis</td>
<td>1103 (91.9)</td>
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<td>Patients with no evidence of any interaction with the healthcare system within 90 days of diagnosis or survival less than 30 days after diagnosis</td>
<td>1043 (86.9)</td>
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<tr>
<td>Patients who did not enroll in a clinical trial within 182 days of the initial diagnosis</td>
<td>1031 (85.9)</td>
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<th>Analytic sample</th>
<th>Patients, n (%)</th>
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<tr>
<td>Most patients (n = 764, 74.1%) received at least one biomarker test within 6 months of their eNSCLC diagnosis</td>
<td>1031 (85.9)</td>
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- The 10 most frequently tested biomarkers were epidermal growth factor receptor (EGFR) (64%), anaplastic lymphoma tyrosine kinase (ALK) (40%), programmed death ligand 1 (PD-L1) (48%), ROS proto-oncogene 1 (ROSC1) (46%), BRAF (40%), human epidermal growth factor receptor 2 (HER2) (21%), PIK3CA (20%), and PTPN11 (14%).

- Of the 1031 patients with eNSCLC during the entire study period between 2011-2021, the proportion of patients undergoing biomarker testing rose from 55.3% in 2011 to 88.1% in 2021 (Figure 2).

- The test turnaround time was shortest for IHC testing (median [interquartile range [IQR]]: 9 [7–22] days) and longest for RNA sequencing (median [IQR]: 59 [36–68] days).
- Among 763 patients who received the five most commonly used biomarker tests (i.e., EGFR, ALK, PD-L1, ROS1, and BRAF), almost all of them received a biomarker test before the initiation of a systemic treatment (Figure 4).

- The most commonly performed testing method was Sanger sequencing for EGFR (n = 244, 37%), fluorescent in situ hybridization (FISH) for ALK (n = 446, 75%), and ROS1 (n = 357, 51%), immunohistochemistry (IHC) for PD-L1 (n = 450, 90%), and next generation sequencing (NGS) for other biomarkers (Figure 3).

Figure 1. Biomarker tests received within 6 months of diagnosis among the 1031 patients with eNSCLC during the entire study period between 2011-2021

Figure 2. Trends in receipt of the top 10 biomarker tests within 6 months of diagnosis over time (2011-2021)

Figure 3. Distribution of biomarker testing methods among 764 patients with eNSCLC who received biomarker tests within 6 months of diagnosis

Figure 4. Time from diagnosis to five most commonly used biomarker tests and time from five most commonly used biomarker tests to systemic treatment initiation within 1 year of eNSCLC diagnosis