Biomarker Testing in NSCLC: A Landscape Assessment of Administrative Data

P.A. Pawloski[1], S.M Myers[2], C.M. Lockhart[1]

1. Academy of Managed Care Pharmacy Research Institute, Alexandria, VA, USA,
2. PearlDiver Technologies, Colorado Springs, CO, USA.

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INTRODUCTION

- Lung Cancer is the leading cause of cancer mortality in the US
- Oncology precision medicine aims to tailor cancer treatment to a patient's unique tumor molecular profile to deliver high-quality, personalized, evidence-based care
- Despite National Comprehensive Cancer Network (NCCN) recommendations for broad panel biomarker testing for all newly diagnosed non-small cell lung cancer (NSCLC), studies report sub-optimal biomarker testing rates
- We sought to describe the current biomarker testing landscape among patients diagnosed with NSCLC and quantify biomarker testing and first cycle targeted therapy

METHODS

- A longitudinal retrospective study of patients diagnosed with lung cancer using a national, multi-payer claims database (PearlDiver)
- 174 million patients with commercial, Medicare, Medicaid, employer-sponsored, worker's compensation, and out of pocket claims across all US states and territories from 1/1/2010-12/31/2023
- Patients 20 years and older with two lung cancer diagnoses at least 30 days apart were identified using International Classification of Diseases (ICD)-9 and -10 codes
- Patients had no prior cancer diagnoses or history of chemotherapy receipt
- Biomarker testing was identified by Current Procedural Terminology (CPT) codes
- First cycle targeted therapy receipt was identified by CPT codes and National Drug Codes (NDCs)
- The National Cancer Institute Comorbidity Index based on ICD codes
- Risk Analysis Index frailty score based on demographics and ICD codes
- Biomarker testing was described by patient demographics, comorbid conditions, and payer type in two cohorts: 2010-2018 (Early) and 2019-2023 (Late) to ascertain testing rates relative to changes in NCCN recommendations for comprehensive biomarker testing

CONCLUSIONS

- Among patients with a diagnosis of lung cancer, biomarker testing remains low, but has increased over time across sex, age, and health plan coverage
- Multi-gene panel testing remains low, but has increased over time
- The receipt of targeted therapy has increased among those who receive biomarker testing, but is also identified and increasing among those without a claim for biomarker testing

RESULTS

Table 1. Demographics of patients with a lung cancer diagnosis 2010-2023

Characteristic	2010-2018						2019-2023					
Biomarker Test Status	Untested	%	Tested	%	Total	%	Untested	%	Tested	%	Total	%
Number of Patients	265,244	100.00%	190,016	100.00%	455,260	100.00%	100,369	100.00%	113,429	100.00%	213,798	100.00%
Age (years)												
20-39	1,029	0.39%	1,230	0.65%	2259	0.50%	423	0.42%	543	0.48%	966	0.45%
40-59	42,538	16.04%	41,793	21.99%	84,331	18.52%	14,124	14.07%	17,287	15.24%	31,411	14.69%
60-79	217,945	82.17%	144,411	76.00%	362,356	79.59%	71,627	71.36%	81,875	72.18%	153,502	71.80%
80+	3,732	1.41%	2,582	1.36%	6,314	1.39%	14,195	14.14%	13,724	12.10%	27,919	13.06%
Sex												
Female	136,845	51.59%	101,202	53.26%	238047	52.29%	52,194	52.00%	60,750	53.56%	112944	52.83%
Male	128,397	48.41%	88,814	46.74%	217,211	47.71%	48,174	48.00%	52,679	46.44%	100853	47.17%
Payer												
Cash	161	0.06%	226	0.12%	387	0.09%	134	0.13%	151	0.13%	285	0.13%
Commercial	126,218	47.59%	124,608	65.58%	250,826	55.10%	54,033	53.83%	69,471	61.25%	123504	57.77%
Government	3,784	1.43%	2,457	1.29%	6,241	1.37%	2,437	2.43%	1,685	1.49%	4,122	1.93%
Medicaid	14,811	5.58%	9,855	5.19%	24,666	5.42%	6,775	6.75%	6,549	5.77%	13324	6.23%
Medicare	115,191	43.43%	49,620	26.11%	164,811	36.20%	34,826	34.70%	31,760	28.00%	66586	31.14%
NCI Comorbidity Index (mean)	2.21		2.71		2.37		1.9		2.17		1.9	
RAI Frailty Index (SD)	51.29	(6.10)	51.63	(6.25)	51.36	(6.15)	54.32	(7.23)	55.03	(7.37)	54.32	(7.23)
Receipt of Targeted Therapy	23,446	8.84%	19,658	10.35%	43,104	9.47%	16,810	16.75%	47,530	41.90%	64,340	30.09%
Mean time from diagnosis to first biomarker Test (days; SD)	—	—	562.5	(709.6)	—	—	—	—	376.6	(759.5)	—	—
Est NSCLC Diagnoses (85% population)	225,457	85.00%	161,513	85.00%	386,971	85.00%	85,313	85.00%	96,414	85.00%	181,728	85.00%

Figure 1. Biomarker Testing in Lung Cancer over Time

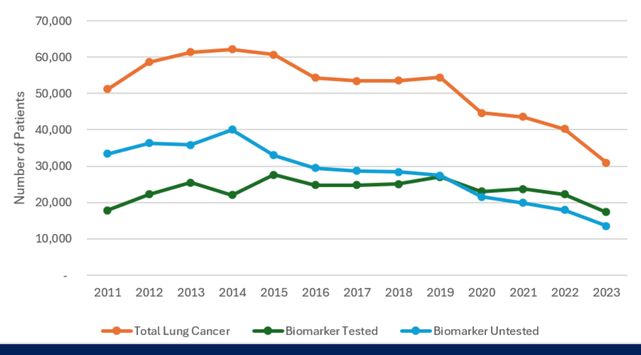


Figure 2. Biomarker Testing of Total Lung Cancer Diagnoses

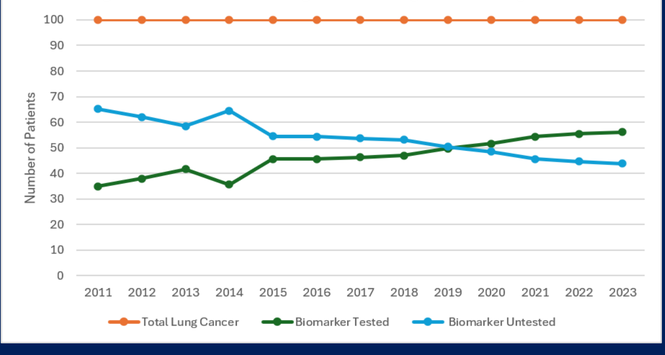


Figure 3. Biomarker Untested and Tested by Age 2010-2018

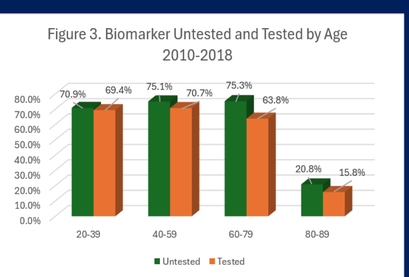


Figure 4. Biomarker Untested and Tested by Payer 2010-2018

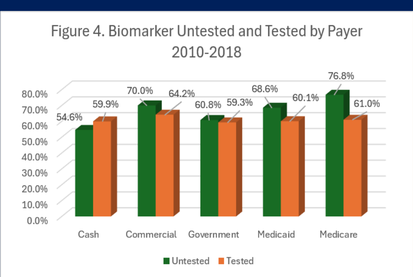


Figure 5. Biomarker Untested and Tested by Sex 2010-2018

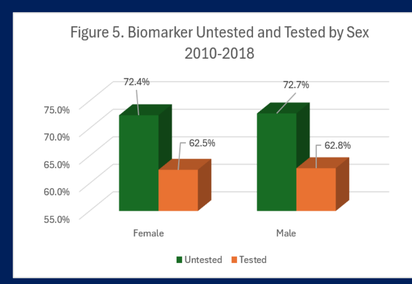


Figure 6. Biomarker Untested and Tested by Age 2019-2023

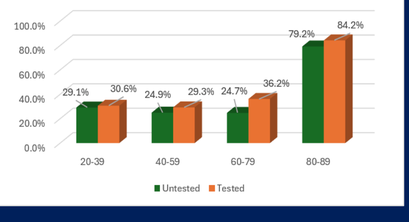


Figure 7. Biomarker Untested and Tested by Payer 2019-2023

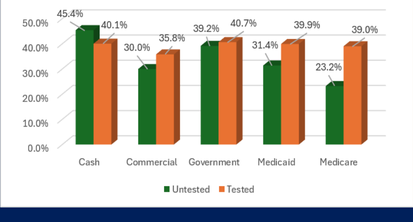


Figure 8. Biomarker Untested and Tested by Sex 2019-2023

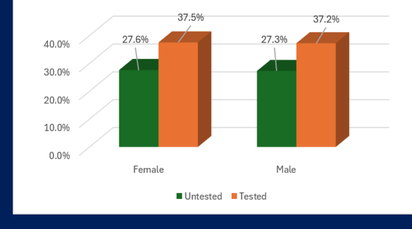


Figure 9. First Targeted Therapy in Biomarker Untested 2010-2018

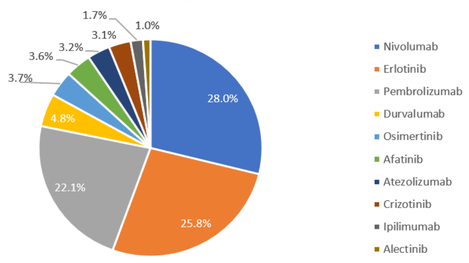


Figure 10. First Targeted Therapy in Biomarker Tested 2010-2018

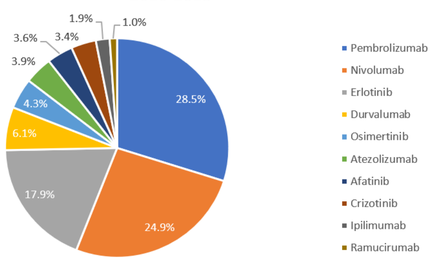


Figure 11. First Targeted Therapy in Biomarker Untested 2019-2023

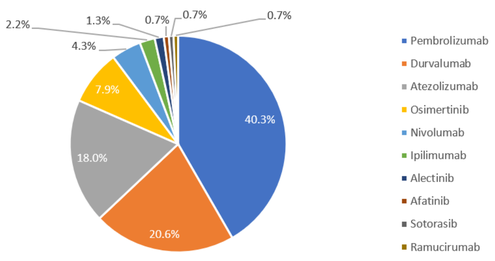


Figure 12. First Targeted Therapy in Biomarker Tested 2019-2023

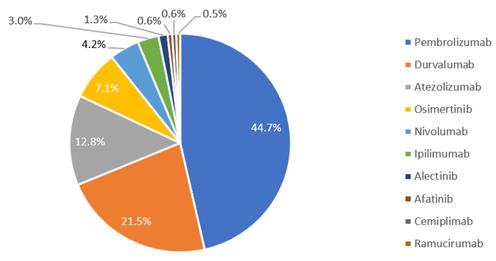


Table 2. Most Common Biomarker Tests among Patients with Lung Cancer 2010-2018 (n=190,016)

CPT Code	Test Name	n	%
88342	Immunohistochemistry (including tissue immunoperoxidase), each antibody	79,468	41.82%
88341	Immunohistochemistry/Cytochemistry, each additional antibody slide	61,057	32.13%
81235	EGFR gene analysis, common variants	15,789	8.31%
81210	BRAF gene analysis V600E variant	8,356	4.40%
88360	Morphometric analysis tumor immunohistochemistry (e.g., Her-2/neu estrogen receptor/progesterone receptor) quantitative or semiquantitative, each antibody	4,969	2.62%
88368	Morphometric analysis in situ hybridization (quantitative or semi-quantitative), each probe	2,543	1.34%
88271	Molecular cytogenetics; DNA probe, each (e.g., FISH)	2,173	1.14%
81401	Molecular pathology procedure Level 2 (e.g., 2-10 SNPs, 1 meth variant, 1 somatic variant, or detection of a dynamic mutation/triplet repeat disorder)	2,135	1.12%
81445	Targeted genomic sequence DNA analysis, 5-50 genes	1,790	0.94%
81455	Genomic sequence analysis DNA & RNA analysis, 51 or more genes	1,757	0.92%

Table 3. Most Common Biomarker Tests among Patients with Lung Cancer 2019-2023 (n=113,429)

CPT Code	Test Name	n	%
88341	Immunohistochemistry/Cytochemistry each additional antibody slide	66,733	58.83%
88342	Immunohistochemistry (including tissue immunoperoxidase) each antibody	19,776	17.43%
88360	Morphometric analysis tumor immunohistochemistry (eg Her-2/neu estrogen receptor/progesterone receptor) quantitative or semiquantitative each antibody	7,073	6.24%
81479	Unlisted molecular pathology procedure (e.g., novel assay, NGS panel, liquid biopsy, or PGx)	3,189	2.81%
81210	BRAF gene analysis V600E variant	2,739	2.41%
81445	Targeted genomic sequence DNA analysis 5-50 genes	2,176	1.92%
81455	Genomic sequence analysis DNA & RNA analysis 51 or more genes	2,006	1.77%
81235	EGFR gene analysis common variants	1,348	1.19%
81401	Molecular pathology procedure Level 2 (e.g., 2-10 SNPs, 1 meth variant, 1 somatic variant)	1,332	1.17%
88344	Immunohistochemistry/Cytochemistry each multiplex antibody slide	1,050	0.93%

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CONTACT INFORMATION

Pam Pawloski, PharmD, BCOP ppawloski@bbcic.org
Principal Research Scientist
AMCP Research Institute https://www.amcp.org/Research-Institute

