Disparities in biomarker testing practices in patients with metastatic non-small cell lung cancer (NSCLC) in the United States (US)

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Objective

- To investigate trends and disparities in real-world biomarker testing receipt of biomarker-informed therapy for EGFR, ALK, ROS1, MET, BRAF, RET, and PD-L1 biomarkers in US patients diagnosed with metastatic non-small cell lung cancer (mNSCLC)

Background

- Biomarker testing is guideline recommended to inform treatment patterns for mNSCLC patients. [1]
- While testing rates have been increasing,[2] data from other tumor types suggest possible disparities in access to and use of biomarker testing.

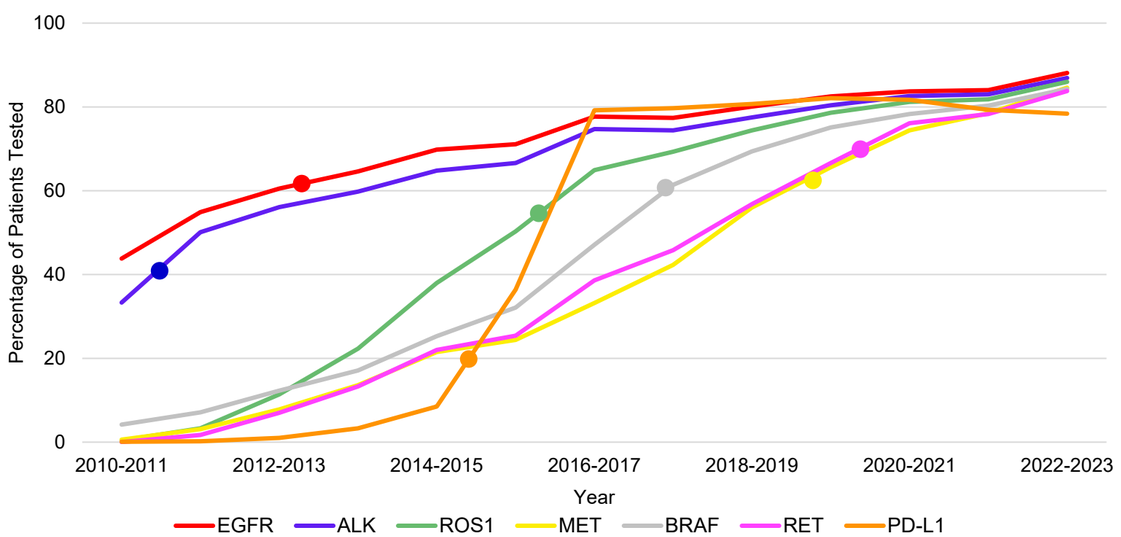
Methods

- This study of adults ≥18 years old with stage IV mNSCLC used the nationwide Flatiron Health electronic health record-derived de-identified database (01/2011-04/2023).
- Biomarker testing rate (i.e., proportion of patients with mNSCLC with at least one biomarker test) and receipt of biomarker-informed therapy, since its date of availability, were quantified.
  - Biomarker-informed therapy is defined as any guideline recommended targeted therapy indicated for the specific biomarker (e.g., for ALK+ patients, receipt of crizotinib, ceritinib, alectinib, brigatinib, lorlatinib). [1]
- Unadjusted biomarker testing and receipt of biomarker-informed therapy rates were assessed in groups of patients stratified by demographic and clinical characteristics, including age group, sex, race, insurance type, practice type, smoking status, and histology to quantify disparities.

Results

- In 42,037 patients with mNSCLC, 34,510 (82.1%) received at least one biomarker test.
- Over the entire study period, the rates for each test were: EGFR: 74.9%, ALK: 71.6%, ROS1: 54.2%, MET: 41.4%, BRAF: 48.8%, RET: 42.3%, and PD-L1: 49.3%.
  - Yearly testing rates increased, with the most recent year suggesting that anywhere from 78.7% of patients to 88.7% of patients received a test for at least one biomarker, with PD-L1 and EGFR being the least and most frequently tested, respectively **(Figure 1)**.
- Over the entire study period, the rates for biomarker-informed therapies varied by biomarker: EGFR: 82.1%, ALK: 89.0%, ROS1: 66.7%, MET: 37.3%, BRAF: 47.2%, RET: 25.0%, and PD-L1: 68.1%.
  - In the most recent year of data, 2022-2023, the biomarker-informed therapy use was: EGFR: 79.5%, ALK: 84.3%, ROS1: 66.7%, MET: 56.6%, BRAF: 56.8%, RET: 63.6%, and PD-L1: 64.0%.

Figure 1: Biomarker testing rates by year



Circles represent date of the first FDA approved of a biomarker-informed therapy for each biomarker.

Impact of demographics on testing (Table 1)

- Rates of testing varied by age group, with 83.6% of younger patients (ages <65) receiving a test compared to 81.2% of older patients (ages ≥65) (**Table 1**).
- Females had a higher percentage of testing 85.0% compared to males (79.3%) (**Table 1**).
- Asian patients had the highest testing rate (91.6%) whereas Black and Hispanic/Latino patients had the lowest (80.8% and 82.5% respectively) (**Table 1**).
  - 82.2% of White patients, the largest racial demographic in this dataset, received at least one test.
- Commercial health plans had a higher testing rate compared to Medicare or Medicaid (87.1%, 81.6% and 81.2%, respectively).
  - Insurance type stratified by age demonstrated that younger patients, regardless of insurance types, were more frequently tested with a 1-2% point difference.
- Smoking status (current or former) was associated with less testing (80.7%) compared to patients with no history of smoking (91.1%).
  - History of smoking had a similar impact on patients, regardless of their race, with an average 11% points fewer patients receiving a test among patients with a history of smoking compared to their no history of smoking counterparts, except among Asian patients, where history of smoking had a more minor impact.
- Patients with non-squamous histology were more frequently tested (88.0%) compared to squamous histology (61.2%).

Impact of demographics on receipt of biomarker-informed therapy (Table 2)

- Younger patients (<65 years) received biomarker-informed therapy more frequently, except for the EGFR and PDL1 biomarkers.
- Receipt of biomarker-informed therapy varied by patient demographics and clinical characteristics.

Table 1: Disparities of biomarker testing by patient demographic or clinical characteristics

Characteristics	Percentage of patients by demographic who received test
Age Group	
<65 years	83.6
≥65 years	81.2
Sex	
Female	85.0
Male	79.3
Race	
White	82.2
Black or African American	80.8
Asian	91.6
Hispanic / Latino	82.5
Other Race	83.0
Practice Type	
Academic	81.8
Community	82.0
Insurance Type	
Commercial	87.1
Medicaid	81.2
Medicare	81.6
Smoking Status	
History of smoking	80.7
No history of smoking	91.1
Histology	
Squamous	61.2
Non-squamous	88.0
Not otherwise specified	70.5

Table 2: Disparities of biomarker-informed therapy, by biomarker, by patient demographic or clinical characteristics

Characteristic	Percentage of patients by demographic who received biomarker-informed therapy						
	EGFR	ALK	ROS1	MET	BRAF	RET	PD-L1
Age Group							
<65 years	81.1	91.0	67.8	40.4	49.6	27.5	64.8
≥65 years	82.8	85.8	65.5	36.7	45.7	23.0	70.0
Sex							
Male	79.0	88.3	67.1	39.9	44.2	28.2	71.4
Female	83.7	89.5	66.4	35.3	49.5	22.4	64.8
Race							
White	80.4	87.7	64.1	38.4	45.1	26.1	69.1
Black or African American	82.1	83.3	80.0	31.6	64.7	16.7	71.2
Asian	89.4	96.3	65.0	33.3	55.6	0.0	44.3
Hispanic / Latino	84.2	88.3	77.8	46.2	47.1	46.2	62.6
Other Race	84.0	94.1	79.0	36.0	50.0	33.3	65.8
Practice Type							
Academic	83.6	91.2	61.8	44.3	54.1	27.4	57.9
Community	81.7	87.9	67.7	35.1	45.6	25.3	70.3
Insurance Type							
Commercial	84.1	91.3	68.7	37.8	47.1	31.8	67.7
Medicaid	80.8	96.0	50.0	0.0	71.4	33.3	72.2
Medicare	80.4	81.4	66.2	40.4	46.3	20.0	69.2
Smoking Status							
History of smoking	78.3	85.8	63.1	38.2	45.0	19.3	73.3
No history of smoking	86.0	91.7	69.9	35.7	52.4	34.1	44.1
Histology							
Squamous	59.3	85.0	63.6	37.1	30.0	5.0	40.0
Non-squamous	82.9	89.2	66.4	37.1	46.4	27.5	44.1
Not otherwise specified	72.2	84.0	83.3	41.2	90.0	12.5	73.2

Conclusions

- This study provides contemporary data on real-world biomarker testing and disparities in mNSCLC in the US.
- Results suggest that more research can be done to evaluate and address testing disparity gaps in specific subsets, including Black and Hispanic patients and those with a current or former history of smoking.
- Further analyses should be conducted to explore the impact of clinical impact of disparities.

References:. **[1]** Pennell et al. Am Soc Clin Oncol Educ Book, 2019. **[2]** Robert et al. Lung Cancer, 2022.

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