Racial Disparities in Biomarker Testing Rate, First-Line Treatment Patterns and Clinical Outcomes Among Real-World Patients in the United States With Advanced or Metastatic Non-Small Cell Lung Cancer

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Conclusions

- In this cohort of patients with a/mNSCLC with access to 1L treatments, there were limited disparities observed in PD-L1 testing rate, 1L treatment distribution, and clinical outcomes by race.
- Real-world overall survival (rwOS), real-world time-to-treatment discontinuation (rwTTD), and real-world time-to-next-treatment (rwTTNT) outcomes were similar between White and Black patients and slightly improved for Asian patients; however, the findings in the Asian population should be interpreted with caution because of the small sample size.
- Results from this study highlight the need for an overall increase in PD-L1 testing rates across races and equitable access to 1L treatment to minimize racial disparities.

Introduction

- Results of current population-based racial disparity studies in non-small cell lung cancer (NSCLC), including advanced/metastatic NSCLC (a/mNSCLC) suggest that although disparities exist in access to treatment,[1] evidence on post-treatment outcomes suggests that disparities may not be associated with race alone.[2,3]
- Real-world differences in treatment outcomes in patients with a/mNSCLC are likely associated with potential disparities in treatment experiences underpinned by social demographics (eg, race, ethnicity, region, socioeconomic status [SES] index, treatment settings, and insurance coverage).
- The systematic evaluation of real-world evidence on racial disparities in the treatment of patients with a/mNSCLC is necessary to derive insights that will inform better clinical practice in the management of NSCLC.
- In this study, programmed cell death ligand 1 tumor proportion score (PD-L1 TPS) testing rates, 1L treatment choice, and clinical outcomes by racial groups were compared in 1L-treated patients with a/mNSCLC without actionable genomic alterations in the United States.

Objective

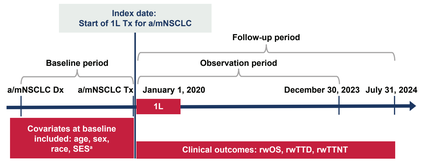
- To assess 1L-treated patients with a/mNSCLC for racial disparities in:
  - PD-L1 testing patterns.
  - 1L treatment distribution.
  - Clinical outcomes such as real-world overall survival (rwOS), real-world time-to-treatment discontinuation (rwTTD), and real-world time-to-next-treatment (rwTTNT).

Methods

- Data were obtained by retrospective analysis of the nationwide United States Flatiron Health electronic health record-derived deidentified database (**Figure 1**).[4]
- Eligibility criteria
  - Patients were aged ≥18 years at first diagnosis of a/mNSCLC and had received any 1L systemic treatment within 180 days after diagnosis, between January 1, 2020, to December 30, 2023 (data cutoff date: July 31, 2024).
  - No primary cancer diagnosis other than a/mNSCLC (except for nonmetastatic, nonmelanoma skin cancer) within 5 years before the index date.
  - No evidence of actionable genomic alteration (ie, *ALK, EGFR, BRAF, KRAS, RET, ROS, NTRK*) and no clinical trial participation.
- rwOS, rwTTD, and rwTTNT were calculated using the Kaplan-Meier method.
- Adjusted Cox regression models were used to compare outcomes between racial (White and Black) groups.
- The models adjusted for age, sex, race, denovo, Eastern Cooperative Oncology Group performance status (ECOG PS), histology, PD-L1 TPS category, SES index, brain and liver metastases, payer type, index year, practice region, practice type, smoking status, and treatment category.

Study Design

Figure 1. Study Design



[a]SES was calculated using Census block group (ie, neighborhood) data from the American Community Survey (2015-2019) per the Yost Index (incorporating income, home values, rental costs, poverty, blue-collar employment, unemployment, and education information).
1L, first-line; a/mNSCLC, advanced/metastatic non–small cell lung cancer; Dx, diagnosis; rwOS, real-world overall survival; rwTTD, real-world time to treatment discontinuation; rwTTNT, real-world time to next treatment; SES, socioeconomic status; Tx, treatment.

Limitations

- As this analysis is largely community based and post oncologist referral, any disparities before oncologist referral were not captured.
- Details of 1L treatment plan were not available, which may lead to 1L treatment misclassification.
- A higher proportion of Asian patients (19.2%) were reported as receiving "Other" 1L treatment, compared with other race groups (2.4%-3.1%). Distribution data for 1L treatments classified under "Other Treatment" were not reported, and may limit the interpretation of 1L-treatment disparities in this group.
- For a large percentage of the analysis cohort, race was either missing (16.6%) or reported as "Other" (6.3%), which limits the analysis by reducing the sample sizes for racial categories analyzed, potentially weakening the statistical power and generalizability of the findings.

Results

- The study population included 7932 patients in total, of which 64.0% were White, followed by Black (11.1%) and Asian (1.9%) patients.
- Most patient demographics and clinical characteristics were similar across all race groups, with few exceptions (**Table 1**).
  - Although most patients in this study had a prior history of smoking, a lower percentage of Asian patients had smoked previously compared with other races.
  - Overall, 42.0% of patients had disease of squamous histology, which is more than that in published reports (25%–30%).[5,6]
  - More Black patients (43.4%) were in the lowest socioeconomic status (SES) group than White (16.9%) and Asian (12.5%) patients.
  - Asian patients had the highest percentage (31.6%) in the highest (fifth) SES quintile, followed by White (14.5%) and Black (6.0%) patients.
  - Asian patients had a lower percentage of brain metastases (5.9%) than White (9.1%) and Black (10.3%) patients; however, liver metastases were slightly higher (7.2% vs 4.8% and 4.9%, respectively).
  - The highest percentage of the Black and White patient populations came from the South of the United States, and the highest percentage of Asian patients came from the West.

Table 1. Demographics and Baseline Clinical Characteristics

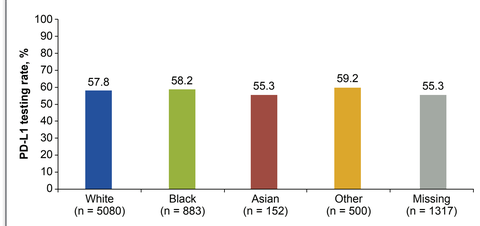
Characteristics	Total (N = 7932)	White (n = 5080)	Black (n = 883)	Asian (n = 152)	Others[a] (n = 500)	Missing (n = 1317)
Age at index, median, y	70	70	68	70	69	71
Sex, n (%)						
Men	4455 (56.2)	2858 (56.3)	484 (54.8)	86 (56.6)	290 (58.0)	737 (56.0)
Women	3477 (43.8)	2222 (43.7)	399 (45.2)	66 (43.4)	210 (42.0)	580 (44.0)
Smoking status, n (%)						
History of smoking	7337 (92.5)	4774 (94.0)	819 (92.8)	96 (63.2)	457 (91.4)	1191 (90.4)
No history/unknown/undocumented	595 (7.5)	306 (6.0)	64 (7.3)	56 (36.8)	43 (8.6)	126 (9.6)
Type of medical insurance, n (%)						
Commercial	3355 (42.3)	2133 (42.0)	388 (43.9)	66 (43.4)	212 (42.4)	556 (42.2)
Medicaid	2340 (29.5)	1700 (33.5)	174 (19.7)	30 (19.7)	120 (24.0)	316 (24.0)
Medicare	618 (7.8)	320 (6.3)	129 (14.6)	19 (12.5)	58 (11.6)	92 (7.0)
Others/missing	1619 (20.4)	927 (18.3)	192 (21.7)	37 (24.3)	110 (22.0)	353 (26.8)
Histology, n (%)						
Nonsquamous cell carcinoma	4245 (53.5)	2613 (51.4)	524 (59.3)	100 (65.8)	284 (56.8)	724 (55.0)
Squamous cell carcinoma	3332 (42.0)	2232 (43.9)	318 (36.0)	46 (30.3)	196 (39.2)	540 (41.0)
Not otherwise specified	355 (4.5)	235 (4.6)	41 (4.6)	6 (4.0)	20 (4.0)	53 (4.0)
ECOG PS						
0	2124 (26.8)	1433 (28.2)	235 (26.6)	40 (26.3)	105 (21.0)	311 (23.6)
1	3219 (40.6)	2115 (41.6)	348 (39.4)	66 (43.4)	183 (36.6)	507 (38.5)
≥2	1609 (20.3)	1018 (20.0)	212 (24.0)	23 (15.1)	109 (21.8)	247 (18.8)
Missing	980 (12.4)	514 (10.1)	88 (10.0)	23 (15.1)	103 (20.6)	252 (19.1)
Metastatic disease sites, n (%)						
Brain	682 (8.6)	460 (9.1)	91 (10.3)	9 (5.9)	33 (6.6)	89 (6.8)
Liver	360 (4.5)	242 (4.8)	43 (4.9)	11 (7.2)	21 (4.2)	43 (3.3)
SES quintile, n (%)						
First (low)	1602 (20.2)	858 (16.9)	383 (43.4)	19 (12.5)	106 (21.2)	236 (17.9)
Second	1635 (20.6)	1071 (21.1)	188 (21.3)	19 (12.5)	103 (20.6)	254 (19.3)
Third	1548 (19.5)	1037 (20.4)	114 (12.9)	27 (17.8)	91 (18.2)	279 (21.2)
Fourth	1485 (18.7)	1031 (20.3)	90 (10.2)	33 (21.7)	84 (16.8)	247 (18.8)
Fifth (high)	1077 (13.6)	735 (14.5)	53 (6.0)	48 (31.6)	51 (10.2)	190 (14.4)
Missing	585 (7.4)	348 (6.9)	55 (6.2)	6 (4.0)	65 (13.0)	111 (8.4)
US Region, n (%)						
North Central	922 (11.6)	689 (13.6)	72 (8.2)	9 (5.9)	72 (14.4)	80 (6.1)
Northeast	968 (12.2)	642 (12.6)	62 (7.0)	28 (18.4)	33 (6.6)	203 (15.4)
South	3669 (46.3)	2413 (47.5)	571 (64.7)	40 (26.3)	167 (33.4)	478 (36.3)
West	1063 (13.4)	368 (7.2)	19 (2.2)	45 (29.6)	169 (33.8)	462 (35.1)
Missing	1310 (16.5)	968 (19.1)	159 (18.0)	30 (19.7)	59 (11.8)	94 (7.1)

Data not shown for the following baseline variables, as these were assessed but with no observed disparities across race: de novo, progressive, PD-L1 status, year of 1L treatment, practice type, or treatment category. [a]No race classification provided, ie, not Asian, Black, White or Hispanic.
1L; first line; ECOG PS, Eastern Cooperative Oncology Group performance status; PD-L1, programmed cell death ligand 1; SES, socioeconomic status; US, United States.

Distribution of PD-L1 Testing by Race

- PD-L1 testing rate before or after the start of 1L treatment was similar for Black, White, and Asian patients (**Figure 2**).

Figure 2. Distribution of PD-L1 Testing by Race

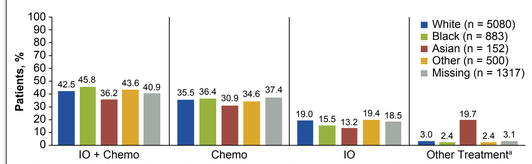


PD-L1, programmed cell death ligand 1.

1L Treatment Distribution by Race

- Similar 1L treatment choices were observed for immunotherapy, chemotherapy, and immunotherapy plus chemotherapy combination therapy between White and Black patients (**Figure 3**).
  - Includes patients who may have started with chemotherapy only while waiting for biomarker/PD-L1 test results and switched to other treatments prior to progression.

Figure 3. Distribution of 1L Treatment by Race

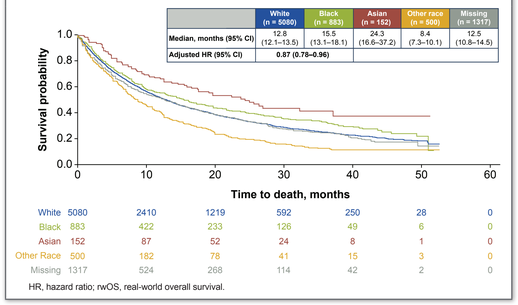


[a]Other treatment includes: paclitaxel, paclitaxel-protein bound, gemcitabine, docetaxel, etoposide, vinorelbine, pemetrexed.
1L, first line; chemo, chemotherapy; IO, immuno-oncology.

Clinical Outcomes by Race

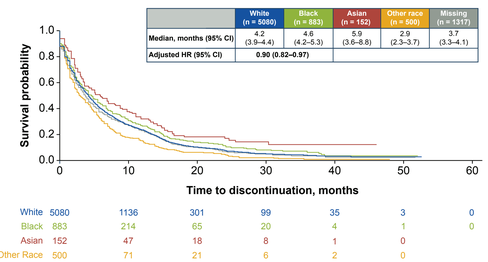
- Survival outcomes were similar between Black and White populations, with slightly better median rwOS among the Black population (hazard ratio [HR], 0.87; 95% CI, 0.78–0.96; **Figure 4**).
  - Longer rwOS was also associated with absence of brain or liver metastases, PD-L1 TPS >1%, ECOG PS score of 0, female sex, and nonsquamous histology (*P* <.01) (data not shown).
- Similarly, median rwTTD and rwTTNT were comparable between Black and White populations, with slightly better outcomes in the Black population (rwTTD: HR, 0.90 [95% CI, 0.82–0.97] and rwTTNT: HR, 0.89 [95% CI: 0.82–0.98]; **Figures 5** and **6**).
  - Longer rwTTD was also associated with no brain or liver metastases, PD-L1 TPS >50%, and ECOG PS score of 0 (*P* <.01) (data not shown).
  - Longer rwTTNT was also associated with academic practice compared with community practice, SES in the first quintile, and ECOG PS score of 0 (*P* <.01) (data not shown).
- The Asian population showed improved outcomes vs the Black or White populations, but results should be interpreted cautiously because of the limited sample size.

Figure 4. rwOS by Race



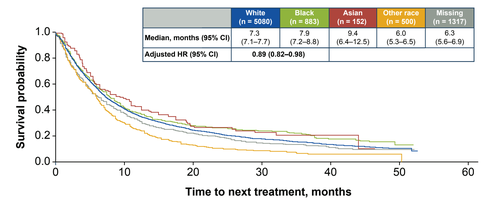
HR, hazard ratio; rwOS, real-world overall survival.

Figure 5. rwTTD by Race



HR, hazard ratio; rwTTD, real-world time to treatment discontinuation.

Figure 6. rwTTNT by Race



HR, hazard ratio; rwTTNT, real-world time to next treatment.

Clinical Outcomes by Race and Sex

- In comparisons of the same sexes between Black and White populations, there was no difference in rwOS, rwTTD, and rwTTNT.
  - Improved outcomes were observed in Asian vs White and Black patients regardless of sex, although the sample size was small.

Table 2. Clinical Outcomes by Race and Sex

Outcomes, median (IQR), mo	White (n = 5080)	Black (n = 883)	Asian (n = 152)	Other Race (n = 500)	Missing (n = 1317)
Men	n = 2858	n = 484	n = 86	n = 290	n = 737
rwOS	11.2 (10.2–11.9)	12.5 (9.7–16.2)	22.4 (13.7–ND)	8.1 (6.8–10.1)	11.8 (9.3–13.3)
rwTTD	3.9 (3.7–4.2)	4.2 (3.3–5.2)	6.2 (3.6–11.0)	2.7 (2.1–4.2)	3.7 (3.2–4.2)
rwTTNT	7.0 (6.5–7.3)	7.1 (6.1–8.0)	9.1 (5.5–15.0)	5.8 (4.7–6.8)	5.7 (5.1–6.9)
Women	n = 2222	n = 399	n = 66	n = 210	n = 580
rwOS	15.2 (14.0–16.9)	18.6 (15.5–22.5)	26.4 (17.5–ND)	9.3 (7.3–11.1)	14.3 (11.4–17.9)
rwTTD	4.4 (4.2–4.9)	4.9 (4.3–5.8)	4.7 (3.3–8.1)	3.4 (2.3–4.0)	3.7 (3.3–4.2)
rwTTNT	8.2 (7.4–8.9)	9.0 (7.8–10.2)	9.8 (5.7–12.6)	6.1 (5.1–6.7)	6.5 (5.8–7.6)

IQR, interquartile range; ND, not determined; rwOS, real-world overall survival; rwTTD, real-world time to treatment discontinuation; rwTTNT, real-world time to next treatment.

References: 1. Dwyer LL, et al. *J Racial Ethn Health Disparities*. 2024;11(3):1489-1500. **2.** Olateju OA, et al. *Front Oncol*. 2023;12:1092355. **3.** Duncan FC, et al. *Transl Lung Cancer Res.* 2024;13(1):76-94. **4.** Flatiron Health. Database Characterization Guide. Flatiron.com. Published March 18, 2025. Accessed April 16, 2025. https://flatiron.com/database-characterization **5.** McKeage MJ, Jameson MB. *J Thorac Dis*. 2010;2(4):199-204. **6.** Neumann JM, et al. *J Cancer Res Clin Oncol*. 2022;148(2):351-360.

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