

Treatment Patterns Among Newly Diagnosed Patients With Multiple Sclerosis by Race and Ethnicity

**Caroline Geiger, Danny Sheinson, Tu My To, David Jones,
Nicole Bonine**

Genentech, Inc., South San Francisco, CA

Thursday, April 7, 2022
S40: MS Diversity and Epidemiology

Scan QR code or click
link to download a PDF
with supplemental
material
<https://bit.ly/3hWHZRJ>



Disclosures

C Geiger is an employee of Genentech, Inc., and shareholder of F. Hoffmann-La Roche Ltd.

D Sheinson is an employee of Genentech, Inc., and shareholder of F. Hoffmann-La Roche Ltd.

TM To is an employee of Genentech, Inc., and shareholder of F. Hoffmann-La Roche Ltd.

D Jones is an employee of Genentech, Inc., and shareholder of F. Hoffmann-La Roche Ltd.

N Bonine is an employee of Genentech, Inc., and shareholder of F. Hoffmann-La Roche Ltd.

Background

- Early initiation of high-efficacy disease-modifying therapies (DMTs) has been shown to reduce the number of relapses and new MRI activity and delay disability progression in MS¹⁻³
- Non-Hispanic Black and Hispanic patients are more likely to have highly active disease and experience worse symptom severity and overall disability and may benefit from early use of high-efficacy DMTs⁴⁻⁷
- However, little is known about the recent use of specific DMTs after diagnosis and how treatment patterns differ by race and ethnicity

Objective



To describe treatment patterns among newly diagnosed patients with MS by race and ethnicity using US claims data

DMT, disease-modifying therapy; MS, multiple sclerosis.

1. Buron MD, et al. *Neurology* 2020;95:e1041–e1051. 2. Harding K, et al. *JAMA Neurol* 2019;536–541. 3. Simonsen CS, et al. *Front Neurol* 2021;12:1009. 4. Ventura RE, et al. *Mult Scler* 2017;23:1554–1557. 5. Kister I, et al. *Neurol Clin Prac* 2021;11:4335–4341. 6. Amezcua L, et al. *Mult Scler* 2020;26:561–567. 7. Pérez CA, et al. *Mult Scler Dis* 2021;56:103248.

Methods

Study design, data source and patient population



Study design and data source

- Retrospective cohort study
- Optum Market Clarity
 - Linked EHR/claims data from the United States
 - Includes commercial, Medicare and Medicaid



- **Study period:** January 1, 2015, to September 30, 2020



Inclusion criteria

- First MS diagnosis code between January 1, 2016, and September 30, 2018
 - **Index date:** date of the first MS diagnosis
- Required to have continuous enrollment in claims data for ≥ 12 months before and ≥ 24 months after the index date
 - **Baseline period:** 12 months prior to index date
 - **Follow-up period:** 24 months after index date
- Initiated any MS DMT during the follow-up period
 - **Index DMT:** first DMT initiated following the index date



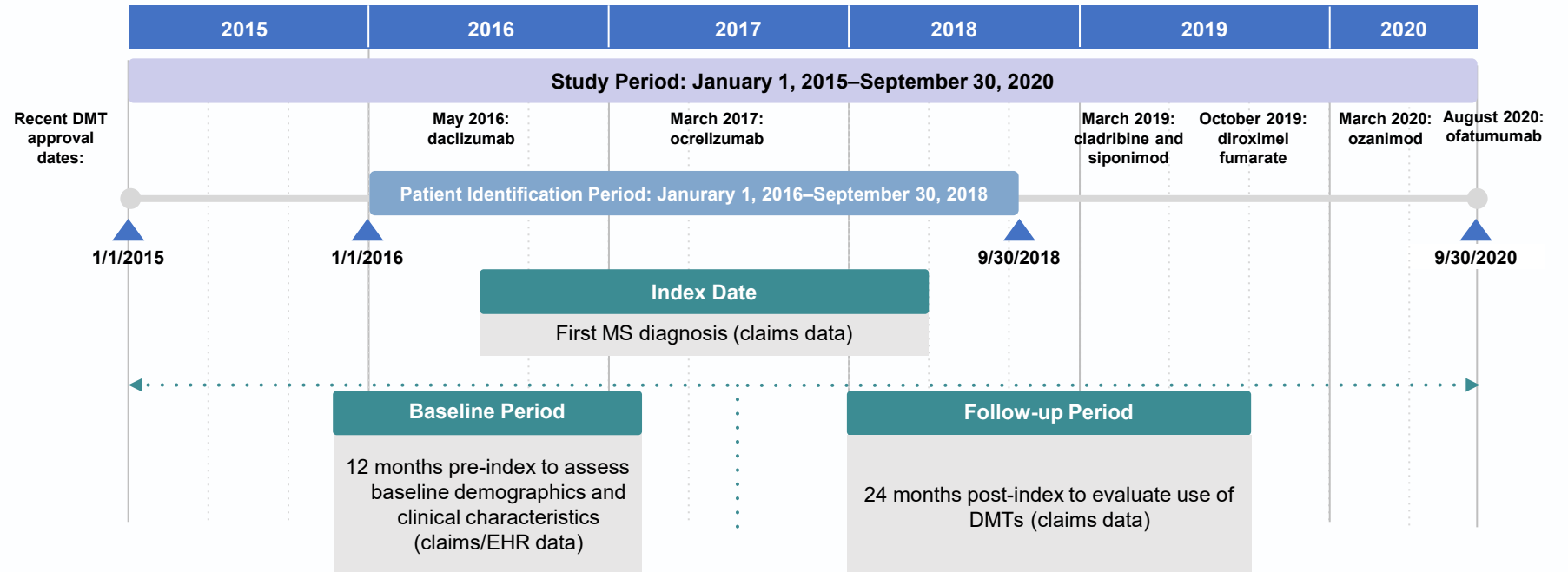
Exclusion criteria

- Patients receiving any DMTs at any time prior to the index date
- Patients initiating multiple concurrent DMTs
- Patients initiating rituximab as the only DMT during the follow-up period
- Pregnancy during the baseline or follow-up periods

Methods

Study time frame, treatment pattern outcomes and classification of DMTs

- Evaluated in the 24 months following the index date:
 - Time to initiation of index DMT
 - Total number of lines of therapy
 - DMTs used in each line
 - Treatment duration in each line
- Treatment patterns (e.g., time to initiation, total number of lines of therapy) were reported overall and stratified by race/ethnicity



High-efficacy DMTs

alemtuzumab, cladribine, daclizumab,^a mitoxantrone, natalizumab, ocrelizumab, ofatumumab, rituximab^b

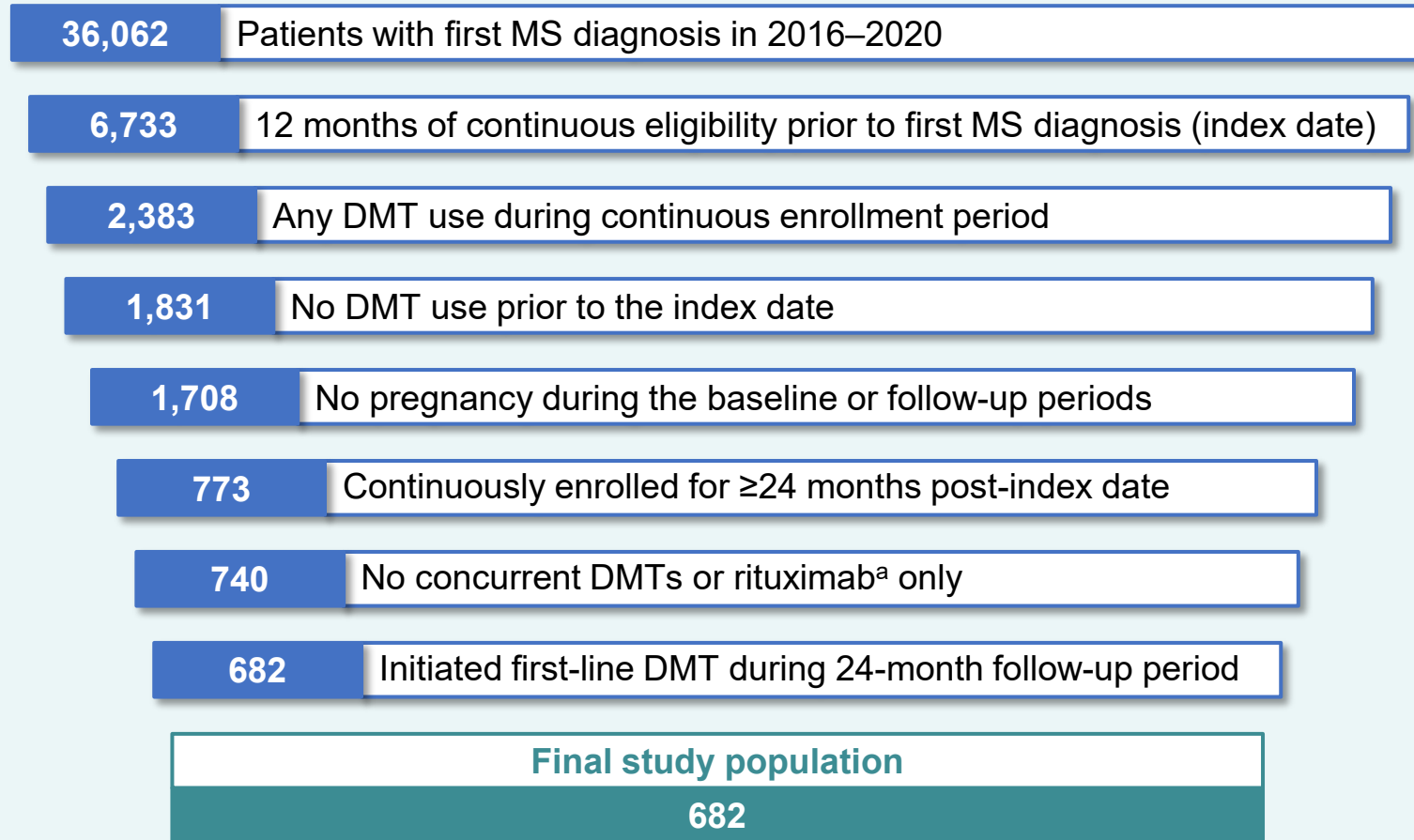
DMT, disease-modifying therapy; EHR, electronic health record; MS, multiple sclerosis.

^aDaclizumab was withdrawn from the market in 2018 but included in this study to capture all lines of treatment.

^bRituximab is not approved for the treatment of MS; however, this treatment was included in the study to capture the correct number of lines of treatment.

Results

Patient selection



DMT, disease-modifying therapy; MS, multiple sclerosis.

^aPatients with rituximab as the only DMT during follow-up period were excluded since rituximab is not approved for the treatment of MS. However, rituximab was included as a potential line of treatment when sequenced with other DMTs to capture the correct line number for all other DMTs.

Results

Baseline characteristics by race and ethnicity

- Non-Hispanic Black and Hispanic patients were more likely to have Medicaid insurance
- Hispanic patients were more likely to be female
- Non-Hispanic White patients were less likely to have comorbidities

	Overall (N=682)	Non-Hispanic Black (n=99)	Non-Hispanic White (n=479)	Hispanic (n=35)	Other/Unknown Race (n=69)	P Value ^a
Age at index diagnosis (years), mean (SD)	43 (12)	43 (13)	44 (12)	40 (12)	42 (12)	0.3
Insurance, n (%)						<0.001
Medicaid	92 (13)	27 (27)	42 (9)	12 (34)	11 (16)	
Medicare	31 (4.5)	4 (4.0)	22 (4.6)	2 (5.7)	3 (4.3)	
Commercial	462 (68)	53 (54)	349 (73)	17 (49)	43 (62)	
Unknown	97 (14)	15 (15)	66 (14)	4 (11)	12 (17)	
Sex, n (%)						0.1
Female	471 (69)	70 (71)	328 (68)	30 (86)	43 (62)	
MS subtype, n (%)						0.4
RRMS	222 (33)	39 (39)	153 (32)	12 (34)	18 (26)	
PPMS	45 (6.6)	5 (5.1)	36 (7.5)	3 (8.6)	1 (1.4)	
SPMS	10 (1.5)	2 (2.0)	6 (1.3)	1 (2.9)	1 (1.4)	
Unknown	405 (59)	53 (54)	284 (59)	19 (54)	49 (71)	
CCI category, n (%)						0.09
None: 0	530 (78)	67 (68)	386 (81)	23 (66)	54 (78)	
Mild: 1–2	134 (20)	27 (27)	83 (17)	10 (29)	14 (20)	
Moderate: 3–4	12 (1.8)	4 (4.0)	7 (1.5)	1 (2.9)	0	
Severe: ≥ 5	6 (0.9)	1 (1.0)	3 (0.6)	1 (2.9)	1 (1.4)	

CCI, Charlson Comorbidity Index; MS, multiple sclerosis; PPMS, primary-progressive multiple sclerosis; RRMS, relapsing-remitting multiple sclerosis; SPMS, secondary-progressive multiple sclerosis.

^aP values calculated with χ^2 test of independence or Kruskal-Wallis test.

Results

First line of treatment by race and ethnicity

- Glatiramer acetate was the most common index DMT across all race/ethnic groups
- Ocrelizumab was the second most frequently initiated index DMT among non-Hispanic White patients

	Overall (N=682)	Non-Hispanic Black (n=99)	Non-Hispanic White (n=479)	Hispanic (n=35)	Other/Unknown Race (n=69)	P Value ^a
Specific index DMT, n (%)						0.9
Glatiramer acetate	219 (32)	28 (28)	158 (33)	11 (31)	22 (32)	
Dimethyl fumarate	123 (18)	20 (20)	78 (16)	10 (29)	15 (22)	
Ocrelizumab	113 (17)	16 (16)	84 (18)	2 (5.7)	11 (16)	
Natalizumab	63 (9.2)	9 (9.1)	46 (9.6)	2 (5.7)	6 (8.7)	
Interferons	62 (9.1)	13 (13)	37 (7.7)	6 (17)	6 (8.7)	
Fingolimod	60 (8.8)	8 (8.1)	45 (9.4)	2 (5.7)	5 (7.2)	
Other DMTs	42 (6.2)	5 (5.1)	31 (6.5)	2 (5.7)	4 (5.8)	

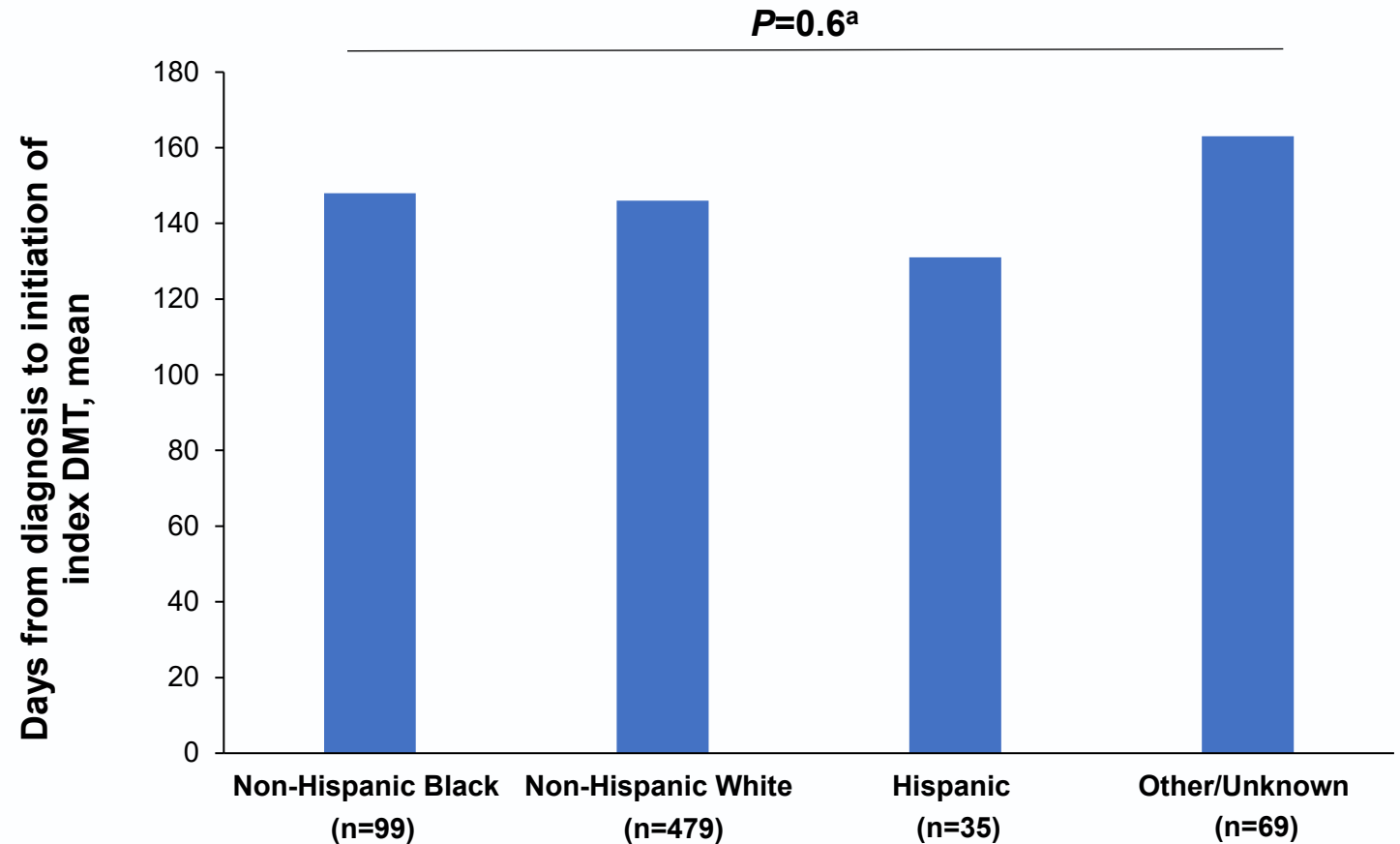
DMT, disease-modifying therapy.

^aP value calculated with χ^2 test of independence or Kruskal-Wallis test.

Results

Time to first line of treatment by race and ethnicity

- Time from diagnosis to initiation of treatment was 4.9 months for all patients
- No significant differences were observed in the time to initiation by race/ethnicity



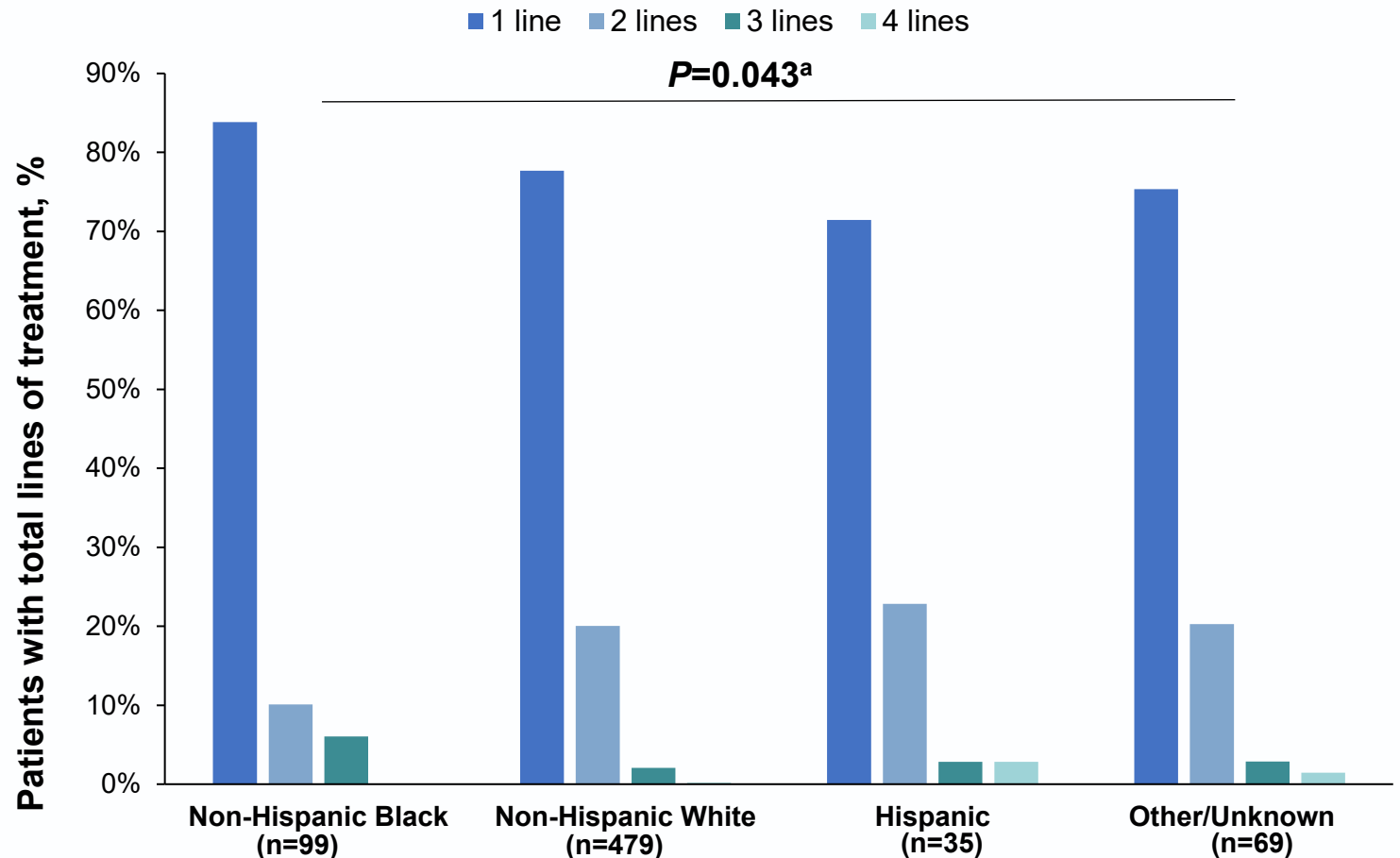
DMT, disease-modifying therapy.

^aP value calculated with Kruskal-Wallis test.

Results

Total lines of treatment by race and ethnicity

- Overall, 78% of patients only received 1 line of treatment in the 2 years after diagnosis
- Hispanic patients were most likely to receive ≥ 2 lines of treatment

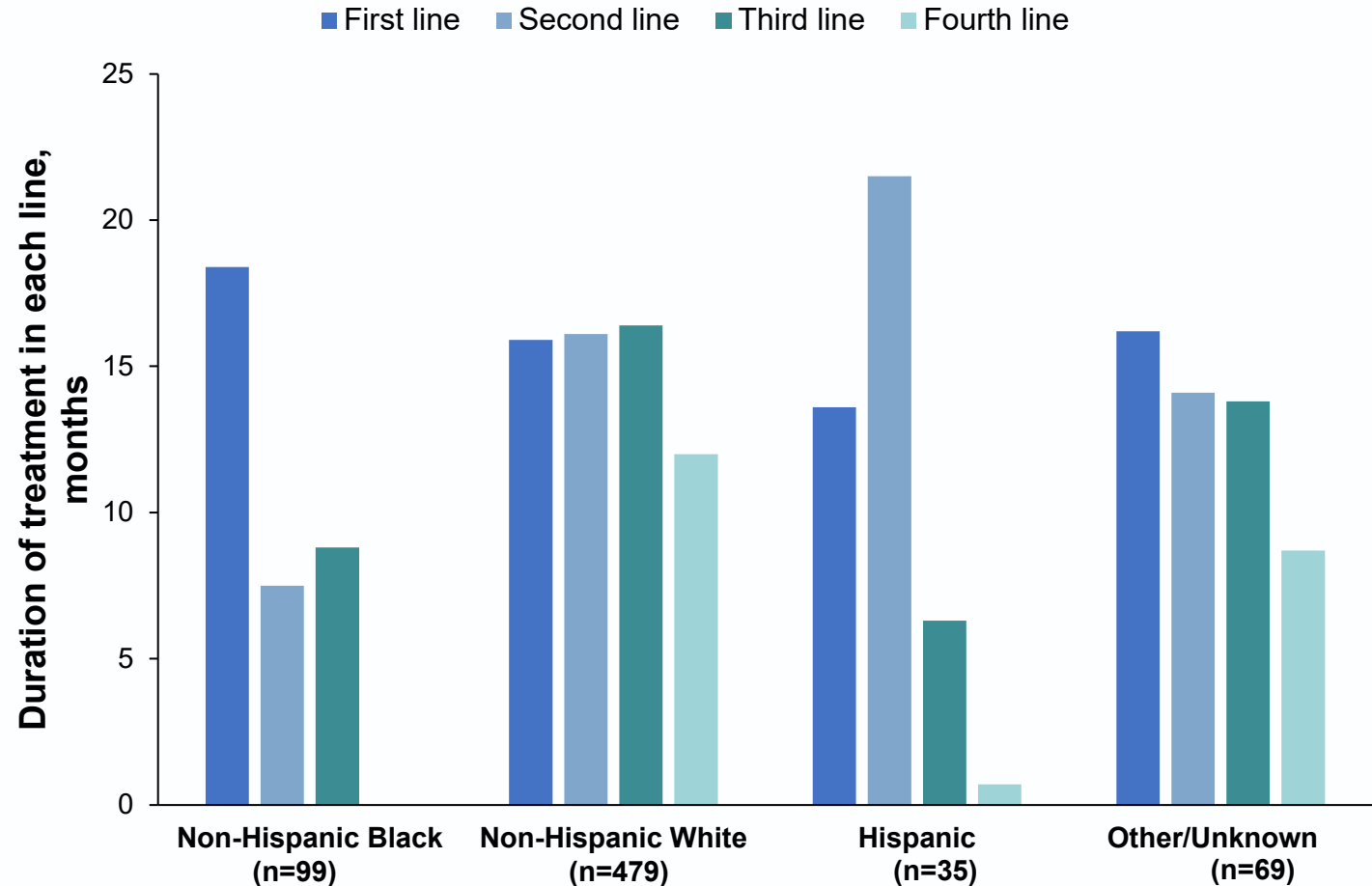


^aP value calculated with χ^2 test of independence.

Results

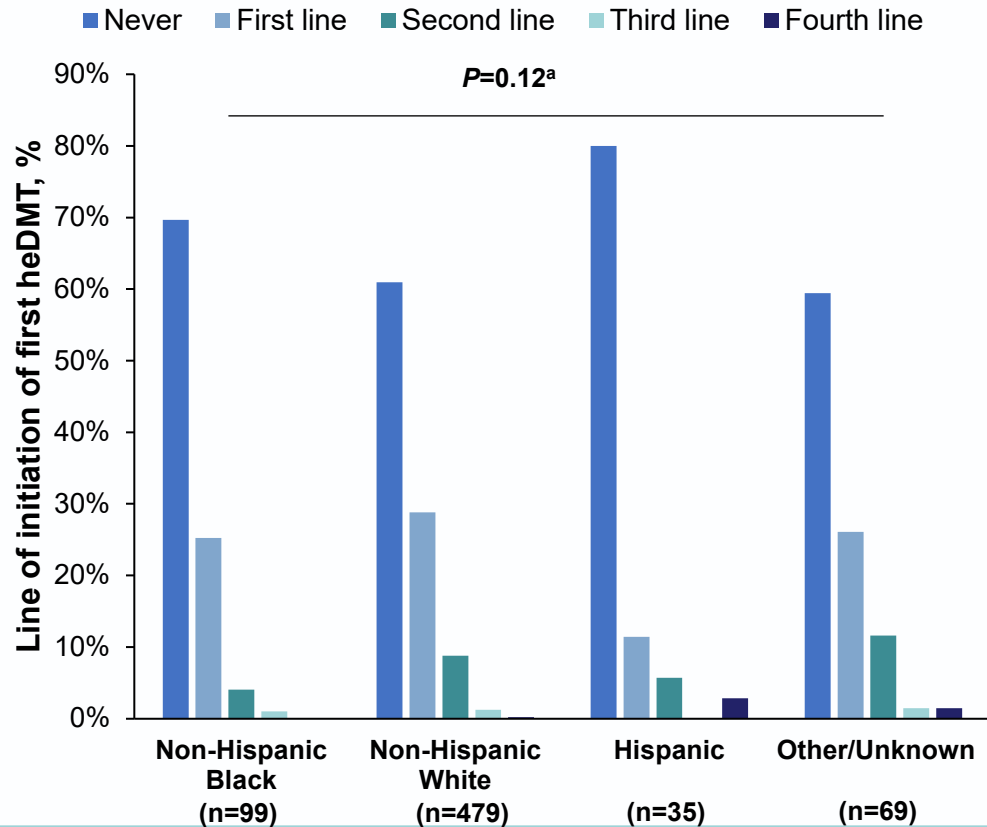
Duration of treatment by race and ethnicity

- Patients continued to receive the first-line DMT for 16.2 months on average
- Hispanic patients had the shortest duration receiving the index DMT

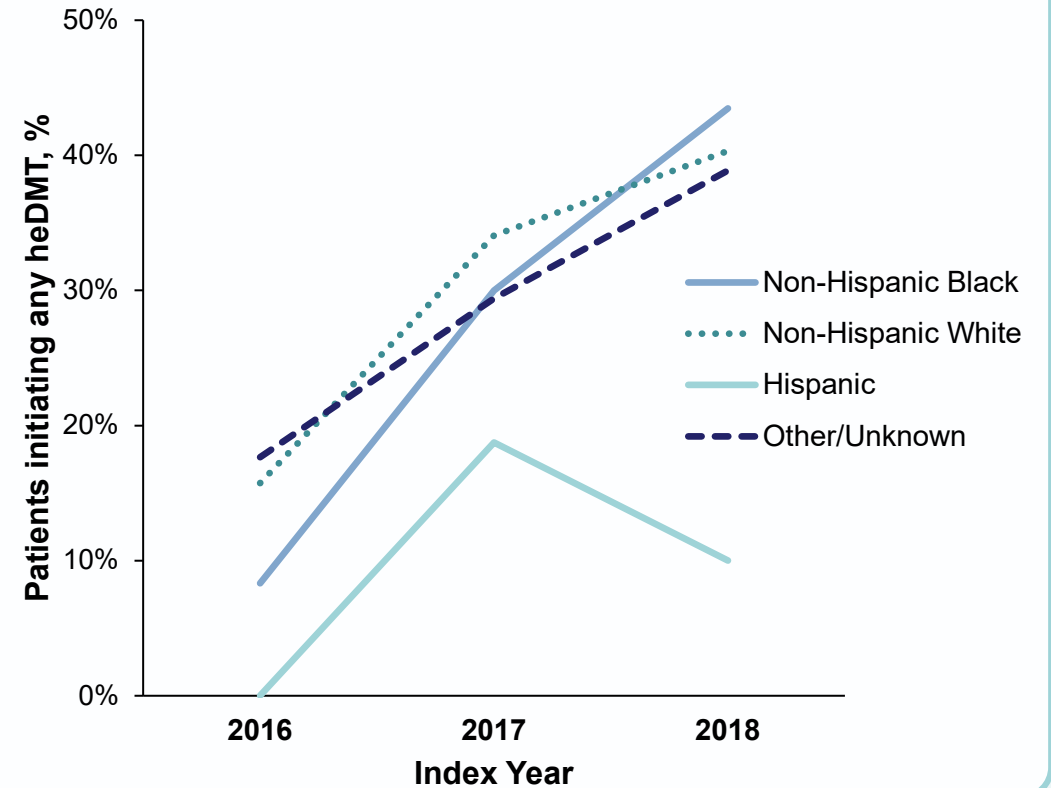


Results

Initiation of high-efficacy DMTs by race and ethnicity and by index year



Non-Hispanic Black and Hispanic patients were less likely to initiate any high-efficacy DMT



Use of high-efficacy DMTs increased over time for non-Hispanic Black and White patients

DMT, disease-modifying therapy; heDMT, high-efficacy DMT.

^aP value calculated with χ^2 test of independence.

Summary

Limitations

- The following could not be determined: whether patients receiving injectable and oral medications took the DMTs as prescribed, whether all patients were newly diagnosed with MS on the index date and the reasons for discontinuation and switching of DMTs
- Treatment patterns, including the first-line DMT, are expected to differ by MS severity; however, measures of disease severity and activity, such as EDSS and MRI results, on the index date for patients in the database could not be confirmed
- This study only included patients with ≥ 36 months of continuous eligibility from a single payer, and results may not be generalizable to all patients with MS

Summary

Conclusions

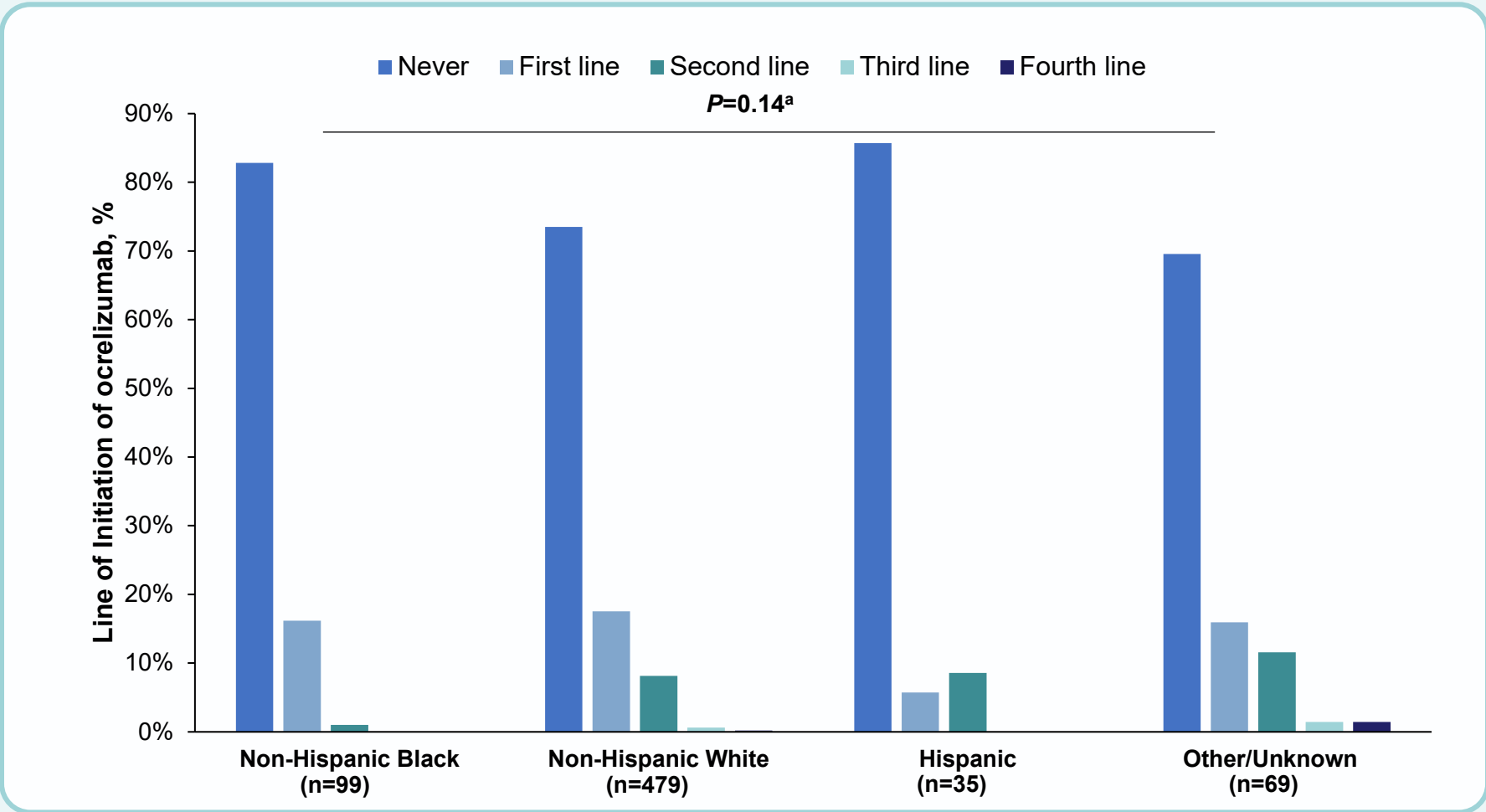
- **Non-Hispanic Black and Hispanic patients** were frequently treated with either **glatiramer acetate or dimethyl fumarate as the first-line treatment**, despite the potentially increased risk of highly active disease¹⁻⁴
- **Use of high-efficacy DMTs was limited** across all race/ethnicity subgroups
- Although uptake of high-efficacy DMTs increased over the study period for both non-Hispanic White and non-Hispanic Black patients, **use of high-efficacy DMTs remained low among Hispanic patients**
- **Hispanic patients** had the **shortest time on the index DMT** and were **more likely to initiate subsequent lines** of therapy
- Future research is needed to understand the factors contributing to the low uptake of high-efficacy DMTs among Hispanic patients

Supplemental

Results

Initiation of ocrelizumab by line by race and ethnicity

Hispanic patients were less likely to initiate ocrelizumab in first line



^aP value calculated with χ^2 test of independence.

Results

Baseline characteristics by race and ethnicity

	Overall (N=682)	Non-Hispanic Black (n=99)	Non-Hispanic White (n=479)	Hispanic (n=35)	Other/Unknown Race (n=69)	P Value ^a
Region, n (%)						0.1
Midwest	260 (38)	36 (36)	196 (41)	10 (29)	18 (26)	
Northeast	184 (27)	27 (27)	120 (25)	11 (31)	26 (38)	
South	134 (20)	24 (24)	91 (19)	7 (20)	12 (17)	
West	88 (13)	7 (7.1)	63 (13)	7 (20)	11 (16)	
Other/unknown	16 (2.3)	5 (5.1)	9 (1.9)	0	2 (2.9)	
Plan type, n (%)						0.002
PPO	178 (26)	22 (22)	136 (28)	5 (14)	15 (22)	
HMO	161 (24)	34 (34)	92 (19)	15 (43)	20 (29)	
POS	67 (9.8)	8 (8.1)	51 (11)	3 (8.6)	5 (7.2)	
EPO	11 (1.6)	2 (2.0)	6 (1.3)	0	3 (4.3)	
Multiple	3 (0.4)	2 (2.0)	0	0	1 (1.4)	
Other/unknown	262 (38)	31 (31)	194 (41)	12 (34)	25 (36)	
Comorbidities, n (%)						0.09
Hypertension	147 (22)	36 (36)	92 (19)	7 (20)	12 (17)	0.002
Anxiety disorder	133 (20)	15 (15)	99 (21)	5 (14)	14 (20)	0.5
Smoking (current or former)	131 (19)	23 (23)	90 (19)	8 (23)	10 (14)	0.5
Hyperlipidemia	129 (19)	19 (19)	89 (19)	5 (14)	16 (23)	0.7
Obesity	118 (17)	24 (24)	79 (16)	7 (20)	8 (12)	0.2
Major depressive disorder	85 (12)	8 (8.1)	64 (13)	4 (11)	9 (13)	0.5
Migraine	67 (9.8)	5 (5.1)	48 (10)	4 (11)	10 (14)	0.2
Diabetes	61 (8.9)	13 (13)	35 (7.3)	4 (11)	9 (13)	0.1
Overweight	46 (6.7)	9 (9.1)	26 (5.4)	3 (8.6)	8 (12)	0.2
HCRU, n (%)						
Any hospitalization	40 (5.9)	5 (5.1)	26 (5.4)	2 (5.7)	7 (10)	0.5
Any ED visit	264 (39)	46 (46)	179 (37)	17 (49)	22 (32)	0.1
Any MRI	421 (62)	59 (60)	303 (63)	18 (51)	41 (59)	0.5
Any neurologist visit	299 (44)	47 (47)	207 (43)	16 (46)	29 (42)	0.9

EPO, exclusive provider organization; ED, emergency department; HCRU, healthcare resource utilization; HMO, health maintenance organization; POS, point of service; PPO, preferred provider organization.

^aP values calculated with χ^2 test of independence or Kruskal-Wallis test.

Results

First line of treatment by race and ethnicity

	Overall (N=682)	Non-Hispanic Black (n=99)	Non-Hispanic White (n=479)	Hispanic (n=35)	Other/ Unknown Race (n=69)	P Value ^a
Time to initiation of first DMT (days), mean (SD)	148 (177)	149 (173)	146 (176)	132 (172)	169 (194)	0.6
Specific index DMT, n (%)						0.9
Glatiramer acetate	219 (32)	28 (28)	158 (33)	11 (31)	22 (32)	
Dimethyl fumarate	123 (18)	20 (20)	78 (16)	10 (29)	15 (22)	
Ocrelizumab	113 (17)	16 (16)	84 (18)	2 (5.7)	11 (16)	
Natalizumab	63 (9.2)	9 (9.1)	46 (9.6)	2 (5.7)	6 (8.7)	
Fingolimod	60 (8.8)	8 (8.1)	45 (9.4)	2 (5.7)	5 (7.2)	
Interferon beta-1a	41 (6.0)	11 (11)	23 (4.8)	4 (11)	3 (4.3)	
Teriflunomide	33 (4.8)	5 (5.1)	23 (4.8)	2 (5.7)	3 (4.3)	
Peginterferon beta-1a	14 (2.1)	2 (2.0)	9 (1.9)	1 (2.9)	2 (2.9)	
Interferon beta-1b	7 (1.0)	0	5 (1.0)	1 (2.9)	1 (1.4)	
Rituximab	6 (0.9)	0	5 (1.0)	0	1 (1.4)	
Alemtuzumab	3 (0.4)	0	3 (0.6)	0	0	

DMT, disease-modifying therapy.

^aP value calculated with χ^2 test of independence or Kruskal-Wallis test.

Results

Second line of treatment by race and ethnicity

	Overall (N=150)	Non-Hispanic Black (n=16)	Non-Hispanic White (n=107)	Hispanic (n=10)	Other/ Unknown Race (n=17)	P Value ^a
Specific index DMT, n (%)						0.043
Ocrelizumab	51 (34)	1 (6.2)	39 (36)	3 (30)	8 (47)	
Dimethyl fumarate	28 (19)	4 (25)	19 (18)	2 (20)	3 (18)	
Natalizumab	17 (11)	3 (19)	13 (12)	0	1 (5.9)	
Teriflunomide	17 (11)	1 (6.2)	15 (14)	1 (10)	0	
Fingolimod	14 (9.3)	2 (12)	8 (7.5)	0	4 (24)	
Glatiramer acetate	11 (7.3)	2 (12)	6 (5.6)	3 (30)	0	
Interferon beta-1a	4 (2.7)	1 (6.2)	2 (1.9)	1 (10)	0	
Rituximab	3 (2.0)	0	3 (2.8)	0	0	
Alemtuzumab	2 (1.3)	0	1 (0.9)	0	1 (5.9)	
Peginterferon beta-1a	2 (1.3)	1 (6.2)	1 (0.9)	0	0	
Interferon beta-1b	1 (0.7)	1 (6.2)	0	0	0	

DMT, disease-modifying therapy.

^aP value calculated with χ^2 test of independence or Kruskal-Wallis test.

Results

Time receiving index DMT by race and ethnicity

	Overall (N=682)	Non-Hispanic Black (n=99)	Non-Hispanic White (n=479)	Hispanic (n=35)	Other/ Unknown Race (n=69)
Time receiving index DMT (months), mean (SD)					
Natalizumab	20.2 (13.5)	25.9 (10)	20 (14.1)	15.3 (18.7)	14.3 (10.6)
Ocrelizumab	19.3 (10)	16.8 (11.1)	18.9 (9.8)	28.2 (13.6)	23.8 (8.3)
Teriflunomide	18.1 (14.7)	24.5 (7.7)	17.4 (16.3)	18.3 (18.9)	12.5 (9.5)
Interferon beta-1b	17 (18)		12.9 (14.3)	6.6 (NA)	47.4 (NA)
Fingolimod	16.6 (14.2)	20.7 (17.5)	16.8 (14.2)	13.5 (11.7)	9.9 (9.4)
Interferon beta-1a	15 (13.8)	17.3 (12.5)	15 (14.8)	5.7 (4.7)	19.4 (19.4)
Dimethyl fumarate	14.9 (14.3)	12 (12.8)	15.2 (14.3)	12.1 (11.7)	18.6 (17.5)
Glatiramer acetate	14.7 (14.5)	20.7 (17.2)	13.8 (14.3)	15.7 (11.9)	13 (11.9)
Peginterferon beta-1a	10.1 (11.8)	11 (15.6)	11.7 (13.3)	3.6 (NA)	5.5 (4.9)
Alemtuzumab	8.3 (7.2)	–	8.3 (7.2)	–	
Rituximab	8.2 (8.5)	–	9.8 (8.4)	–	0

Results

Time receiving treatment by race and ethnicity

	Overall (N=682)	Non-Hispanic Black (n=99)	Non-Hispanic White (n=479)	Hispanic (n=35)	Other/ Unknown Race (n=69)
Time receiving line of DMT (months), mean (SD)					
1	16.2 (13.7)	18.4 (14.2)	15.9 (13.7)	13.6 (11.8)	16.2 (13.6)
2	15.3 (12.6)	7.5 (10.4)	16.1 (12.7)	21.5 (12.9)	14.1 (11.5)
3	13 (10.7)	8.8 (8.3)	16.4 (12.7)	6.3 (1.5)	13.8 (8.5)
4	7.1 (5.8)	–	12 (NA)	0.7 (NA)	8.7 (NA)
Time receiving ocrelizumab by line (months), mean (SD)					
1	19.3 (10)	16.8 (11.1)	18.9 (9.8)	28.2 (13.6)	23.8 (8.3)
2	16.4 (10.3)	13.3 (NA)	15.8 (9.8)	22 (13.9)	17.8 (12.6)
3	15.7 (10.6)	–	14.6 (12.7)	–	19.1 (NA)
4	10.3 (2.3)	–	12 (NA)	–	8.7 (NA)

Results

Lines of treatment by race and ethnicity

	Overall (N=682)	Non-Hispanic Black (n=99)	Non-Hispanic White (n=479)	Hispanic (n=35)	Other/ Unknown Race (n=69)	P Value ^a
Total lines of treatment, n (%)						0.043
1	532 (78)	83 (84)	372 (78)	25 (71)	52 (75)	
2	128 (19)	10 (10)	96 (20)	8 (23)	14 (20)	
3	19 (2.8)	6 (6.1)	10 (2.1)	1 (2.9)	2 (2.9)	
4	3 (0.4)	0	1 (0.2)	1 (2.9)	1 (1.4)	
Patients initiating ocrelizumab, n (%)	170 (25)	17 (17)	127 (27)	5 (14)	21 (30)	0.07
Line of initiation of ocrelizumab, n (%)						0.1
Never	512 (75)	82 (83)	352 (73)	30 (86)	48 (70)	
1	113 (17)	16 (16)	84 (18)	2 (5.7)	11 (16)	
2	51 (7.5)	1 (1.0)	39 (8.1)	3 (8.6)	8 (12)	
3	4 (0.6)	0	3 (0.6)	0	1 (1.4)	
4	2 (0.3)	0	1 (0.2)	0	1 (1.4)	
Line of initiation of heDMT, n (%)						0.1
Never	430 (63)	69 (70)	292 (61)	28 (80)	41 (59)	
1	185 (27)	25 (25)	138 (29)	4 (11)	18 (26)	
2	56 (8.2)	4 (4.0)	42 (8.8)	2 (5.7)	8 (12)	
3	8 (1.2)	1 (1.0)	6 (1.3)	0	1 (1.4)	
4	3 (0.4)	0	1 (0.2)	1 (2.9)	1 (1.4)	

heDMT, high-efficacy disease-modifying therapy.

^aP value calculated with χ^2 test of independence or Kruskal-Wallis test.

Results

First line of treatment by race and ethnicity (index=2016)

	Overall (N=257)	Non-Hispanic Black (n=36)	Non-Hispanic White (n=178)	Hispanic (n=9)	Other/ Unknown Race (n=34)
Specific index DMT, n (%)					
Glatiramer acetate	102 (40)	13 (36)	72 (40)	4 (44)	13 (38)
Dimethyl fumarate	55 (21)	10 (28)	36 (20)	1 (11)	8 (24)
Natalizumab	25 (9.7)	2 (5.6)	21 (12)	0	2 (5.9)
Interferon beta-1a	19 (7.4)	4 (11)	11 (6.2)	2 (22)	2 (5.9)
Teriflunomide	17 (6.6)	4 (11)	11 (6.2)	2 (22)	0
Fingolimod	14 (5.4)	2 (5.6)	9 (5.1)	0	3 (8.8)
Ocrelizumab	10 (3.9)	1 (2.8)	5 (2.8)	0	4 (12)
Peginterferon beta-1a	8 (3.1)	0	7 (3.9)	0	1 (2.9)
Interferon beta-1b	5 (1.9)	0	4 (2.2)	0	1 (2.9)
Rituximab	2 (0.8)	0	2 (1.1)	0	0

Results

First line of treatment by race and ethnicity (index=2017)

	Overall (N=255)	Non-Hispanic Black (n=40)	Non-Hispanic White (n=182)	Hispanic (n=16)	Other/ Unknown Race (n=17)
Specific index DMT, n (%)					
Glatiramer acetate	79 (31)	12 (30)	57 (31)	5 (31)	5 (29)
Ocrelizumab	61 (24)	10 (25)	46 (25)	2 (12)	3 (18)
Dimethyl fumarate	38 (15)	7 (18)	24 (13)	4 (25)	3 (18)
Fingolimod	29 (11)	4 (10)	23 (13)	1 (6.2)	1 (5.9)
Natalizumab	16 (6.3)	2 (5.0)	12 (6.6)	1 (6.2)	1 (5.9)
Interferon beta-1a	13 (5.1)	5 (12)	6 (3.3)	2 (12)	0
Teriflunomide	10 (3.9)	0	8 (4.4)	0	2 (12)
Rituximab	4 (1.6)	0	3 (1.6)	0	1 (5.9)
Peginterferon beta-1a	3 (1.2)	0	1 (0.5)	1 (6.2)	1 (5.9)
Alemtuzumab	1 (0.4)	0	1 (0.5)	0	0
Interferon beta-1b	1 (0.4)	0	1 (0.5)	0	0

Results

First line of treatment by race and ethnicity (index=2018)

	Overall (N=170)	Non-Hispanic Black (n=23)	Non-Hispanic White (n=119)	Hispanic (n=10)	Other/ Unknown Race (n=18)
Specific index DMT, n (%)					
Ocrelizumab	42 (25)	5 (22)	33 (28)	0	4 (22)
Glatiramer acetate	38 (22)	3 (13)	29 (24)	2 (20)	4 (22)
Dimethyl fumarate	30 (18)	3 (13)	18 (15)	5 (50)	4 (22)
Natalizumab	22 (13)	5 (22)	13 (11)	1 (10)	3 (17)
Fingolimod	17 (10)	2 (8.7)	13 (11)	1 (10)	1 (5.6)
Interferon beta-1a	9 (5.3)	2 (8.7)	6 (5.0)	0	1 (5.6)
Teriflunomide	6 (3.5)	1 (4.3)	4 (3.4)	0	1 (5.6)
Peginterferon beta-1a	3 (1.8)	2 (8.7)	1 (0.8)	0	0
Alemtuzumab	2 (1.2)	0	2 (1.7)	0	0
Interferon beta-1b	1 (0.6)	0	0	1 (10)	0