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Conflicts of interest

Dr Pratt has been a consultant for AbbVie, Amgen, Celgene, Eli Lilly, Janssen, Leo, Novartis, Pfizer, Sanofi Genzyme, UBC, and Valeant. Dr Yeung has been a speaker, consultant, and investigator for AbbVie, Allergan, Amgen, Astellas, Boehringer Ingelheim, Celgene, Centocor, Coherus, Dermira, Eli Lilly, Forward, Galderma, GSK, Janssen, Leo, MedImmune, Merck, Novartis, Pfizer, Regeneron, Roche, Sanofi Genzyme, Takeda, UCB, Valeant, and Xenon. Dr Mufti and authors Jo and Sachdeva have no conflicts of interest to declare.

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Disparities in melanoma stage at diagnosis in Arizona: A 10-year Arizona Cancer Registry study

To the Editor: Although there are known racial disparities concerning melanoma,[1] there is a paucity of data regarding melanoma stage at presentation between white non-Hispanics (WNH) and white Hispanics (WH) in Arizona despite a large WH population and a heavy melanoma burden.[2] The purpose of our study was to evaluate for ethnic disparities in melanoma stage at diagnosis between these 2 populations in Arizona.

We performed a retrospective analysis of patients with cutaneous melanoma from the Arizona Cancer Registry (ACR) from 2007 to 2017.[3] There were underreporting of cases to the ACR during earlier years of the study. Data points obtained included age at diagnosis, sex/gender, race/ethnicity, stage, site, year at diagnosis, and ICD-0-3 site codes C44.0 to C44.9. The ACR uses SEER Summary Staging 2000 for the staging scheme and for the purpose of our analysis, we divided the stages into 3 staging categories: 1) in situ and local; 2) regional; and 3) distant. Bivariable and multivariable polytomous logistic regressions were fitted for the 3 staging categories with in situ and local melanomas as the reference.

A total of 27,727 persons with melanoma were included from the ACR. Patient demographic information can be found in Table I. There were significant differences in age by ethnicity, with the WH population having a higher proportion of younger patients. There was nearly a 2-fold rate of lower limb melanomas in WH versus in WNH. When looking at absolute rates, 23.3% of WH present with regional or distant melanoma compared with only 8.0% of WNH.

The results of our analyses can be found in Table II and include odds ratios (OR). For the bivariable analysis, WH were found to have 2.70 (95% CI, 2.01-3.64) times greater odds of presenting with regional stage melanoma and 4.80 (95% CI, 3.61-6.37) times greater odds of presenting with distant stage melanoma compared to WNH. When looking at the primary site, the lower limb/hip had an OR of 1.93 (95% CI, 1.64-2.27) for presentation at regional stage disease and an OR of 1.45 (95% CI, 1.09-1.92) for presentation at the distant stage.

When controlling for confounders with a multivariable analysis, the disparity in stage at diagnosis between the 2 groups was also reaffirmed (Table II). WH were found to have 2.53 (95% CI, 1.83-3.48) times greater odds of presenting with regional stage

Table I. Demographics of patients diagnosed with melanoma from 2007-2017

Characteristic	All (n = 27,737)	%	WNH (n = 26,960)	%	WH (n = 476)	%	Other (n = 301)	%	*P* value
Age									**<.0001**
0-39 years	1601	5.77	1495	5.55	72	15.13	34	11.30	
40-49 years	2095	7.55	1984	7.36	74	15.55	37	12.29	
50-59 years	4262	15.37	4109	15.24	93	19.54	60	19.93	
60-69 years	7289	26.28	7128	26.44	94	19.75	67	22.26	
70-79 years	7733	27.88	7574	28.09	90	18.91	69	22.92	
>80 years	4757	17.15	4670	17.32	53	11.13	34	11.30	
Sex									**<.0001**
Male	17,474	63.00	17,474	64.81	256	53.78	178	59.14	
Female	10,263	37.00	10,263	38.07	220	46.22	123	40.86	
Diagnosis year									.6
2007	1258	4.54	1220	4.53	27	5.67	11	3.65	
2008	1350	4.87	1316	4.88	21	4.41	13	4.32	
2009	1755	6.33	1701	6.31	34	7.14	20	6.64	
2010	1609	5.80	1554	5.76	30	6.30	25	8.31	
2011	2046	7.38	1979	7.34	45	9.45	22	7.31	
2012	2385	8.60	2319	8.60	47	9.87	19	6.31	
2013	2655	9.57	2583	9.58	38	7.98	34	11.30	
2014	2977	10.73	2897	10.75	50	10.50	30	9.97	
2015	3301	11.90	3219	11.94	48	10.08	34	11.30	
2016	3989	14.38	3872	14.36	72	15.13	45	14.95	
2017	4412	15.91	4300	15.95	64	13.45	48	15.95	
SEER Summary Staging 2000*									**<.0001**
In situ	12,883	46.45	12,632	46.85	148	31.09	103	34.22	
Localized to dermis	12,544	45.22	12,184	45.19	217	45.59	143	47.51	
Direct regional extension	446	1.61	414	1.54	21	4.41	11	3.65	
Regional node involvement	740	2.67	705	2.61	24	5.04	11	3.65	
Regional + nodes	123	0.44	114	0.42	3	0.63	6	1.99	
Regional NOS	81	0.29	74	0.27	4	0.84	3	1.00	
Distant sites/nodes	920	3.32	837	3.10	59	12.39	24	7.97	
Primary Site									**<.0001**
Lip	51	0.18	49	0.18	1	0.21	1	0.33	
Eyelid	129	0.47	123	0.46	4	0.84	2	0.66	
External ear	958	3.45	940	3.49	16	3.36	2	0.66	
Other face	3772	13.60	3665	13.59	71	14.92	36	11.96	
Scalp/neck	2874	10.36	2825	10.48	28	5.88	21	6.98	
Trunk	8219	29.63	8038	29.81	109	22.90	72	23.92	
Upper limb/shoulder	7427	26.78	7251	26.90	103	21.64	73	24.25	
Lower limb/hip	3572	12.88	3387	12.56	111	23.32	74	24.58	
Overlapping lesion of the skin	17	0.06	17	0.06	0	0	0	0	
Skin, NOS	718	2.59	665	2.47	33	6.93	20	6.64	
Staging Categories†									**<.0001**
In situ and local	25,427	91.70	24,816	92.10	365	76.70	246	81.70	
Regional	1390	5.00	1307	4.80	52	10.90	31	10.30	
Distant	920	3.30	837	3.10	59	12.40	24	8.00	

n, Number; *NOS*, not otherwise specified; *SEER*, Surveillance, Epidemiology, and End Results; *WNH*, white non-Hispanic; *WH*, white Hispanic.
*The Arizona Cancer Registry utilizes SEER Summary Staging 2000 for the staging scheme: in situ (code = 0), localized to dermis (code = 1), regional by direct extension only (code = 2), regional lymph nodes involved only (code = 3), regional by both direct extension and lymph node involvement (code = 4), regional not otherwise specified (code = 5), and distant site(s)/node(s) involved (code = 7).
†For the purpose of this analysis, the SEER summary stages were divided into 3 staging categories: 1. in situ and local (codes 0 and 1); 2. Regional (codes 2-5); and 3. distant (code 6).

Table II. Results of polytomous logistic regression

Characteristic	In situ and local (n = 25,427)	Regional (n = 1390)	Bivariable OR (CI_{95})	Distant (n = 920)	Bivariable OR (CI_{95})
Bivariable polytomous logistic regression assessing risk factors					
Race, N (%)*					
White non-Hispanic	24,816	1307	Ref	837	Ref
White Hispanic	365	52	2.70 (2.01-3.64)	59	4.80 (3.61-6.37)
Other	246	31	2.39 (1.64-3.49)	24	2.89 (1.90-4.42)
Age, N (%)*					
0-39 years	1416	127	1.95 (1.57-2.41)	58	1.10 (0.82-1.47)
40-49 years	1894	130	1.49 (1.21-1.84)	71	1.01 (0.77-1.31)
50-59 years	3882	226	1.26 (1.06-1.51)	154	1.06 (0.87-1.31)
60-69 years	6728	310	Ref	251	Ref
70-79 years	7158	334	1.01 (0.87-1.19)	241	0.90 (0.75-1.08)
≥80 years	4349	263	1.31 (1.11-1.55)	145	0.89 (0.73-1.10)
Sex, N (%)†					
Male	15,944	897	1.08 (0.97-1.2)	633	**1.31 (1.14-1.51)**
Female	9483	493	Ref	287	Ref
Primary site, N (%)*					
Lip	44	6	**3.08 (1.30-7.27)**	1	1.32 (0.18-9.68)
Eyelid	126	1	0.18 (0.03-1.29)	2	0.92 (0.23-3.78)
External ear	918	33	0.81 (0.56-1.17)	7	**0.44 (0.21-0.95)**
Other face	3623	**121**	**0.75 (0.61-0.93)**	28	**0.45 (0.30-0.68)**
Scalp/neck	2614	200	**1.73 (0.61-0.93)**	60	1.34 (0.98-1.81)
Trunk	7743	343	Ref	133	Ref
Upper limb/shoulder	7055	298	0.95 (0.81-1.11)	74	**0.61 (0.46-0.81)**
Lower limb/hip	3217	275	**1.93 (1.64-2.27)**	80	**1.45 (1.09-1.92)**
Overlapping lesion of the skin	13	3	**5.21 (1.48-18.37)**	1	4.48 (0.58-34.38)
Skin, NOS	74	110	**33.55 (24.50-45.91)**	534	**419.97 (311.91-565.43)**
Diagnosis Year, N (%)*					
2007	1107	106	**2.66 (2.06-3.44)**	45	**1.80 (1.26-2.59)**
2008	1187	113	**2.65 (2.06-3.41)**	50	**1.87 (1.32-2.65)**
2009	1542	140	**2.52 (1.99-3.20)**	73	**2.10 (1.54-2.87)**
2010	1402	135	**2.68 (2.10-3.40)**	72	**2.28 (1.67-3.11)**
2011	1818	140	**2.14 (1.69-2.71)**	88	**2.15 (1.60-2.89)**
2012	2202	89	**1.12 (0.86-1.47)**	94	**1.89 (1.42-2.53)**
2013	2463	98	**1.106 (0.85-1.43)**	94	**1.69 (1.27-2.26)**
2014	2742	133	1.348 (1.06-1.71)	102	1.65 (1.24-2.19)
2015	3057	126	1.15 (0.90-1.46)	118	1.712 (1.30-2.25)
2016	3739	160	1.189 (0.95-1.49)	90	1.067 (0.80-1.43)
2017	4168	150	Ref	94	Ref

	In situ and local (n = 25,427)	Regional (n = 1390)	Multivariable OR (CI_{95})*,†	Distant (n = 920)	Multivariable OR (CI_{95})*,†
Multivariable polytomous logistic regression assessing the effect of race on melanoma stage at diagnosis					
Race					
White non-Hispanic	24,816	1307	Ref	837	Ref
White Hispanic	365	52	2.53 (1.83-3.48)	59	5.37 (4.0-7.21)
Other	246	31	2.00 (1.31-3.07)	24	2.94 (1.88-4.60)

CI, Confidence interval; *n*, number; *NOS*, not otherwise specified; *OR*, odds ratio; *Ref*, reference group.

*$P < .05$.

†When controlling for sex, year (pre/post 2013), and age (< or >60).

melanoma and 5.37 (95% CI, 4.0-7.21) times greater odds of presenting with distant stage melanoma than WNH.

These results highlight a disparity in melanoma stage at presentation between WH and WNH in Arizona, with WH presenting at later stages. WH also had a higher proportion of younger patients with melanoma and were more likely to have lower limb melanomas, which was independently associated with regional/distant stage at presentation. These results suggest that there is a need for improved education regarding melanoma among the WH population and that there should be a focus on lower limbs and on younger WH patients. Further studies are needed to delineate the factors contributing to these disparities, such as education, socioeconomic status, and insurance status.

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Conflicts of interest

None disclosed.

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