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Melanoma of the skin and laterality

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We were intrigued by the study of Butler and Fosko reporting a left-sided predominance of skin cancers, particularly among men.¹ However, findings for melanoma were inconclusive due to the limited number of cases available for analysis. Therefore, using the large numbers of cases available in the Surveillance, Epidemiology and End Results (SEER) Program, we assessed the incidence of melanoma diagnosed among White residents of 12 SEER registry areas during 1992–2006.² Histology and topography information are classified according to the International Classification of Diseases for Oncology, third edition.³ Age-adjusted incidence rates (IRs) and IR ratios (IRRs) were estimated for all cutaneous (C-440-449) melanomas (M-8720-8790) for sites with more than 70% of cases having specified laterality: eyelid (n=777; 99%), ear (n=4,772; 99%), other face (n=19,273; 91%), trunk (n=29,329; 71%), upper extremity (32,237; 99%), and lower extremity (23,679; 99%).

Among males, incidence of left-sided melanoma was significantly higher than right-sided melanoma across all skin sites, ranging from 7–26% (Table 1). Among women, significantly higher IRs for left-sided melanoma were limited to the face, and upper and lower extremities, although left-sided lesions predominated at all sites (IRRs 1.03–1.15). A left-sided predominance was observed for in situ and invasive melanoma at all sites among males, in contrast to women who had nearly equal or a slight right-sided predominance for in situ melanoma of the ear and trunk and invasive melanoma of the eyelid. Except for eyelid melanoma among older women, left-sided melanoma predominated at all sites among younger (<60 years) and older (60+ years) men and women. Age and histology laterality patterns, particularly among men, were generally similar for younger individuals and superficial spreading melanoma and for older individuals and lentigo maligna melanoma. A significantly higher incidence of right-sided than left-sided melanoma was not observed at any site by gender, age, or histology.

As discussed by Butler and Fosko,¹ a predilection for left-sided skin cancers in the United States is postulated to be related to ultraviolet light (UV) exposure while driving. Findings from our study support this hypothesis, despite the imperfect correlation between site of melanoma occurrence and UV intensity at exposed sites.⁴ With few exceptions, a greater left-to-right predominance was observed among men than women, suggesting that women

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may experience more equally distributed sun exposure, including possibly spending more time in the passenger seat. In addition, use of and types of UV-protective attire and accessories, use of sunscreen and sites of application, duration and intensity of UV exposure, and varying outdoor activities likely contribute to the gender-, age-, and histology-related laterality patterns we observed. Future studies that incorporate information on these factors may help to elucidate reasons for the laterality differences noted in our study and that of Butler and Fosko.¹ However, in combination, these findings suggest that increased awareness and protection from situations associated with asymmetric UV exposure may help decrease the incidence of UV-related skin cancers.

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Age-adjusted incidence rates and incidence rate ratios of melanoma skin cancers among Whites according to behavior, site, laterality, gender, age, and histology, SEER-12, 1992–2006*

Table 1

Site [†]	Males				Females				Left-to-right IRR			
	Left		Right		Left		Right		Males		Females	
	No.	IR	No.	IR	No.	IR	No.	IR	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)
Melanoma, all[‡]												
Eyelid	216	1.2	171	1.0	197	0.8	193	0.8	1.26	(1.02–1.55)	1.04	(0.84–1.27)
Ear	2,231	12.4	2,015	11.2	281	1.2	245	1.1	1.11	(1.04–1.18)	1.15	(0.96–1.37)
Face, other	6,248	34.8	5,665	31.5	3,828	16.2	3,532	14.9	1.11	(1.07–1.15)	1.09	(1.04–1.14)
Trunk	10,053	50.6	9,440	47.4	4,987	22.3	4,849	21.7	1.07	(1.04–1.10)	1.03	(0.99–1.07)
Upper extremity	8,789	45.7	7,768	40.4	8,079	35.7	7,601	33.5	1.13	(1.10–1.17)	1.06	(1.03–1.10)
Lower extremity	3,175	15.7	2,855	14.1	9,249	41.2	8,400	37.4	1.11	(1.06–1.17)	1.10	(1.07–1.14)
Behavior												
Melanoma, in situ												
Eyelid	127	0.7	101	0.6	118	0.5	112	0.5	1.28	(0.98–1.69)	1.08	(0.83–1.42)
Ear	1,016	5.7	886	5.0	88	0.4	94	0.4	1.14	(1.04–1.25)	0.93	(0.69–1.26)
Face, other	3,688	20.4	3,308	18.3	2,313	9.8	2,061	8.8	1.12	(1.06–1.17)	1.12	(1.06–1.19)
Trunk	2,773	14.2	2,603	13.3	1,460	6.5	1,476	6.6	1.07	(1.01–1.13)	0.99	(0.92–1.06)
Upper extremity	3,027	15.9	2,677	14.0	2,911	12.9	2,842	12.6	1.13	(1.07–1.19)	1.02	(0.97–1.08)
Lower extremity	769	3.8	695	3.4	2,902	13.0	2,686	12.0	1.11	(1.00–1.23)	1.08	(1.03–1.14)
Melanoma, invasive												
Eyelid	89	0.5	70	0.4	79	0.3	81	0.3	1.22	(0.88–1.70)	0.97	(0.70–1.35)
Ear	1,215	6.7	1,129	6.1	193	0.8	151	0.7	1.09	(1.00–1.19)	1.28	(1.03–1.59)
Face, other	2,560	14.4	2,357	13.2	1,515	6.3	1,471	6.1	1.10	(1.03–1.16)	1.04	(0.96–1.11)
Trunk	7,280	36.3	6,837	34.1	3,527	15.8	3,373	15.1	1.07	(1.03–1.10)	1.05	(1.00–1.10)
Upper extremity	5,762	29.8	5,091	26.3	5,168	22.8	4,759	21.0	1.13	(1.09–1.18)	1.09	(1.04–1.13)
Lower extremity	2,406	11.9	2,160	10.7	6,347	28.2	5,714	25.3	1.11	(1.05–1.18)	1.11	(1.07–1.15)
Age												

Site [†]	Males				Females				Left-to-right IRR			
	Left		Right		Left		Right		Males		Females	
	No.	IRR	No.	IRR	No.	IRR	No.	IRR	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)
<60 years												
Eyelid	65	0.4	46	0.3	50	0.3	39	0.2	1.39	(0.94–2.08)	1.28	(0.83–2.00)
Ear	584	3.2	544	3.0	141	0.8	109	0.6	1.07	(0.95–1.20)	1.29	(1.00–1.68)
Face, other	1,514	8.4	1,495	8.3	1,088	6.0	1,038	5.7	1.01	(0.94–1.09)	1.05	(0.96–1.14)
Trunk	5,330	29.1	5,029	27.4	3,603	19.6	3,512	19.1	1.06	(1.02–1.10)	1.03	(0.98–1.08)
Upper extremity	3,770	20.7	3,311	18.1	4,503	24.7	4,138	22.7	1.14	(1.09–1.20)	1.09	(1.04–1.14)
Lower extremity	1,949	10.5	1,726	9.3	6,173	33.8	5,542	30.3	1.13	(1.06–1.21)	1.11	(1.07–1.16)
60+ years												
Eyelid	151	5.4	125	4.5	147	3.6	154	3.7	1.22	(0.95–1.56)	0.97	(0.76–1.22)
Ear	1,647	59.0	1,471	52.5	140	3.5	136	3.4	1.12	(1.05–1.21)	1.02	(0.80–1.30)
Face, other	4,734	168.7	4,170	148.8	2,740	67.6	2,494	61.3	1.13	(1.09–1.18)	1.10	(1.04–1.17)
Trunk	4,723	159.0	4,411	148.4	1,384	35.8	1,337	34.6	1.07	(1.03–1.12)	1.03	(0.96–1.12)
Upper extremity	5,019	171.8	4,457	152.7	3,576	91.2	3,463	88.4	1.13	(1.08–1.17)	1.03	(0.98–1.08)
Lower extremity	1,226	41.7	1,129	38.3	3,076	78.8	2,858	73.0	1.09	(1.00–1.18)	1.08	(1.03–1.14)
Histology [‡]												
Superficial spreading melanoma												
Eyelid	25	0.1	20	0.1	17	0.1	21	0.1	1.24	(0.66–2.36)	0.81	(0.40–1.62)
Ear	301	1.6	272	1.4	61	0.3	30	0.1	1.11	(0.93–1.31)	1.99	(1.26–3.19)
Face, other	508	2.8	533	2.9	381	1.6	367	1.6	0.96	(0.85–1.09)	1.04	(0.90–1.21)
Trunk	3,412	16.8	3,140	15.4	1,793	8.1	1,712	7.7	1.09	(1.04–1.15)	1.05	(0.98–1.12)
Upper extremity	2,386	12.0	2,159	10.9	2,365	10.6	2,203	9.8	1.10	(1.04–1.17)	1.08	(1.02–1.14)
Lower extremity	1,040	5.0	908	4.4	3,138	14.1	2,853	12.8	1.15	(1.05–1.26)	1.10	(1.05–1.16)
Lentigo maligna melanoma												
Eyelid	100	0.6	81	0.5	92	0.4	84	0.3	1.26	(0.93–1.71)	1.11	(0.82–1.52)
Ear	910	5.2	804	4.6	67	0.3	58	0.2	1.12	(1.02–1.24)	1.15	(0.79–1.66)
Face, other	3,359	18.8	2,963	16.6	2,048	8.6	1,843	7.7	1.13	(1.08–1.19)	1.11	(1.04–1.19)
Trunk	817	4.5	773	4.2	283	1.2	294	1.3	1.06	(0.96–1.17)	0.97	(0.82–1.14)

	Males			Females			Left-to-right IRR		
	Left	Right		Left	Right		Males	Females	
Site [†]	No.	IR	No.	IR	No.	IR	IRR (95% CI)	IRR (95% CI)	
Upper extremity	1,336	7.4	1,090	6.0	1,015	4.4	4.3	1.23	(1.13–1.33)
Lower extremity	110	0.6	82	0.4	429	1.9	1.7	1.38	(1.02–1.86)

Abbreviations: No., number of cases; IR, incidence rate; IRR, incidence rate ratio; CI, confidence interval; ICD-O-3, International Classification of Diseases for Oncology, third edition.

* Unless otherwise specified, categories include in situ and invasive behavior codes, all age groups, and all melanoma histology codes. Incidence rates are age-adjusted to the 2000 U.S. standard population and expressed per 1,000,000 person-years. Incidence rate ratios are based on unrounded incidence rates. IRRs and 95% CIs in bold are statistically significant ($P<0.05$).

[†]ICD-O-3 topography codes: eyelid (C-441), ear (C-442), other face (C-443), trunk (C-445), upper extremity (C-446), and lower extremity (C-447). "Other face" includes skin of the cheek, chin, face, forehead, jaw, nose, and temple as well as ala nasi and eyebrow.

[‡]When melanomas of the face (eyelid, ear, other face) and non-face sites (trunk, upper extremities, lower extremities) were considered in combination, IRRs and 95% CI were as follows: males (face IRR=1.11, 95% CI 1.08–1.15; non-face IRR=1.10, 95% CI 1.08–1.12); females (face IRR=1.09, 95% CI 1.04–1.14; non-face IRR=1.07, 95% CI 1.05–1.09).

[§]ICD-O-3 histology codes: superficial spreading melanoma (M-8743), lentigo malignant melanoma (M-8742).