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Skin cancer biopsy and detection rates with total body skin examination: A cross-sectional retrospective analysis.

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Title: Skin Cancer Biopsy and Detection Rates with Total Body Skin Examination: A Cross-Sectional Retrospective Analysis

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Office-based skin cancer screening is limited in its capacity to screen entire populations.[1,2] Most organizations worldwide recommend screening only at-risk individuals.[2,3] In the United States, less than a quarter of those deemed at high risk for skin cancer per USPSTF criteria have received a total body skin examination (TBSE) in their lifetime.[4] Lack of consensus for skin cancer screening guidelines leads to patient-driven screening.[5] This study evaluated factors which influence the likelihood of skin biopsy during TBSE and skin cancer detection upon biopsy.

This was a retrospective cross-sectional study of patients 18 years or older who received a TBSE for the purpose of skin cancer screening in 2017. Thirteen dermatologists at four clinics affiliated with Thomas Jefferson University Hospital performed the examinations. Data were abstracted from medical records. The analyses were based on binomial regression with log link, which yields estimated relative risks.

We reviewed data from 3130 screened patients; 911 skin biopsies were performed among 653 of those patients. Cancer was detected in 246 biopsies (27%) from 180 patients (28%), corresponding to about 18 patients needed to be screened and 4 biopsies needed to be performed for the detection of 1 malignancy. The 246 malignant biopsy results included 9 (4%) melanomas, 162 (66%) basal cell carcinomas, and 72 (29%) squamous cell carcinomas.

Table 1 summarizes the association of patient characteristics with the performance of a skin biopsy. Biopsy was more likely for older patients, males, and whites, as well as if the patient had one or more risk factors for skin cancer, and when the reason for screening was a specific lesion.

Table 2 summarizes the association of patient and biopsy characteristics with the detection of cancer among the 911 biopsies performed. The strongest predictor was

dermatologist concern for malignancy (relative risk = 17); the number of biopsies needed for the detection of one malignancy was 3 in its presence, but 62 in its absence. Dermatologist concern for malignancy was 98% (95% CI: 96% to 100%) sensitive and 46% (95% CI: 42% to 51%) specific for detecting skin cancer following biopsy. Consistent with prior studies, the risk of malignancy detection with TBSE increased fairly linearly with age.[5] The probability of malignancy upon biopsy was higher among male patients, patients with one or more risk factors for skin cancer, and when the reason for screening was a specific lesion.

Although our study was limited by its retrospective design and lack of diverse patient population, our results suggest that about a third of the biopsies are performed on benign lesions in the absence of dermatologist concern for malignancy. Despite alleviating patient fears, the routine practice of biopsying lesions without concern for cancer diverts resources from at-risk individuals and inflates biopsy and cancer detection rates when intent of biopsy is not considered. Providers can discuss the medical necessity of biopsies and advocate for monitoring benign lesions. Future efforts to reduce unnecessary biopsies and TBSEs can enhance the efficacy and cost effectiveness of TBSE for skin cancer detection.

Abbreviation and Acronym List

TBSE Total Body Skin Examination

USPSTF United States Preventative Services Task Force

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Table 1. Association of patient characteristics with performance of skin biopsy.

		Pts w/ Bx				
	N	*n*	*%*	*RR*	*95% CI*	*P*
TOTAL	3130	653	21%			
Age (years)						0.001
18-29	335	29	9%	0.64	(0.43, 0.96)	0.029
30-39	527	76	14%	1.00	ref	
40-49	359	50	14%	0.99	(0.72, 1.37)	0.970
50-59	558	130	23%	1.45	(1.13, 1.87)	0.004
60-69	759	193	25%	1.52	(1.19, 1.93)	0.001
70-79	450	128	28%	1.64	(1.27, 2.12)	0.001
80+	142	47	33%	1.95	(1.43, 2.65)	0.001
Sex						
Female	1836	317	17%	1.00	ref	
Male	1293	335	26%	1.33	(1.16, 1.52)	0.001
Race						
White	2834	611	22%	1.00	ref	
Other	296	42	14%	0.70	(0.52, 0.93)	0.015
Patient type						
Established	1719	384	22%	1.00	ref	
New or not seen for 3 years	1411	269	19%	1.03	(0.89, 1.18)	0.711
Any risk factor*						
No/unknown	1266	204	16%	1.00	ref	
Yes	1864	449	24%	1.18	(1.01, 1.37)	0.033
Reason for screening						
Routine (no lesion)	1073	97	9%	1.00	ref	
Lesion	2057	556	27%	2.84	(2.32, 3.48)	0.001

Bx: biopsy. RR: relative risk (simultaneously adjusted for all variables shown). CI: confidence interval. BxN: number of biopsies needed for the detection of 1 malignancy.

(*) Risk factors included: UVR exposure (present in 957 of the 3130 patients), history of actinic keratosis (775), history of skin cancer (810), immunocompromised state (168), and family history (first-degree relative, 523).

Table 2. Association of patient and biopsy characteristics with detection of malignancy upon skin biopsy.

		Bx w/ ca					
	N	*n*	*%*	*RR*	*(95% CI)*	*P*	*BxN*
TOTAL	911	246	27%				4
Age (years)						0.021	
18-29	29	1	3%	0.45	(0.06, 3.23)	0.423	29
30-39	93	10	11%	1.00	ref		10
40-49	63	6	10%	1.07	(0.42, 2.74)	0.885	11
50-59	187	35	19%	1.19	(0.56, 2.52)	0.650	6
60-69	282	98	35%	1.65	(0.81, 3.33)	0.166	3
70-79	186	59	32%	1.69	(0.82, 3.51)	0.157	4
80+	71	37	52%	2.13	(1.02, 4.45)	0.043	2
Sex							
Female	428	80	19%	1.00	ref		6
Male	482	165	34%	1.32	(1.06, 1.65)	0.015	3
Race							
White	856	239	28%	1.00	ref		4
Other	55	7	13%	0.68	(0.31, 1.47)	0.322	8
Patient type							
Established	543	158	29%	1.00	ref		4
New or not seen for 3 years	368	88	24%	1.09	(0.89, 1.33)	0.408	5
Any risk factor*							
No/unknown	265	26	10%	1.00	ref		11
Yes	646	220	34%	1.91	(1.29, 2.82)	0.001	3
Reason for screening							
Routine (no lesion)	121	24	20%	1.00	ref		6
Lesion	790	222	28%	1.55	(1.07, 2.25)	0.019	4
Bx location						0.463	
Scalp	47	13	28%	1.24	(0.67, 2.31)	0.497	4
Ear	32	16	50%	1.67	(0.98, 2.83)	0.058	2
Face	225	81	36%	1.58	(1.02, 2.45)	0.041	3
Neck	69	12	17%	1.37	(0.81, 2.31)	0.243	6
Chest/abdomen	111	14	13%	1.00	ref		8
Back	120	30	25%	1.44	(0.89, 2.36)	0.141	4
Arm/hand	154	41	27%	1.43	(0.90, 2.29)	0.129	4
Leg/foot	129	38	29%	1.71	(1.09, 2.69)	0.021	4
Groin/genitals/buttocks	24	1	4%	0.76	(0.11, 6.07)	0.775	24
Dermatologist concern for cancer							
No	310	5	2%	1.00	ref		62
Yes	601	241	40%	17.43	(7.14, 42.60)	0.001	3
Who detected lesion						0.302	
Patient/family/friend	612	157	26%	1.00	ref		4
Medical provider	263	72	27%	0.87	(0.68, 1.12)	0.287	4
Other/unknown	36	17	47%	1.15	(0.83, 1.59)	0.414	3

Bx: biopsy. RR: relative risk (simultaneously adjusted for all variables shown). CI: confidence interval. BxN: number of biopsies needed for the detection of 1 malignancy.

(*) Risk factors included: UVR exposure (present in 190 of the 653 patients), history of actinic keratosis (230), history of skin cancer (249), immunocompromised state (46), and family history (first-degree relative, 79).