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Does disparity in educational material contributing to melanoma mortality?

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Title: Does disparity in educational material contributing to melanoma mortality?

Objective: Is there a difference in the skin tones used to depict presentation of cutaneous melanoma in the educational materials used to education physician and medical students?

Design: Literature Review

Setting: Educational resources used to teach dermatological conditions to physicians and medical students that are listed in the Doody's health science book review 2016.

Subjects: Images from dermatology educational material depicting cutaneous melanoma of all type.

Main outcome measures: Using the Fitzpatrick skin tone scale, determine what skin tone predominates in the depiction of cutaneous melanoma in medical textbooks.

Introduction

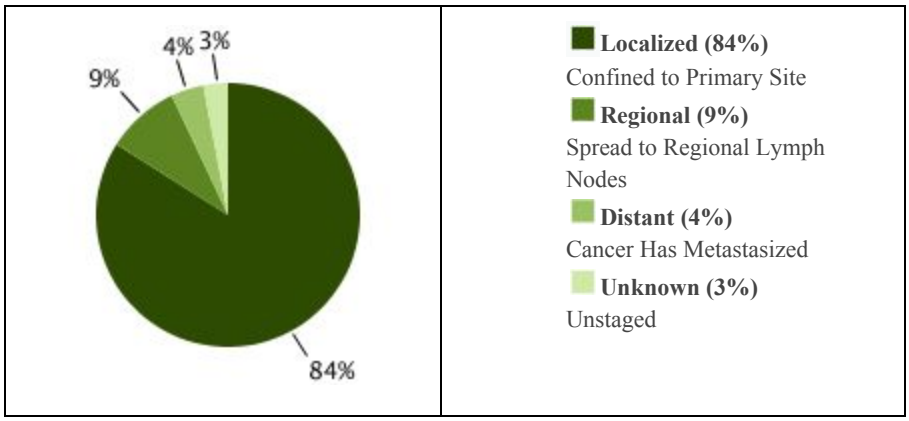
The lack of diversity in the medical fraternity among physicians and educators is quite notable across America, but even more notable is the lack of diversity within the educational material being used to educate medical professionals. In a medical school in an urban setting where African Americans and Hispanic population predominates, it was noticeable that the educational material, both textbooks and lecture slides, were not representative of the population that the school serves. Even in a school that has a demonstrated track record for committing to community service. The school is most recognized for encouraging its student to engage in community activities that promotes the wellbeing of the population it serves. This institution also demonstrates it's commitment to community service by requiring their medical student be active in direct patient care at their student operated community clinic as early as their first year of medical school. However, as will be presented in this pilot study, exposure to patients without proper educational exposure does not guarantee the best outcome for the patients.

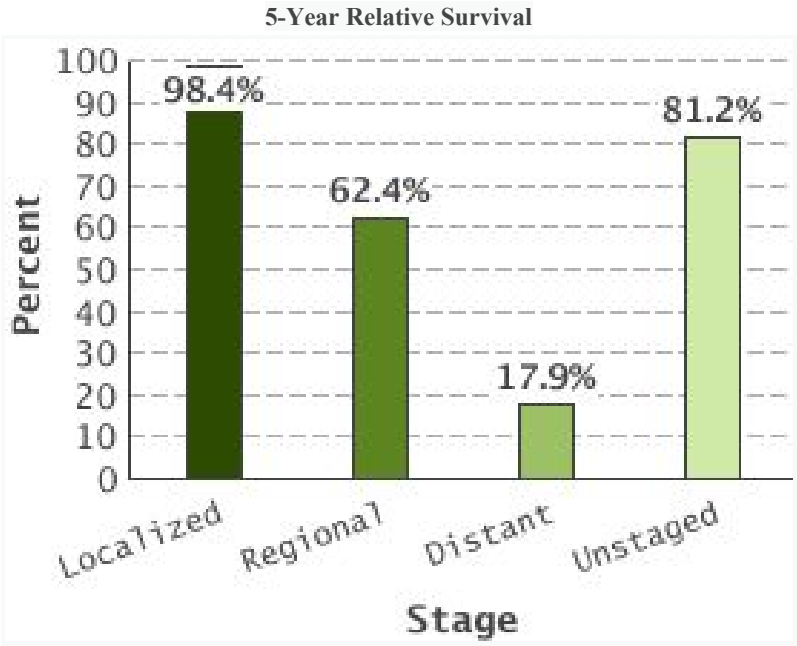
Cutaneous melanoma is the most commonly fatal cancer among all the cancers affecting the skin. This highly fatal skin cancer is also increasing in incidence more than other forms of cancer that are of a preventable nature. The current SEERS data trend ranks melanoma of the skin as 6th in incidence and 6th in death in 2016. In 1990 the worldwide age-adjusted incidence of melanoma in men and women were 2.3 and 2.2 per 100,000 people respectively. Between 2009 and 2013 the incidence had increased significantly to 21.8 men and women per 100,000 people according to the SEERS database. In 2016 the SEERS database estimates the number of new cases of melanoma to be 76,380 representing 4.5% of all new cases of cancer in the United States. The estimated death rate from melanoma in 2016 is set at 10,130 cases, representing 1.7% of death by cancer.

For melanoma of the skin, 83.8% are diagnosed at the local stage (confined to the primary site), 9% are diagnosed at the regional stage (spread to regional lymph nodes) and distant metastasis is diagnosed in 4% of cases. The five year survival rate for those diagnosed with cutaneous melanoma is significantly dependent on the stage of the disease at the time of diagnosis, with survival rates declining dramatically as the tumor thickens and the stage of the disease increases. The five year survival for tumors diagnosed at the localized stage is 98.4%. The survival rate declines significantly to 62.4% for tumors diagnosed at the regional stage and even worse for those diagnosed with distant metastasis, 17.9%.

Percent of Cases & 5-Year Relative Survival by Stage at Diagnosis: Melanoma of the Skin

Percent of Cases by Stage





SEER 18 2006-2012, All Races, Both Sexes by SEER Summary Stage 2000

Incidence

Melanoma of the skin affects fair skinned individuals more than their darker skinned counterpart resulting in the incidence in the Caucasian population being significantly greater than Hispanics and African Americans. Men are also more affected than women. The age adjusted incidence in Caucasian men between 2009 and 2013 is 33.5 per 100,000 and that for Hispanic and African American males are

4.8 and 1.1 respectively. The number of new cases in Caucasian females during the same time frame is 20.4 per 100,000 and that for Hispanic and African American females are 4.4 and 1.0 respectively.

Mortality

The number of death from melanoma in the Caucasian male population between 2009 and 2013 is 4.6 per 100,000 and the death rate in the Hispanic and African American male population is 1.0 and 0.5 per 100,000 respectively. The female trend during the same time frame is 2.0 per 100,000 in Caucasian female and 0.6 and 0.4 per 100,000 in the Hispanic and African American female population repectively. The recent mortality trend from the SEERs database shows that between 2000-2013 the mortality in the Caucasian population annual percent change is 0.6% in both sexes. More specifically in the caucasian female population the annual trend is actually decreasing at a rates of -0.1% annually. In the caucasian male population the trend increased from 2000 to 2009 and started to decrease between 2009 - 2013 at an annual rate of -0.6%.

The mortality trend in the Hispanic population shows an overall decline at an estimated annual rate of -0.1%. More specifically the mortality in the Hispanic female population is declining at an annual rate of -0.3% however, the Hispanic male population is increasing at a rate of 0.2% annually.

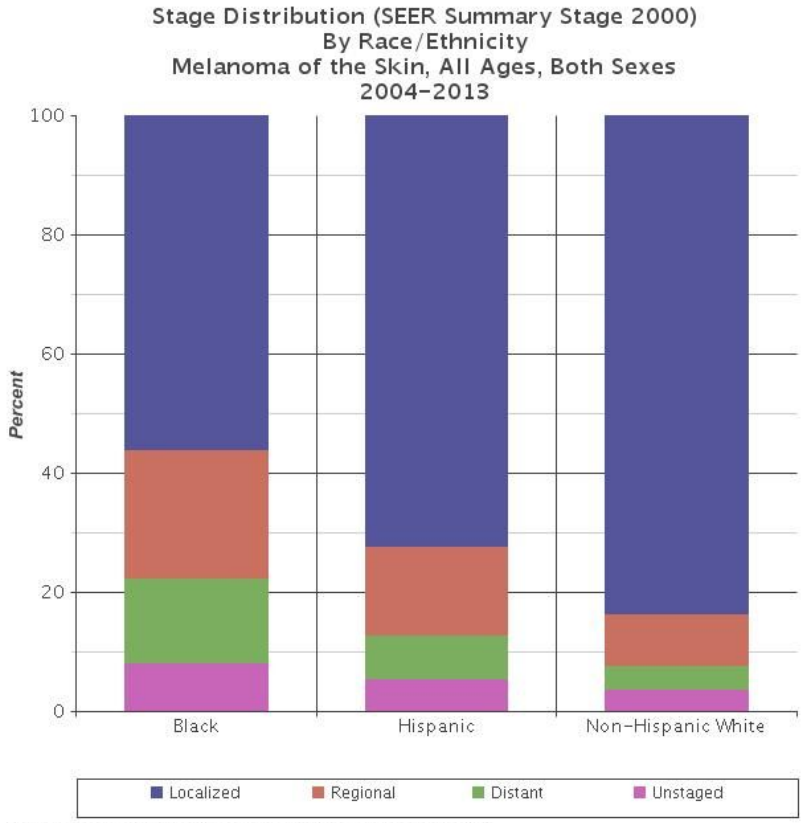
The trend in the African American population also included the Hispanic population and shows an estimated annual mortality decline of -1.3% in both sexes, -0.2% in the African American females and -0.5% in the African American male population.

Stage of Distribution

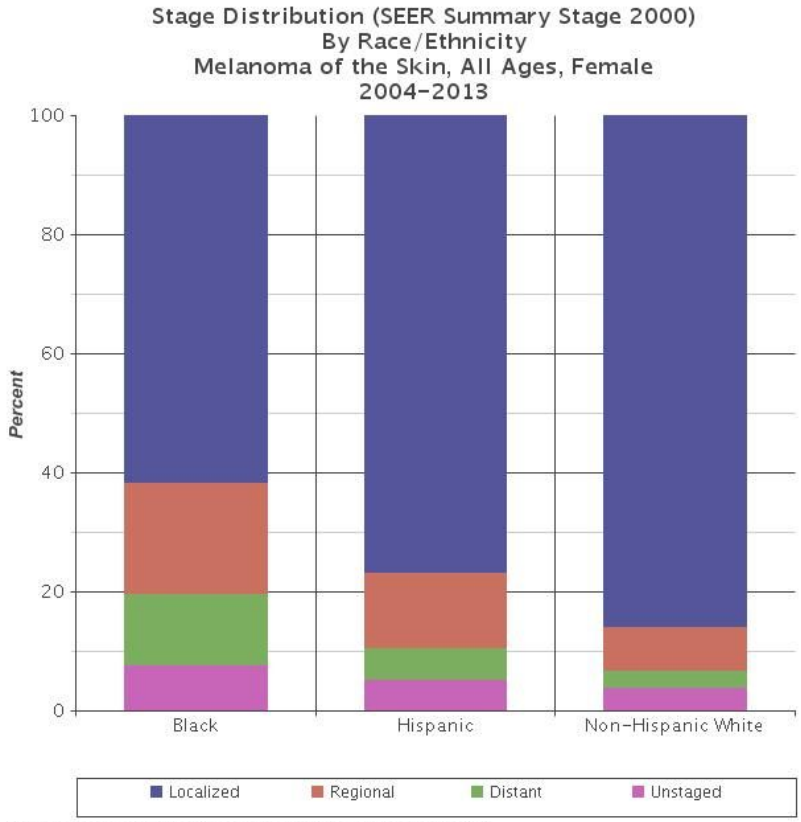
The stage of distribution indicates how advanced the disease had progressed at the time the of diagnosis, with the most advanced disease associated with increased morbidity and mortality. The SEERS database dated 2004 - 2013 shows disparity related to the stage of distribution of cutaneous melanoma in different races. Localize melanoma represents the majority of the stage in all the races. In non-hispanic whites

localized spread contributes to 83.9% of the disease at the time of diagnosis. In the Hispanic population 72.5% of the disease was diagnosed at the localized stage and in the African American population only 56.1% was diagnosed at the localized stage. However, the disparity is most notable when comparing the the more advanced stages of the disease. The combination of regional spread and distant metastasis represents 12.5% of the disease at the time of diagnosis in the non-hispanic white population compared to 22.3% in the Hispanic population and 35.8% in African Americans.

Within the caucasian population 14% of Caucasian men and 10.3% of Caucasian women were diagnosed at either the regional stage or had distant metastasis at the time of diagnosis. Among the Hispanic population 27.6% of Hispanic men and 18% of Hispanic women were diagnosed at the either the regional stage or had distant metastasis at the time of diagnosis. The disparity was most notable within the African American population which demonstrated that 42% of African American men and 30.6% of African American women were diagnosed at either the regional stage or had distant metastasis at the time of diagnosis.



Cancer sites include invasive cases only unless otherwise noted.
Hispanics and Non-Hispanics are not mutually exclusive from whites, blacks, Asian/Pacific Islanders, and American Indians/Alaska Natives.
Incidence data for Hispanics and Non-Hispanics are based on NHIA and exclude cases from the Alaska Native Registry.
Incidence source: SEER 18 areas (San Francisco, Connecticut, Detroit, Hawaii, Iowa, New Mexico, Seattle, Utah, Atlanta, San Jose-Monterey, Los Angeles, Alaska Native Registry, Rural Georgia, California excluding SF/SJM/LA, Kentucky, Louisiana, New Jersey and Georgia excluding ATL/RG).



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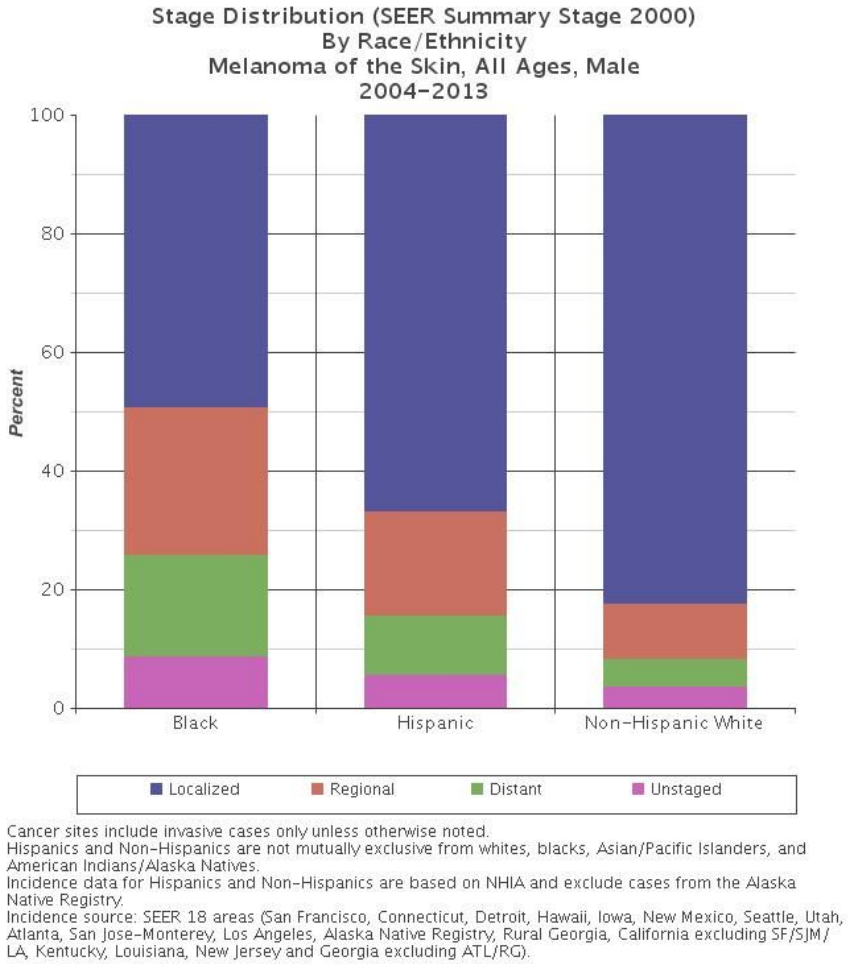
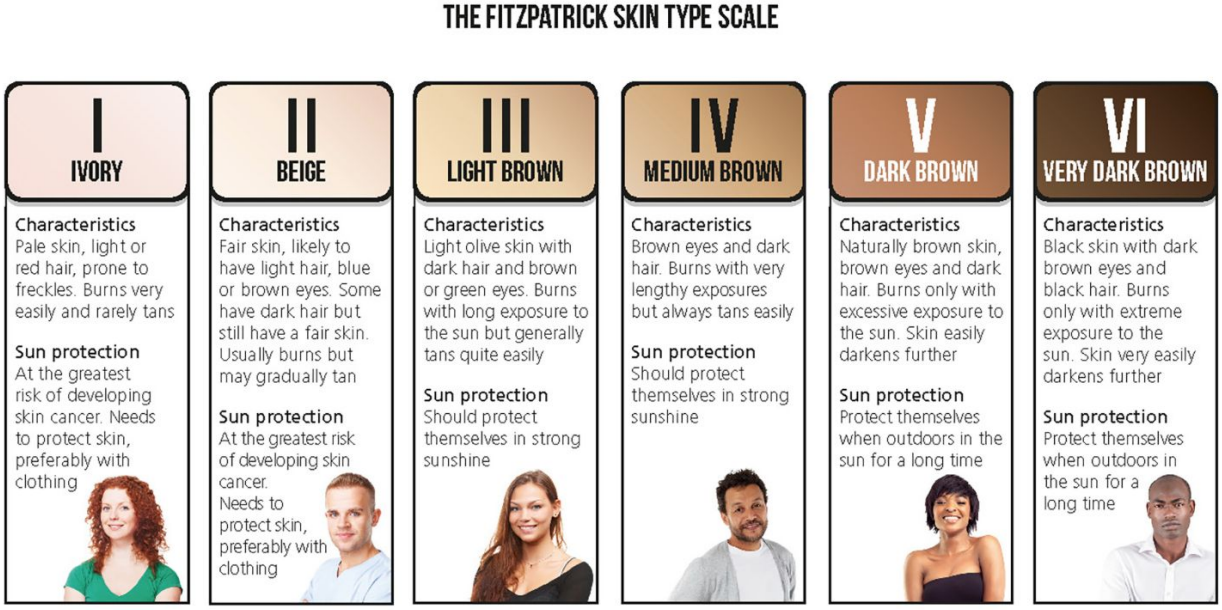


Method

This pilot study aims to evaluate one possibility to the late diagnosis of cutaneous in the African American and Hispanic population. This study evaluated the most commonly used educational resources in dermatology and oncology for their pictorial representation of melanoma. The images in these educational materials were evaluated using the Fitzpatrick skin tone scale to assign a skin tone.

The most commonly utilized educational resources were determined using the Doody's health science book review. From this list, the books were arranged in order of their star rating. Doody assigns star ratings and a numerical score based on reviewers qualitative and quantitative analysis of these educational material. The lowest rated items are assigned a 1 star and the highest 5 stars. Their numerical ranking ascribed 100 as a perfect score. All book with 5 star ratings and a numerical ranking of 97 and above were collected. A total of 27 titles were collected, 4 of which were rejected because they were specific to only animal dermatology. Three titles were rejected because they were pediatric dermatology textbooks. A total of 12 books could be sourced through or institution and it's affiliated hospital. Of the 12 book that were sourced 5 additional books were rejected because they did not have images specific to our topic of interest. Books were sourced through the Cooper Medical School library and Cooper University Hospital library in the electronic form. All the images in the books corresponding to cutaneous melanoma were collect. A total of 129 images were collected.

Using the fitzpatrick skin type chart, the various skin types were determined by comparing the electronic images in the education materials to the Fitzpatrick chart. The images were rated by 3 independent individuals all of whom were blinded to the rating given by the other. All graders were asked to grade the images on the same computer under identical lighting. Each image was then given a rating between I-VI based on the Fitzpatrick rating scale, with I representing the fairer complexion and VI representing the darker complexion. To minimize variability the 6 Fitzpatrick skin types were grouped into 3 groups A, B and C. Group A consists of skin types I and II, group B consists of types III and IV and group C consists of types V and VI. The different groups were then compared to each other to see if a statistical difference exists in the number of images that were assigned to the groups.



Results

All three graders reviewed the 129 images that were included in the study. Of the 129 images evaluated by all three graders a total of 327 images (84%) were assigned to group A, 51 images (13%) were assigned to group B and only 9 images (2%) were assigned to group C. Grader 1 assigned 103 images to group A, mean grade = 1.47 (SD = 0.50). Grader 2 assigned 120 images to group A, mean grade = 1.51 (SD = 0.50). Grader 3 assigned 104 images to group A, mean grade = 1.52 (SD = 0.50). Among the images assigned to group A the differences of the means between grader 1 and 2 is 0.05, ($p = 0.50$), between grader 1 and 3 is 0.07, ($p = 0.41$) and between grader 2 and 3 is 0.01, ($p = 0.86$). Within group B, grader 1 assigned 22 images, mean grade = 3.09 (SD = 0.29), grader 2 assigned 7 images, mean grade = 3.14 (SD = 0.38) and grader 3 assigned 22 images, mean grade = 3.05 (SD = 0.21). Within group B the differences of the means between grader 1 and 2 is 0.03, ($p = 0.91$), between grader 1 and 3 is 0.03, ($p = 0.89$) and between grader 2 and 3 is 0.05, ($p = 0.84$). Within group C grader 1 assigned 4 images, mean grade = 5.50 (SD = 0.58); Grader 2 assigned 2 images, mean grade = 5 (SD = 0) and grader 3 assigned 3 images, mean grade = 5.67 (SD = 0.58). The differences of the means in group C between grader 1 and 2

is 0.24, (p = 0.65), between grader 1 and 3 is 0.08, (p = 0.86) and between grader 2 and 3 is 0.32, (p = 0.56). The overall mean grade by all 3 graders combined was 1.8 (SD = 0.13), which corresponds to a skin tone between I and II on the Fitzpatrick skin type chart. Grader 1 overall mean grade = 1.87 (SD = 1.0), grader 2 overall mean grade = 1.65 (SD = 0.74) and grader 3 overall mean grade = 1.88 (SD = 0.94). The intergrader agreement/reliability (intraclass correlation) among the three graders was moderate at 60% (95% CI 0.501 - 0.680). The differences of group means between group A and group B is 1.67 (p < 0.0001), between group A and group C is 2.62 (p < 0.0001) and between group B and group C is 0.95 (p < 0.0001).

Analysis Variable : GRADE

GROUP	GRADER	N	Mean	Std Dev	Minimum	Maximum
A	1	103	1.4660194	0.5012833	1.0000000	2.0000000
	2	120	1.5083333	0.5020267	1.0000000	2.0000000
	3	104	1.5192308	0.5020496	1.0000000	2.0000000
B	1	22	3.0909091	0.2942449	3.0000000	4.0000000
	2	7	3.1428571	0.3779645	3.0000000	4.0000000
	3	22	3.0454545	0.2132007	3.0000000	4.0000000
C	1	4	5.5000000	0.5773503	5.0000000	6.0000000
	2	2	5.0000000	0	5.0000000	5.0000000
	3	3	5.6666667	0.5773503	5.0000000	6.0000000

Analysis Variable : GRADE

GRADER	N	Mean	Std Dev	Minimum	Maximum
1	129	1.8682171	1.0107226	1.0000000	6.0000000
2	129	1.6511628	0.7463574	1.0000000	5.0000000
3	129	1.8759690	0.9437935	1.0000000	6.0000000

Differences of Group Means

Effect	GROUP	GROUP	Estimate	Standard Error	DF	Param	P
GROUP	A	B	-1.6700	0.08983	384	-18.59	<.0001
GROUP	A	C	-2.6175	0.2016	384	-12.98	<.0001
GROUP	B	C	-0.9475	0.2157	384	-4.39	<.0001

Analysis Variable : GRADE

GROUP	N	Mean	Std Dev	Minimum	Maximum
A	327	1.4984709	0.5007639	1.0000000	2.0000000
B	51	3.0784314	0.2715244	3.0000000	4.0000000
C	9	5.4444444	0.5270463	5.0000000	6.0000000

Conclusion

The incidence of cutaneous melanoma in the United States seems to have stabilized over the years. However, the data presented in SEERs demonstrates that those with darker skin tones are at increased risk of being diagnosed at an advanced stage and therefore are more likely to suffer increased morbidity and mortality as a result of this disease. Data from SEERs demonstrates that African Americans followed by Hispanics are at increased risk of being diagnosed at advanced stages. Advanced stages of the disease at the time of diagnosis is associated with increased morbidity and mortality. Several factors possibly contributes to why a significant number of African Americans and Hispanics present with the disease at an advance stage. This paper explores the lack of diversity within education material as one correctable contributing factor. The results of this pilot study demonstrates that among some of the most commonly utilized educational material used in teaching member of the medical fraternity there are significant difference in the skin type used to demonstrated skin pathology, specifically cutaneous melanoma. Teaching material with adequate depiction of cutaneous melanoma in darker skin individuals needs to be

made available to foster early identification of the disease by medical professionals and the general public.

Discussion

The noted discrepancy in the stage of distribution of cutaneous melanoma in the African American and Hispanic population calls into question the ability of the medical establishment in identifying cutaneous melanoma in this patient population. There are possibly multiple factors that contributes to the lack of early recognition of cutaneous melanoma in this patient population but the data presented here clearly identify one possible factor. It is understandable that classes of melanoma is different across these specific groups with acral lentiginous being more common in African American. However, more work needs to be done as it is still not clear why the disease was not found at an earlier stage in these patient population. To this end a more comprehensive research to include more educational materials and more graders should be considered.

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