COMMENTARY

Malignant Melanoma in Pigmented Skin: Does the Current Interventional Model Fit a Different Clinical, Histological, and Molecular Entity?

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Despite public awareness and public health initiatives aimed at early detection and prevention, the incidence of melanoma continues to increase. In this issue of Dermatologic Surgery, Alexandrescu and colleagues address the disparity in the incidence of melanoma between lightly and deeply or darkly pigmented individuals.[1] The authors note that, although the incidence of melanoma in lightly pigmented populations is much greater than in darker-skinned populations, the prognosis is worse for individuals with dark pigmentation. They suggest that, based on clinical, histologic, and molecular differences, there may be a need to approach these two populations differently with regard to detection and prevention. The authors conclude that further study of the differences in clinical presentation and histologic behavior of melanoma in these two categories of individuals is necessary.

According to 2011 statistics from the U.S. Census Bureau of the U.S. Department of Commerce, there are estimated to be 306 million people living in the United States. Given that data collection is based on self-identification and reflects a social rather than biologic or genetic definition of race, the U.S. population comprises 64.5% whites,12.8% blacks, and 5.1% Asians. Therefore, more than one in eight individuals in the United States self-identifies as black or Asian and is likely to be considered deeply or darkly pigmented.[2] As such, this population is in need of an appropriate approach to education and awareness about melanoma, as well as prevention and early detection as it uniquely pertains to this population.

Darkly pigmented skin is deeply pigmented because the melanosomes within epidermal keratinocytes are large and predominantly individually distributed, whereas the melanosomes in lightly pigmented skin are smaller and predominantly arranged in membrane-bound clusters. In Asian skin, and perhaps other skin of intermediate pigment, the melanosomes within keratinocytes are intermediate in size and arranged individually and in clusters.[3]

Melanosomes contain melanin, which functions to absorb ultraviolet radiation to protect the melanocytes and neighboring keratinocytes from damage, but recent research by Jenkins and colleagues suggests that the production of melanin within melanocytes may be responsible for higher baseline levels of reactive oxygen species within melanocytes than in keratinocytes and fibroblasts. They also

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report more intracellular reactive oxygen species and thus greater susceptibility to oxidative stress exhibited by melanocytes than keratinocytes and fibroblasts when all cell types are depleted of tumor suppressor p16. Because oxidative stress plays a role in melanoma development, this discovery may help explain why genetic compromise of p16 is associated with a greater predisposition to melanoma, but it places in question the protective role of melanin.[4]

In contrast, past research by Hoogduiin and colleagues investigating the role that melanin may play in protection from reactive oxygen species in melanocytes and keratinocytes suggests that melanin may protect against reactive oxygen species–induced DNA strand breaks in melanocytes and keratinocytes through its ability to bind calcium. Thus, in contrast to Jenkins' research, Hoogduiin's research suggests a protective role for melanin against reactive oxygen species.[5]

As Alexandrescu's review suggests and research such as that of Jenkins and Hoogduiin regarding melanoma supports, we seem to be faced with more questions than answers. We know that environmental and genetic factors play a role in malignant transformation of melanocytes to melanoma, but to what extent melanin protects melanocytes from malignant transformation is uncertain. Likewise, how do we account for the differences in distribution, presentation, and aggressiveness of melanomas in various skin types? We must continue to research these disparities while at the same time focus on the certainty that melanomas in lightly and darkly pigmented individuals differ. Until we have more answers, we must engage in efforts aimed at educating the public and health professionals about melanoma in an effort to decrease the morbidity and mortality associated with this preventable disease.

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