EDITORIAL

Challenges and Controversy in Determining UV Exposure as a Risk Factor for Cutaneous Melanoma in Skin of Color

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Despite the lower prevalence of melanoma in people of color compared with the White population, there is increased morbidity and mortality as evidenced by more advanced stage at diagnosis and lower 5-year survival rates.[1,2] This disparity persists in all racial minority groups with localized melanoma and increasingly in Hispanic patients with regional or distant disease.[3] Exposure to UV radiation, especially high intermittent exposure during childhood, is a significant environmental risk factor for melanoma in individuals with fair skin.[1] However, for populations of color, in which melanomas are commonly found in sun-protected locations, such as acral, subungual, and mucosal surfaces, the role of UV exposure as a risk factor is much less clear.[1] This is a recognized gap in knowledge that highlights the need to further identify and stratify risk factors for melanoma in this population. Evidence is needed to inform meaningful recommendations regarding melanoma prevention, screening, and treatment to improve outcomes in this population.[1,2]

Related article

In this issue of *JAMA Dermatology*, Lopes et al[4] review the available literature to determine whether there is an association between UV exposure and risk for melanoma in individuals with darker skin. In this systematic review, 13 studies met the inclusion criteria of UV exposure preceding the diagnosis of melanoma and cohort classification of skin of color. The authors included studies that attempted to quantify UV exposure as measured by a broad range of methods, including UV index, irradiance, latitude, history of phototherapy, and individual sun exposure history. The authors also defined skin of color broadly, including Fitzpatrick skin types (FSTs) IV through VI; UV sunburn susceptibility (rarely or never burns); or race/ethnicity other than non-Hispanic White.[4] Eleven of the studies reviewed by the authors showed no association between UV exposure and melanoma risk in patients with skin of color, and only 2 studies suggested an association with mixed results.

The study findings from Lopes et al[4] support the assertion that increased UV exposure does not appear to be a significant risk factor for melanoma in populations with skin of color. Should this evidence influence the way we counsel populations with skin of color regarding UV exposure and photoprotection to prevent melanoma? In interpreting these conclusions, it is important to note that the studies reviewed were found to be of overall low-quality to moderate-quality evidence based on study design. Limitations were compounded by the inconsistency across studies in quantifying UV exposure at the population and individual level and different methods of classification of skin color and sunburn susceptibility. Assessment of risk factors based on melanoma subtype and location was not possible, as this information was not consistently reported in the articles reviewed. In addition, the conclusions cannot be extrapolated to immunosuppressed persons, including transplant recipients, and individuals with established elevated melanoma risk, as these groups were excluded from the authors' review.

Measuring UV Exposure Is Not an Easy or Reliable Task

How UV radiation exposure is determined in the literature varies widely across studies. When evaluating the association between melanoma risk and UV exposure, the measurement and patterns of exposure over relevant time periods is important.[5] Understanding the difference between determining sun exposure in populations vs an individual helps us understand how to interpret the data presented and their limitations.[5] Ecological surrogates for population-level sun exposure, such as latitude or ambient (at the earth's surface) UV radiation, which may be affected by altitude, season, time of day, ozone column, or cloud cover, only give a rough estimate of an individual's specific exposure.[5] An individual's received dose of UV radiation relies on additional factors, including sun protective measures, amount of time spent outdoors, and time period of exposure (eg, childhood vs adulthood), which can be further elicited through the use of questionnaires.[5]

The variability of UV exposure reporting makes it difficult to compare data and interpret conclusions. Several of the studies analyzed data from large cancer registries and determined UV exposure based on ambient UV radiation at the patient's geographic region at the time of melanoma diagnosis. This is not representative of an individual's cumulative exposure or exposure at critical time periods, such as childhood, which is an important predictive factor of melanoma risk later in adulthood. Among the studies that showed no association, 4 studies used UV-B phototherapy as the only measure of UV exposure and did not account for other sources of UV radiation, including UV-A, which plays an important role in melanoma development. The utility of including these studies in the analysis can be questioned, given the lack of evidence to support UV-B phototherapy as a significant risk factor for melanoma.[6] The 2 studies that did demonstrate an association between UV exposure and melanoma risk in populations with skin of color also had limitations. In a study comparing 2 cities in Chile at different latitudes,[7] the regional differences in skin type were not accounted for and may have weakened study conclusions. In a second population-based study,[8] cancer registries in demographically diverse states, representing approximately two-thirds of the US population of Black and Hispanic individuals, demonstrated a negative association

between melanoma incidence and latitude. However, this was found to be statistically significant only in Black males and not among White individuals, as would have been expected, making it difficult to interpret these findings.

More Objective Methods to Determine Skin Color Are Needed in Dermatology

Proxies used to define skin of color in clinical research are often subjective and inconsistently applied. It is important to accurately define an individual's skin color, an important modifier of received UV radiation dose, to determine sunburn susceptibility, which is a key risk factor for melanoma.[5,9,10] The FST classification is widely used and attempts to assess sun sensitivity of the skin by determining the tendency of the skin to burn and tan after moderate UV exposure as reported by an individual.[8] Physicians are increasingly estimating FST based on race and pigmentary phenotypes by visual assessment, referred to as physician-diagnosed skin phototype, which has been criticized as unreliable and a poor correlate of skin color.[9] Similarly, classification and use of race/ethnicity in scientific research has been the subject of debate and controversy and allows for only broad categorical assumptions to be made about skin tone and is not a reliable surrogate for melanin index.[9,10] Self-reported race has been shown to be a weak independent predictor of FST, and quantitative objective measures demonstrate a range of sunburn susceptibility within each racial and ethnic group, especially among Latino individuals.[8-10] In addition, the collection of racial/ethnic data is also subject to limitations and selection bias, which may result in misclassification, as demonstrated by the determination of Hispanic ethnicity by indirect methods, such as surname, in larger cancer registries.[11] In defining skin of color, Lopes et al[4] use broad inclusion criteria with very few studies attempting to stratify study populations beyond race/ethnicity and into specific FST or sunburn susceptibility classifications. Best practices are needed in clinical research to more accurately define skin color, including use of objective measures (eg, colorimeters and spectrophotometers), which can help provide a consistent and reproducible determination of skin color and help mitigate potential bias related to subjective clinical scoring.[12]

Addressing Disparities in Melanoma Diagnosis and Treatment

It is critically important to address the disparity in which melanomas in populations with skin of color are diagnosed at later stages, which negatively affects survival rates. Research should move "beyond simply measuring differences"[13] and integrate a phased approach that includes detecting, understanding, and reducing disparities. Ethnic and racial minorities are underrepresented in clinical research, including melanoma clinical trials, limiting our understanding around how unique environmental, cultural, and physiologic factors may affect health outcomes.[3,14] Adequate representation is critical to performing research that results in conclusions that are clinically relevant and that can be equitably and broadly applied.[15] Although there are several factors that influence lower participation of underrepresented populations in medical research (eg, mistrust, lack of access, lack of cultural competency in research design), there are intentional steps that researchers can take to increase participation of this population.[15] The systematic review conducted by Lopes et al[4] underscores the need for high-quality literature spanning diverse populations to fill the knowledge gaps regarding the role of UV protection in the prevention of melanoma, especially for individuals with skin of color with high sunburn susceptibility.

How should dermatologists advise patients with darker skin types regarding the role of photoprotection? Sun protection is still important, as these measures have additional benefits in skin of color in reducing the effects of UV exposure on photoaging and preventing UV-related dyspigmentation.[1] Further research is needed to clarify what aspects of skin cancer and melanoma prevention are of highest value in patients with skin of color, including the level of sun protective measures, self-examination (including acral, subungual, and mucosal surfaces), early skin cancer and melanoma detection, and best treatments in this patient population. Culturally competent delivery of these best practices is critical to best acknowledge sun-protective beliefs, misconceptions, and practices in skin of color that may act as barriers to adherence.[1]

ARTICLE INFORMATION

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