



Racial and Ethnic Disparities in Malignant Melanoma: A Literature Review

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INTRODUCTION

- Melanoma is a tumor arising from uncontrolled proliferation of melanocytes, neural crest derived cells responsible for production of pigment in the basal layer of the epidermis
- The incidence of melanoma has grown significantly worldwide, where 324,635 new cases of melanoma were reported worldwide in 2020 accompanied by 57,043 deaths
- While the incidence of melanoma is greatest in fair-skinned populations, studies indicate that populations of color are reported to have lower survival rates when diagnosed with melanoma
- Potential explanations for these outcomes in minority populations include more advanced disease at presentation, more biologically aggressive tumor behavior, and socioeconomic factors
- The aim of this article is to review the relationship between melanoma and underserved communities as well as discuss the current explanations behind these observations

METHODS

Databases: PubMed, EMBASE, Google Scholar, CINAHL, and Cochrane Library
Keywords: melanoma disparities, racial and ethnic health disparities, melanoma disparities, barriers to healthcare access, melanoma in populations of color
Number of Articles: A total of 36 articles were identified and selected
Analysis: After reading the full-text then extracting the findings from each article, our team organized those findings under the following competencies: advanced stage of presentation, melanoma subtype, molecular studies of BRCA1 and BRCA2, socioeconomic and demographic factors
Inclusion Criteria: Discussion of described competencies pertaining to melanoma disparities in populations of color
Exclusion Criteria: Not empirical, duplicates, not in English, published before the year 1998, not directly relevant to melanoma disparities, or not from viewpoints of targeted disciplines

FINDINGS

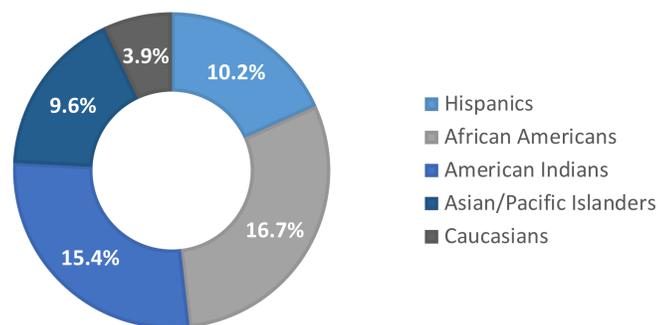


Figure 1. Percentages of different populations diagnosed with advanced stage IV melanoma upon presentation.

FINDINGS

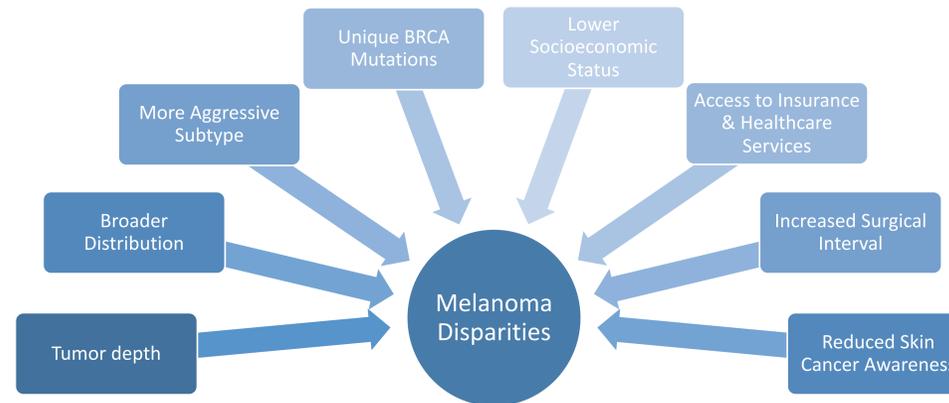


Figure 2. Overview of factors observed to contribute to melanoma disparities in underserved populations

Broader Melanoma Distributions
 Racial and ethnic minority groups are shown to have broader distributions of melanoma, conferring a more advanced staging. While Caucasians most commonly present with melanoma on the trunk (34.5%), African Americans frequently present with melanoma on the lower extremities and feet (56.1%). According to Hsueh et. al, the prognosis for patients diagnosed with melanoma of the lower extremity is affected by the distance of the lesion from the trunk, where a more distal tumor carries a poorer prognosis.

Deeper Tumors
 A comparison of melanoma depth between African Americans and Caucasians indicate African Americans on average present with deeper tumors compared to Caucasians across major melanoma subtypes, including Superficial Spreading (1.26 vs. 0.83mm), Nodular Melanoma (3.50 vs. 2.93mm), and Lentigo Maligna (1.07 vs. 0.63mm), respectively.
 Overall, 8.1% of all African Americans diagnosed with Superficial Spreading melanoma presented with tumors deeper than 3.00mm compared to only 3.1% of Caucasians.

Aggressive Subtype
 The most common form of melanoma in African Americans is Acral Lentiginous melanoma, accounting for 36% of all melanomas in this population. In contrast, Acral Lentiginous melanoma only accounts for 1% of all Caucasian melanoma diagnoses.
 Acral Lentiginous melanoma presents atypically and is commonly found on the soles of the feet, palms, and nail beds.
 Acral Lentiginous melanoma is associated with lower 5-year and 10-year survival rates compared to other melanoma subtypes; while all other cutaneous melanoma subtypes collectively have a 5-year and 10-year survival rate of 91.3% and 87.5%, respectively, Acral Lentiginous melanoma has a 5-year and 10-year survival rate of 80.3% and 67.5%, respectively.

Figure 3. Synthesized findings of tumor characteristics conferring an advanced melanoma stage in underserved populations

Socioeconomic Status

- Populations of color diagnosed with melanoma are observed to have a lower socioeconomic status
 - African Americans: \$38,000
 - Non-Hispanic Whites: \$63,000 or greater
- Lower socioeconomic status has been associated with reduced 5-year survival in melanoma patients vs. higher economic status patients
 - Early-stage: 83.2% vs. 90.9%
 - Late-stage: 30.0% vs. 45.5%
- A separate study conducted by Linos et. al evaluated 29,792 melanoma cases in the state of California and found that the lowest socioeconomic status groups experienced the greatest incidence of thick melanomas greater than 4mm

Insurance & Healthcare Services

- Percentage of uninsured populations in 2019:
 - African Americans: 11%
 - Hispanics: 20%
 - AIAN: 22%
 - NHOPI: 13%
 - Caucasians: 8%
- Percentage of insured populations covered by Medicaid:
 - African Americans: 37%
 - Hispanics: 32%
 - AIAN: 38%
 - NHOPI: 30%
 - Caucasians: 26%
- Medicaid patients experience lower acceptance rates for dermatology appointments
 - Medicaid: 32% acceptance
 - Medicare: 85% acceptance
 - Private Insurance: 87% acceptance
- Populations of color are less likely to have been screened for skin cancer
 - Hispanics: 3.7%
 - African Americans: 6.2%
 - Caucasians: 8.9%
- Increased Surgical Interval (period between the diagnostic biopsy and surgical excision)
 - African Americans: 23.4 days
 - Caucasian patients: 11.7 days

Reduced Level of Awareness

- The advanced stage of melanoma in minority populations is also thought to be due to lower skin cancer awareness in these groups
- Historically, darker-skinned individuals have perceived themselves to have a reduced or no risk for developing melanoma due to increased levels of protective pigment in their skin
- This can also be attributed to the marketing of melanoma risks and preventions to target populations primarily consisting of blonde or red-haired and blue-eyed individuals
- African Americans and Hispanics are less likely to believe that skin cancer is affected by lifestyle choices, despite known impacts of ultraviolet radiation on skin cancer development
- These groups are also more likely to believe that skin cancer is preceded by pain or other non-specific symptoms and that nothing can be done to protect against these tumors

Figure 4. Synthesized findings of socioeconomic and demographic factors conferring an advanced melanoma stage

FINDINGS

- Molecular Studies of BRCA1 and BRCA2**
- More recently, research has focused on further characterizing the role of BRCA1/BRCA2 mutations in the development of melanoma
 - BRCA1 and BRCA2 respond to double-stranded DNA breaks and play a critical role in DNA repair mechanisms
 - Cells lacking functional BRCA1/BRCA2 genes are unable to repair double-stranded DNA breaks, allowing these cells to accumulate genetic mutations and develop into cell clones with malignant potential
 - Individuals with BRCA2 mutations have demonstrated an increased risk of melanoma in several reports
 - In a study conducted by Debinak et. al, the prevalence of the BRCA2-N991D variant was significantly greater in melanoma patients
 - In another study conducted by the National Cancer Institute, individuals with a BRCA2 mutation were 2.5 times more likely to develop melanoma compared to those without the mutation
 - In a study conducted by Golan et. al with metastatic pancreatic cancer patients, a higher prevalence of germline BRCA2 mutations was observed in African Americans compared to other populations (Table 1.)
 - Another study done by Haffty et. al found that the relative distribution of BRCA1 and BRCA2 mutations differed between Caucasian and African American breast cancer patients (Table 2.)
 - Collectively, these results indicate significant differences in BRCA1/2 mutation frequencies that may be contributing to disparities in melanoma across populations

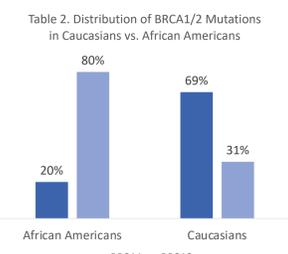
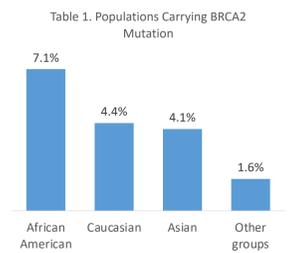


Figure 5. Synthesized findings of BRCA1 and BRCA2 mutations conferring an advanced melanoma stage in underserved populations

CONCLUSION

- The number of reported melanoma cases has continued to rise
- While the Caucasian population accounts for the highest incidence of melanoma, racial and ethnic minority populations disproportionately experience lower rates of survival when diagnosed with melanoma
- Among minority populations, melanoma tends to present at a more advanced stage with more aggressive melanoma subtypes, increased and atypical distributions over the body, and increased tumor depths
- Recent studies indicate that populations of color carry unique mutations in the BRCA genes that may predispose them to developing melanoma and account for increased mortality rates
- Socioeconomic status has also been linked to melanoma disparities, where limited access to quality healthcare including skin exams, insurance, and education may result in decreased melanoma survival rates
- Overall, it is imperative to incorporate melanoma disparities education into physician training to combat the systemic issues observed and improve the melanoma prognosis associated with populations of color

REFERENCES

