Treatment efficacy on melanoma patients through biomarkers: A systematic review

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ABSTRACT

Introduction: One of the most aggressive and resistant skin tumours to therapy is advanced melanoma. Numerous haematological, molecular, and immunological biomarkers have surfaced in recent years as possible indicators of treatment effectiveness, especially in patients receiving targeted treatments and immunotherapy. However, the design, demographics, and techniques of various research frequently differ, which restricts how broadly the results may be applied. **Materials and Methods:** In accordance with PRISMA recommendations, a thorough literature search was carried out in PubMed, EBSCOhost, and Scopus using Medical Subject Headings (MeSH) phrases associated with "skin neoplasm," "treatments," and "biomarkers." The titles, abstract, and full-text reviews of studies published up until 19 November 2024 were used for screening. **Results:** A total of 5597 studies were retrieved, and only studies with clinical trials that reported biomarker profiles and used blood samples. Seven studies with a range of sample sizes and demographics (n = 2–258) were examined. High T-cell receptor (TCR) diversity, low neutrophil-to-eosinophil ratio (NER), and normal lactate dehydrogenase (LDH) levels were important indicators linked to positive treatment results. Actionable targets included molecular indicators like BRAFV600, KIT mutations, and microRNA-27b (miR-27b). Notably, better illness control and survival were substantially correlated with ICOSLG expression, especially in cetirizine-treated patients. PD-L1 expression, tumour mutational burden (TMB), and interferon-gamma (IFN-γ) profiles all indicated improved results with a combination of targeted and immunological therapy in patients with BRAFV600 mutations. **Conclusion:** The increasing importance of biomarker-driven strategies in the treatment of metastatic melanoma is supported by this systematic review. Although the results are encouraging, the majority of the research was retrospective and varied, which emphasizes the necessity of prospective studies to confirm the prognostic power of these biomarkers and allow for their incorporation into standard clinical procedures.

Keywords: Advanced melanoma, biomarkers, immunotherapy, targeted therapy