Article type: Opinion
Home Page URL: https://www.alliedacademies.org/journal-clinical-oncology-cancer-research/

Molecular Biomarkers for Early Detection and Prognosis of Breast Cancer.

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Received: *27-May-2025, Manuscript No. AACOCR-25-169754;* ***Editor assigned:*** *01-Jun-2025, PreQC No. AACOCR-25-169754 (PQ);* ***Reviewed:*** *15- Jun-2025, QC No. AACOCR-25-169754;* ***Revised:*** *22- Jun-2025, Manuscript No. AACOCR-25-169754 (R);* ***Published:*** *29- Jun-2025, DOI:10.35841/AACOCR-8.1.177*

Introduction

Breast cancer remains one of the most prevalent malignancies affecting women worldwide, accounting for substantial morbidity and mortality despite advances in diagnosis and treatment. The heterogeneity of breast cancer in terms of genetic, molecular, and clinical profiles has driven a growing interest in identifying reliable molecular biomarkers that can facilitate early detection and improve prognostic accuracy. Molecular biomarkers—ranging from genetic mutations (e.g., BRCA1/2), circulating tumor DNA (ctDNA), microRNAs, to protein expression signatures—offer valuable insights into tumor biology, disease progression, and therapeutic responsiveness. These markers can be detected through minimally invasive techniques such as liquid biopsy, providing a non-invasive approach to cancer surveillance. Early detection using such biomarkers can significantly enhance treatment outcomes, while prognostic biomarkers enable clinicians to stratify patients based on recurrence risk, guiding personalized treatment strategies. The integration of molecular biomarker analysis into clinical practice has the potential to transform breast cancer management from reactive to proactive care, ultimately improving patient survival and quality of life [1, 2, 3, 4, 5].

Conclusion

Molecular biomarkers represent a transformative frontier in the early detection and prognosis of breast cancer. Their ability to reveal the underlying molecular landscape of tumors facilitates earlier diagnosis, more accurate prognostic predictions, and individualized treatment planning. Ongoing research and clinical validation are critical to translating these biomarkers into routine clinical use, ensuring they are accessible, cost-effective, and reliable. As our understanding of breast cancer biology deepens, the combined use of multiple biomarkers—coupled with advanced imaging and genomic technologies—will likely become the cornerstone of precision oncology. This shift promises not only to improve survival rates but also to reduce the physical and emotional burden of breast cancer through earlier intervention and targeted therapy.

References

1. Awasthi, P., & Sharma, N. (2022). Salivary biomarkers: A non-invasive tool for early detection of oral potentially malignant disorders. *Journal of Oral Biology and Craniofacial Research, 12*(3), 456–462.
2. Gupta, R., Meenakshi, S., & Patel, K. (2021). The role of cytokines in saliva for detecting oral precancerous lesions. *Oral Oncology, 117*, 105307.
3. Khan, M., & Prasad, G. (2020). MicroRNA expression in saliva as a diagnostic tool for oral precancer and cancer. *Critical Reviews in Oncology/Hematology, 150*, 102961.
4. Li, Y., St. John, M. A., Zhou, X., Kim, Y., Sinha, U., Jordan, R. C., Eisele, D., Abemayor, E., Elashoff, D., Park, N. H., & Wong, D. T. (2004). Salivary

Citation: Morgan A. Molecular Biomarkers for Early Detection and Prognosis of Breast Cancer. *J Oral Med Surg*. 2025; 8(1):177

transcriptome diagnostics for oral cancer detection. *Clinical Cancer Research, 10*(24), 8442–8450.

5. Sharma, R., & Bansal, M. (2019). Advances in salivary diagnostics: Role in detection of oral cancer and precancer. *World Journal of Dentistry, 10*(2), 139–144.

Citation: Morgan A. Molecular Biomarkers for Early Detection and Prognosis of Breast Cancer. *J Oral Med Surg*. 2025; 8(1):177