

Stratified treatment based on disease severity and biomarker levels helps improve the targeting of intervention. Patients with significantly elevated inflammatory indicators are more suitable for prioritizing immunomodulatory measures, while patients with early vascular leakage-related signals should focus on endothelial function protection (Shetty et al., 2025). The combination of targeted intervention on the basis of conventional supportive treatment is considered to help reduce the risk of death from severe dengue fever, but the relevant strategies still need further clinical research for verification and improvement.

8 Conclusion and Outlook

Immune storm is the key to the occurrence and deterioration of severe dengue fever. It can cause dengue fever to develop from a common fever into fatal conditions such as plasma leakage, bleeding and shock. The essence is that the immune response is out of order - too many cytokines are released, immune cells are overly active, and the function of endothelial cells is impaired, ultimately destroying the vascular barrier and causing organ problems. Recent studies have found that TNF- α , IL-6 and various chemokines are all involved in this process. Extracellular vesicles and non-coding RNAs may also regulate immune and endothelial responses, providing us with a more comprehensive understanding of the mechanism of severe illness development.

At present, biomarker research has identified many candidate indicators, such as gene expression characteristics, circulating proteins, cytokines, etc., which can be used for early disease prediction and risk stratification. The advantages of these studies lie in the use of multiple sets of data, more advanced molecular detection techniques, and the integration of machine learning to enhance prediction accuracy. However, the shortcomings are also quite obvious: many studies have a small sample size and only come from one institution. The case standards and sampling times are not uniform, making it difficult to replicate and promote the results. Moreover, the research endpoints are not uniform, and the process from experimental discovery to clinical application is unclear, which also hinders the progress of intervention treatment research.

Future research should focus on large sample sizes and multi-center research designs, so as to more confidently verify those candidate markers. At the same time, differences in regions and populations, as well as different types of viruses, should also be taken into account. We need to create a standardized combination of biomarkers, integrating genetic information, protein data and patients' clinical conditions. This will facilitate the comparison among different studies and promote the practical application of research results in clinical treatment. In addition, by integrating high-throughput detection, continuous sampling, and bedside rapid testing technologies, it can help doctors identify critically ill patients earlier and enhance the efficiency of treatment and management. In conclusion, the joint development and validation of a standardized marker system by all is the key to improving the treatment outcomes for patients in dengue fever endemic areas and optimizing intervention methods.

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Conflict of Interest Disclosure

The author affirms that this research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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