Georgian Scientists
ქართველი მეცნიერები
Vol. 8 Issue 4(1), 2026
https://doi.org/10.52340/gs.2026.08.04(1).52

FEVER IN THE INTENSIVE CARE UNIT: THE ROLE OF NEW BIOMARKERS IN THE EARLY DIAGNOSIS OF INFECTION AND SEPSIS

Elene Pachkoria, Ia Mikadze

Department of Infectious Diseases, Tbilisi State Medical University, Tbilisi State Medical University, Tbilisi, Georgia

Fever is a common clinical problem in critically ill patients and does not necessarily indicate bacterial infection. Infectious and non-infectious inflammatory conditions may produce similar clinical manifestations, making early differentiation challenging. Failure to recognize infection may delay appropriate antimicrobial treatment, whereas overdiagnosis can result in unnecessary antibiotic exposure. Biomarkers are increasingly used to complement clinical and microbiological assessment and support antimicrobial stewardship in the intensive care unit (ICU).

The aim of the study is to review the role of conventional and emerging biomarkers in differentiating bacterial infection and sepsis from non-infectious causes of fever in critically ill patients and to discuss their potential contribution to antibiotic decision-making.

New biomarkers provide additional information about different components of the host response. Soluble triggering receptor expressed on myeloid cells-1 (sTREM-1) reflects activation of neutrophils and monocytes during bacterial infection. Presepsin, a soluble CD14 subtype released during monocyte and macrophage activation, has emerged as a potential marker for early diagnosis and prognosis of sepsis. Pentraxin-3 (PTX3), produced locally by inflammatory and endothelial cells, rises rapidly during systemic inflammation. Reduced monocyte HLA-DR expression may identify sepsis-associated immunosuppression and immunoparalysis, while pancreatic stone protein (PSP) represents another promising marker for early recognition of sepsis. Novel host-response technologies extend beyond measurement of individual circulating proteins. IntelliSep evaluates biophysical changes in leukocytes, while mRNA-based assays such as SeptiCyte RAPID and TriVerity assess host gene-expression patterns.

No single biomarker can reliably differentiate all infectious from non-infectious causes of fever in critically ill patients. Biomarkers should therefore complement, rather than replace, clinical assessment, microbiological investigation, evaluation of organ dysfunction, and identification of the potential source of infection. Combining conventional biomarkers with emerging host-

response, molecular, and biophysical technologies may improve the differential diagnosis of fever in the ICU, reduce unnecessary antibiotic exposure, and support more individualized antimicrobial therapy.

Keywords: Fever; Intensive care unit; Biomarkers; Antimicrobial stewardship.