

Point-of-Care Neutrophil Analysis to Determine Post-Traumatic Neutrophil Cell Surface Receptor Alterations: An International Validation Study

Christian T. Hübner, MD; Roman Pfeifer, MD; Emma de Fraiture, MD; Nathalie Piaz, MS; Paolo Cinelli, PD, PhD; Leo Koenderman, PhD; Falco Hietbrink, PhD; Michel PJ Teuben, MD, PhD; Hans-Christoph Pape, MD, FIOTA

Purpose: Changes in cell surface receptors on circulation neutrophils provide valuable insights into the posttraumatic immune response. Recent advances in point-of-care (POC) technologies allow for rapid onsite neutrophil analysis. In a pilot study, posttraumatic alterations of relevant cell surface receptors on neutrophils were measured, and the impact of trauma severity has been studied by POC analysis.

Methods: We implemented a trauma bay POC neutrophil analysis system, adapted from a different laboratory, at a Level I trauma center. Patients with polytrauma (injury severity score [ISS] >25) were included, and flow studies on systemic neutrophils were conducted using an AQUIOS® Flow Cytometer with tailored device settings. We analyzed the neutrophil surface patterns CD10, CD11b, and CD62L and compared expression levels with the ISS and data from a second international laboratory, as well as with data from large animal experiments.

Results: In total, 23 patients with polytrauma with a median ISS of 27.8 were included. Mean time between accident and measurement was 181 minutes. Circulating neutrophil counts, as well as cellular activation status, measured by CD10, CD11b, and CD62L correlated with ISS. These findings were consistent with findings from both standardized animal studies and clinical analysis at another trauma laboratory.

Conclusion: This study demonstrates the successful establishing of a POC neutrophil analysis infrastructure at a Level I trauma center. Posttraumatic neutrophil receptor alterations are similar with findings from other trauma laboratories, as well as with standardized animal experiments. POC neutrophil analysis should thereby be considered as an interesting immunomonitoring tool that could help improve clinical decision-making and patients' outcomes in the future.