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Innovations in Early Diagnosis of Neonatal Sepsis: Advances in Biomarkers and Clinical Protocols

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Neonatal sepsis continues to be one of the leading causes of morbidity and mortality among newborns worldwide, particularly in low-resource settings. Despite improvements in neonatal intensive care, delays in diagnosis remain a major challenge due to the nonspecific clinical presentation and the limitations of traditional diagnostic tools. This study explores recent advancements in early-detection biomarkers, molecular diagnostics, and clinical protocols that have demonstrated promising potential in improving timely diagnosis of neonatal sepsis. The presentation reviews emerging biomarkers including procalcitonin, presepsin, and interleukin-6 which have shown increased sensitivity and specificity compared to conventional methods such as C-reactive protein. Additionally, rapid molecular assays such as multiplex PCR panels and next-generation sequencing are evaluated for their capacity to identify pathogens within hours, thereby enabling more targeted therapeutic decisions. Emphasis is also placed on integrating these diagnostic advancements into standardized clinical pathways to enhance early recognition in both term and preterm infants. Furthermore, the study highlights the role of risk-based screening approaches, digital decision-support systems, and AI-assisted predictive models that enhance clinical judgment and reduce diagnostic uncertainty. By combining biomarker-based testing with improved monitoring strategies and evidence-driven protocols, early diagnosis of neonatal sepsis can be significantly strengthened. The findings underscore the necessity for multidisciplinary collaboration between neonatologists, microbiologists, and public health systems to ensure broad implementation. Ultimately, these advancements hold the potential to reduce global neonatal mortality rates and support equitable access to cutting-edge diagnostics across all healthcare settings.

Biography

Maria Esteban is a neonatologist and clinical researcher at the University of Barcelona, specializing in neonatal infections and intensive care. With over 15 years of experience, her work focuses on the development and validation of early-detection biomarkers for sepsis and other critical neonatal conditions. She has authored numerous peer-reviewed publications and is actively involved in multicenter research collaborations aimed at improving neonatal outcomes in Europe and globally.

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