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Editorial: Response predictors in diagnosis and prognosis of meningitis and pneumonia

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Editorial on the Research Topic
Response predictors in diagnosis and prognosis of meningitis and pneumonia

Meningitis and pneumonia, two highly grave infections, known to many, are global health challenges caused by *Streptococcus pneumoniae* and *Haemophilus influenzae*. The mortality rates for both, particularly among children and neonates, remain distressingly high (1). Consequently, timely and precise diagnosis and prognosis are imperative to enhance patient outcomes. In this context, response predictors have emerged as invaluable tools, reshaping healthcare practices within the public health sector. Meningitis and pneumonia exhibit a wide spectrum of clinical presentations, exacerbated by limited laboratory facilities and a scarcity of expert personnel (2). Compounding the problem are the dearth of effective therapeutic regimens for patients experiencing severe side effects during and after infection. Given that both conditions can manifest as fever, cough, and shortness of breath, irrespective of age, and can be caused by bacteria, viruses, or fungi, the overlapping symptoms often pose a diagnostic conundrum. Conventional diagnostic methods, lacking the requisite sensitivity and specificity for early detection and treatment, present a formidable challenge. This is precisely where response predictors step in as game-changers.

Response predictors offer the potential for early, precise diagnosis to optimize treatment and enhance patients' quality of life. This diverse array of methods and technologies includes biomarkers, advanced imaging techniques, and data analysis. Biomarkers such as CRP, PCT, and cytokines offer valuable insights into the inflammatory response and treatment efficacy in infections. Notably, CT scans and MRI exemplify advanced imaging techniques that empower clinicians to monitor disease progression and treatment effectiveness. A study in Malawi involving 377 critically ill children found that CRP and PCT levels were significantly higher in HIV-infected and uninfected children with serious bacterial infections compared to those without bacterial infections ($p<0.0005$). Elevated CRP and PCT levels upon admission suggest their utility as valuable biomarkers for diagnosing invasive bacterial infections in severely ill African children, potentially reducing the need for rapid tests (3). Furthermore, the nCD64 index exhibited a decline as tuberculosis (TB) treatment progressed, suggesting its

utility in monitoring treatment response. The CD64 assay offers a rapid, non-invasive, and stable method for clinical application, particularly in resource-constrained settings where alternative TB diagnostic tests are unavailable (4). However, further research is needed to confirm its accuracy in larger patient cohorts and to develop rapid, portable tests for its measurement. A retrospective study conducted at Dijon University Hospital, France, involving 435 patients admitted to the emergency department with community-acquired pneumonia (CAP), found that delayed diagnosis correlated with a reduced need for oxygen, lower quick-SOFA scores (> 2), and reduced antibiotic administration in the ED (Bouam et al.). Importantly, these findings do not suggest worse outcomes for CAP patients in the ED Compared to the prevalence and factors associated with a non-pneumonia diagnosis which was made in the hospital ward. In a study in Wuxi, China, Chlamydia psittaci pneumonia, a complex ailment on the rise, including severe cases necessitating ECMO, was associated with high neutrophil ratio, NLR, LDH, and CK levels. Timely detection using metagenomic next-generation sequencing (mNGS) proved pivotal for early treatment and improved prognosis (Gao et al.). Immunocompromised patients with severe community-acquired pneumonia (SCAP) are at greater risk of polymicrobial infections and early mortality. Independent risk factors for ICU mortality include age > 65 years, SOFA score > 2, lymphocyte count < 0.8×109/L, D-dimer level > 0.5 ug/ml, FiO2 > 0.7, and lactate level > 2 mmol/L (Wu et al.).

Biomarkers also hold promise in enhancing the assessment and management of respiratory tract infections (RTIs) and sepsis. Procalcitonin emerges as a prominent biomarker for RTIs, facilitating judicious antibiotic use. Other hormokines, like adrenomedullin, may prove valuable for predicting RTI prognosis (5). Genes and proteins play a pivotal role in response predictors for meningitis and pneumonia. Genes encode instructions for producing proteins, which execute most bodily functions. When viruses and bacteria invade, certain genes such as TLRs and chemokinases are activated to produce proteins that combat the infection, thereby regulating inflammatory responses. In light of this evidence, response predictors are emerging as invaluable allies, offering a diverse array of techniques and tools. They enable early diagnosis, personalized interventions, efficient resource allocation, and improved patient outcomes, heralding a new era of precision and accuracy in medicine.

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Conflict of interest

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References

1. Krishnappa LG, Marie MA, John J, Dabwan KH, Shashidhar PC. Serological and molecular capsular typing, antibiotic susceptibility of Streptococcus pneumoniae isolates from invasive and non-invasive infections. *Acta Microbiol Immunol Hung* (2014) 61(2):173–9. doi: 10.1556/AMicr.61.2014.2.7

2. John J. The remaining challenges to laboratory-based surveillance of invasive pneumococcal disease. *Indian Pediatr* (2015) 52(3):199–200. doi: 10.1007/s13312-015-0606-1

3. Carrol ED, Mankhambo LA, Jeffers G, Parker D, Guiver M, Newland P, et al. The diagnostic and prognostic accuracy of five markers of serious bacterial infection in Malawian children with signs of severe infection. *PloS One* (2009) 4(8):e6621. doi: 10.1371/journal.pone.0006621

4. Liu Q, Gao Y, Ou Q, Xu Y, Zhou Z, Li T, et al. Differential expression of CD64 in patients with Mycobacterium tuberculosis infection: a potential biomarker for clinical diagnosis and prognosis. *J Cell Mol Med* (2020) 24(23):13961–72. doi: 10.1111/jcmm.16004

5. Christ-Crain M, Müller B. Biomarkers in respiratory tract infections: diagnostic guides to antibiotic prescription, prognostic markers and mediators. *Eur Respir J* (2007) 30(3):556–73. doi: 10.1183/09031936.00166106