Biomarkers of Severe and Cerebral Malaria

Diagnostic and prognostic proteinaceous biomarker for severe and cerebral malaria

Technology

The Rodriguez Laboratory has identified and validated novel biomarkers of both severe and cerebral malaria which may offer critical prognostic value. These biomarkers were selected from the secretory response of human brain endothelial cells to *Plasmodium falciparum*. Factors associated with the parasite-mediated inflammation were specifically excluded as these have previously been shown to poorly correlate with disease severity. The resulting secreted biomarker candidates were validated in an ELISA based assay with the plasma from 264 patients with a combination of well-characterized uncomplicated, severe or cerebral malaria. The independent detection of either of three biomarkers was sufficient to distinguish severe malaria from uncomplicated malaria, while the combination of two of these biomarkers was further able to distinguish cerebral malaria from severe malaria. None of these biomarkers have previously been described in the context of malaria, representing an underappreciated avenue for disease risk stratification and treatment intervention.

Background

Malaria remains a major cause of global morbidity and mortality, with more than 600,000 dying every year of malaria. Of all infected individuals, approximately 2% will develop severe or life-threatening cerebral malaria. This disease development can occur incredibly quickly, and if at all possible, is difficult and time-consuming to predict with current prognostic methods. This delay in prognosis and subsequent treatment leads to increased morbidity and likelihood of death. The detection of the three biomarkers identified and validated by the Rodriguez lab enables early determination of patients at high risk of developing severe and cerebral malaria, informing the treatment intervention and reducing disease morbidity and mortality.

Applications

- Diagnostic: Biomarker detection can determine whether a patient has severe or cerebral malaria.
- Prognostic: Determination of a patient's likelihood of developing severe or cerebral malaria can inform optimal treatment intervention.

Advantages

- Predictive: Biomarkers may be able to determine patients with a high likelihood of developing either severe or cerebral malaria.
- Minimal biomarkers: Either one of three biomarkers can predict severe malaria, and two biomarkers can predict cerebral malaria.
- Rapid detection: The secreted biomarkers are suitable for integration into a low-cost rapid antigen test.

Category

Life Sciences/Diagnostics

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