

Prediction of Sepsis in Neonate Blood: an Isothermal Calorimetric Study

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Rapid detection and treatment of sepsis in neonates is a significant cause of mortality in an ICU setting [1]. Sepsis is typically diagnosed based on clinical symptoms only, which commonly present once a patient is already in cardiovascular crisis. Treatment is, therefore, initiated before the acquisition of conventional culture dependent microbiological analyses are complete. The purpose of this work was to investigate the feasibility of isothermal calorimetry as a rapid detection method for sepsis causing microorganisms in neonate blood. Calorimetry is well known for its capacity to study qualitatively (and sometimes quantitatively) the metabolism and growth of microorganisms in complex media [2]. This capacity confers the distinct advantage, over traditional techniques, of allowing non-invasive and non-destructive monitoring of a system. Moreover, because of the nature of the measurement this technique permits monitoring of the system in situ and in real time. Combined with the inherent sensitivity of isothermal calorimetry, this technique could offer real potential for the rapid detection of microorganisms in blood samples. In the work presented, we show that microorganisms inoculated into whole blood (approx 50 CFU ml⁻¹) could be detected in approximately 6h. Moreover, it was also possible to discriminate between clinically significant numbers of microorganisms within approximately 7h. The capacity to detect microorganisms in whole blood within 6h reveals that calorimetry could be a viable alternative to traditional methods for the detection of bacteraemia. In addition, the possibility of using isothermal calorimetry for the identification of pathogenic microorganisms is also discussed.

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- [2] Beezer, A.E., editor. Biological Microcalorimetry, Academic Press, London, 1980.