

Use of Metabolomics as a Diagnostic Tool of Urosepsis in Adult Patients

Manodeep Sen*, Tanushri Chatterji

*Department of Microbiology, Dr. Ram Manohar Lohia Institute of Medical Sciences (RMLIMS), Vibhuti Khand, Gomti Nagar, Lucknow

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Urosepsis is a combined term defining sepsis caused by the urinary tract infection (UTI)(Book, Lehmann et al. 2005 ; Mikkelsen, Miltiades et al. 2009). Urosepsis is one of the leading cause of mortality globally (Dellinger, Levy et al. 2008). The prompt and accurate diagnosis is quite time consuming and often results to false positive cases. Hence, to overcome the limitations we have approached the use of metabolomics for metabolomic profiling in serum and urine samples.

The editors have published a pilot study on rapid and efficient diagnosis of urosepsis using the technique of ¹H NMR spectroscopy(Singh, Chatterji et al. 2016).

The study design was broadly classified into two datasets i.e. urosepsis cases and healthy controls. On the basis of clinic-pathological parameters urosepsis cases were defined as positive urine culture with serum PCT cut off levels (>0.5 ng/ml) and /or positive blood culture for bacterial pathogens(Wilson and Gaido 2004). Clinical signs and symptoms of the cases were found to be statistically significant, which included evidence of fever, high respiratory and high heart rate and significant cell count (>5 WBC/HPF)(Stamm 1983).

1D NMR experiments were performed on collected serum and urine samples, followed by the identification of 34 and 35 metabolites respectively. The metabolites were characterized and assigned as reported in literature (Martin, Sprenger et al. 2009)and were compared with the standard NMR spectra of metabolites available in the biological magnetic resonance bank (BMRB, www.bmrwisc.edu), Human Metabolome Data Base (HMDB, www.hmdb.ca) and through NMR suite 8.1 (Chenomx) software.

Quantification of serum and urine metabolites were further evaluated through multivariate Discriminant Function Analysis (DFA) afforded 93.9% and 91.7% correct classification respectively, along with identification of malonate and urea as potential biomarkers for diagnosis of urosepsis from the control group.

Therefore, this study revealed the perspective of metabolomics in conjunction with serum PCT levels as diagnostic tool for early and precise diagnosis.

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