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NMR based Metabolite Analysis of PD fluid for Early Non-invasive Detection of Infectious Peritonitis

Nitin BAJPAI⁰, *Dinesh KUMAR¹, Anupam GULERIA³, Archana BAJPAYEE⁴,
Narayan PRASAD⁵

¹Magnetic Resonance, CBMR, Centre of Bio-Medical Research, Lucknow, India,

²Assistant Professor, Department of Nephrology, All India Institute of Medical Sciences, Jodhpur, India, ³NMR, CBMR, Centre of Bio-Medical Research, Lucknow, India, ⁴Assistant Professor, Department of Transfusion Medicine, All India Institute of Medical Sciences, Jodhpur, India, ⁵Professor, Department of Nephrology, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, India, ⁶Nephrology, All India Institute of Medical Sciences, Jodhpur, India

Objectives : To evaluate the use of ¹H NMR spectroscopy for diagnosis and prognosis of bacterial peritonitis associated with prolonged peritoneal dialysis (PD) therapy

Methods : NMR spectroscopy coupled with multivariate data analysis was applied to 24 PD effluent samples corresponding to 12 samples of non-infectious PD effluent and 12 samples of bacterial peritonitis

Results and Discussion : As evident from Figure 1, a clear group separation and clustering of infected (bacterial peritonitis) and non-infected samples. The main metabolites responsible for the group separation are the cyclic fatty acids of microbial origin (peaks marked with asterisk in the loading plot) observed only in bacterial infected PD effluent. The other discriminatory metabolites are citric acid, lysine, creatinine, GPC and oxalacetate. The levels of citric acid and oxalacetate has been observed to be reduced, while the levels of creatinine, lysine and GPC has been elevated in the bacterial infected PD group as compared with the non-infected PD group (Fig. 1B).

Conclusions : The metabolic composition profiles of PD effluent samples obtained from PD patients continuing normally on PD and those having bacterial peritonitis were found to be significantly different suggesting that ¹H NMR of PD effluent has huge potential to predict the infections associated with PD in future clinical settings. We foresee that the identified metabolic signatures will provide rapid and non-invasive predictive measures along with the benefit of rapidity in early diagnosis of peritonitis and its recovery after the treatment.

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Keywords :