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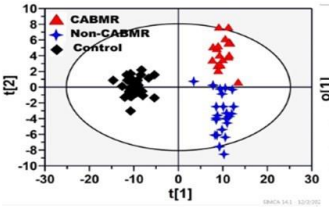
## Abstract Submission No.: A-1487

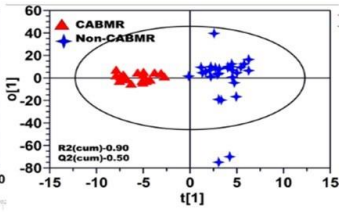
# The investigation of metabolic profile to differentiate chronic versus acute renal allograft rejection using nuclear magnetic resonance (NMR)-based serum metabolomics.

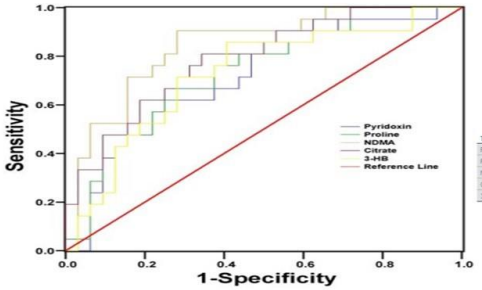
**Mantabya Singh**[1], Narayan Prasad[1], Vikas Agarwal[2], Dinesh Kumar[3]
[1]Department of Internal Medicine-Nephrology, SGPGIMS, India
[2]Department of Department of Clinical Immunology and Rheumatology, SGPGIMS, India
[3]Department of Centre for Biomedical Research, CBMR, India

**Objectives :** A common complication after renal transplantation is allograft rejection, which often leads to chronic rejection and eventual graft loss. While renal allograft biopsy continues to be considered the gold standard in the diagnosis of chronic rejection. The development of non-invasive methods for the accurate detection of chronic rejection of renal grafts has thus become of important clinical importance. The aim of the study was to find out the differential metabolite expressions that differentiate Chronic rejection (chronic antibody mediated) from Acute rejection (either TCMR or ABMR) in renal transplant patients.
**Methods :** NMR-based serum metabolomics was employed for analysis of serum metabolites in 18 renal allograft recipients with chronic rejection (CABMR) and 28 with Acute rejection (NCABMR). Samples were analysed by 800 MHZ NMR spectrometer. The metabolic profiles and differential metabolites of sera were analysed by multivariate statistical analysis (MSA), including orthogonal partial least squares discriminant analysis (OPLS-DA) methods.
**Results :** The orthogonal projection to latent structures discriminant analysis (OPLS-DA) model resulted in a R2(Cum) of 0.9 and a Q2 (Cum) of 0.54 for Chronic rejection and Acute rejection subjects, respectively. Among the differential unregulated metabolites identified in Chronic rejection, NDMA, Citrate, Pyridoxin, NDMA, 3-HB, and proline were upregulated from MSA. NDMA had the highest discriminatory potential (AUC 0.84, P = 0.0006), followed by citrate (AUC 0.79, P=0.02), proline (AUC 0.74, P=0.01), 3-HB (AUC 0.73, P=0.02) and Pyridoxin (AUC 0.72, P=0.05). The results demonstrated that Chronic rejection possesses an active Phenylalanine, Tyrosine, and Tryptophan bio-synthesis pathway.
**Conclusions :** Despite being in its early stages, metabolomics monitoring in kidney transplantation can provide reliable indicators of chronic kidney injuries and allograft rejection The diagnostic model that evolved in this study may prove valuable as a tool for a definitive diagnosis of Chronic rejection and Acute rejection patients after validation in larger sample sizes.

NMR APCN-KSN 2024.jpg




Area Under the Curve

| Test Result Variable(s) | Area | Std. Error[a] | Asymptotic Sig.[b] | Asymptotic 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Pyridoxin | .716 | .072 | .000 | .574 | .857 |
| Proline | .740 | .069 | .000 | .605 | .875 |
| NDMA | .841 | .056 | .000 | .732 | .950 |
| Citrate | .787 | .063 | .000 | .665 | .910 |
| 3-HB | .725 | .072 | .000 | .585 | .866 |

a. Under the nonparametric assumption
b. Null hypothesis: true area = 0.5