KSN 2022
SEOUL, KOREA MAY 26 - 29

Abstract Submission No. : 1019

Exploration of potential chronic kidney disease markers in breath through TD-GCMS (Thermal Desorption Gas chromatography Mass-spectrometry)

Jieun Oh[1], Hyun-Sik Kim[2], Jae-Seok Kim[3], Si-Hyun Seong[2]
[1]Department of Internal Medicine-Nephrology, Kangdong Sacred Heart Hospital, Korea, Republic of
[2]Department of Mass Spectrometry & Advanced Instrumentation Group, Korea Basic Science Institute, Korea Basic Science Institute, Korea, Republic of
[3]Department of Laboratory Medicine, Kangdong Sacred Heart Hospital, Korea, Republic of

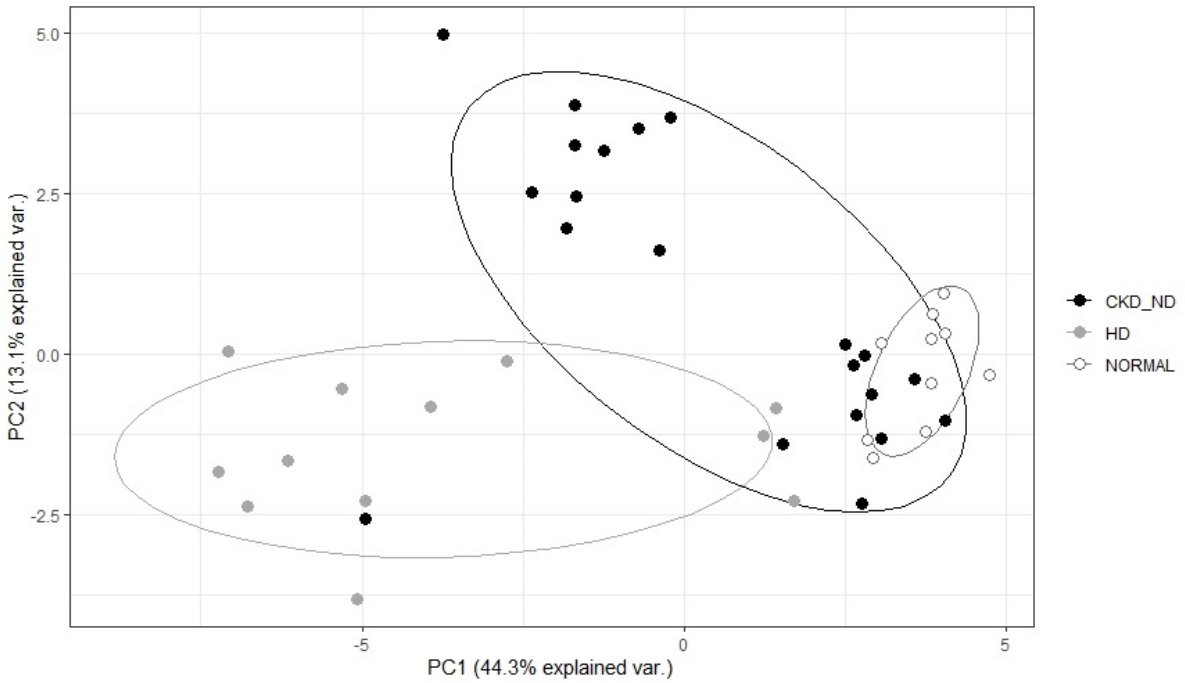
Objectives: Chronic kidney disease (CKD) increases in the general population and is associated with high mortality. Diagnosis of CKD relies on serum creatinine which needs blood sampling and can be affected by factors unrelated to renal function. Therefore, we aimed to explore potential breath biomarkers to identify normal from CKD through thermal desorption-gas chromatography mass-spectrometry (TD-GCMS).

Methods: Untargeted metabolomics using TD-GCMS was performed on breath samples from normal healthy controls (n=10), non-dialysis CKD patients (n=21), and end-stage renal disease (ESRD) patients on hemodialysis (n=12).

Results: Metabolomic analysis revealed sixty-eight significantly different volatile organic compounds (VOCs) in breath of CKD patients (non-dialysis CKD + ESRD) compared to normal healthy controls by using T-test. In the univariate analysis, a total of twenty-nine VOCs were revealed significantly different in the CKD patients compared to normal healty controls. Multivariate model which incorporated 2,6-dimethyloctane [OR 10.6 (95% CI: 2.28-154.08), p = 0.022], octanal [OR 10.3 (95% CI: 1.45-240.65), p = 0.056] and benzaldehyde [OR 5.54 (95% CI: 1.21-60.24), p = 0.067] showed high performance in identifying CKD patients (AUROC = 0.967).

Conclusions: In conclusion, this study showed breath VOCs may be used as non-invasive potential biomarkers in screening test for CKD.

Principal component analysis (PCA) of metabolomic profiles of breath samples from the control group (NORMAL), chronic kidney disease not on dialysis (CKD_ND) and hemodialysis (HD) groups using 29 significant volatile organic compounds in urivariate analysis.



Receiver operating characteristic (ROC) analysis of final multivariate model incorporating 2,6-dimethyloctane, benzaldehyde and octanal.