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대사체학을 통한 만성 사구체 신염의 지표물질 연구

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Biomarker of Irreversible Glomerular Injury – A Metabolomic Analysis Experimental Glomerulonephritis

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Some injuries of the kidney recover completely but many other diseases are not completely reversible and progress to chronic kidney diseases (CKD). While complex network of cellular and molecular events have been known to be involved in the pathophysiological mechanism of CKD, the diverging point between the reversal versus progressionand the triggering event of the progression are still unknown. Therefore, an indicator that predicts progression or regression of injuries is not yet available. To understand the different mechanisms between the reversible and irreversible kidney disease and to search for urinary biomarkers predicting the prognosis, a metabolomic analysis was applied in comparison of acute and chronic experimental glomeruonephritis (GN) model.

Urine samples were collected on day 0, 7, and 14 from rats that were treated with anti-Thy 1 MoAb (OX-7) with or without heminephrectomy. Samples were analyzed by ultra-performance liquid chromatography coupled with Synapt Q-TOF mass spectrometry (Waters, USA). Multivariate analysis was performed on 2597 positive ion markers and 7537 negative ion markers using SIMCA-P (ver. 12.0). Principal components analysis (PCA) revealed that the chronic and acute nephritis models had two discrete phenotypes and orthogonal partial least squares discriminate analysis (OPLS-DA) showed direction of the time trends was different between these two models. Candidates of biomarkers for chronic nephritis were searched from the human metabolome database (HMDB) and confirmed by tandem mass spectrometry of authentic compounds. These results suggested that metabolomic analysis could provide insights into mechanism of disease progression and biomarkers for early diagnosis of chronic nephritis.

Key Words: 만성 사구체신염, 대사체학, 지표물질
Chronic glomerulonephritis, Metabolomics, Biomarker