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The GCMS-based metabolomic study in mice with colitis induced by Dextran Sulfate Sodium

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Metabolomics provides data about all the metabolic processes of a cell or organism. So far, the changes that occur in the levels of metabolites during the development of colitis have not been fully elucidated. Here we examined the changes of metabolite levels in the serum and colon tissue of colitis mice using gas chromatography mass spectrometry (GC/MS) with the aim of achieving a detailed understanding of the pathogenesis of inflammatory bowel disease (IBD). To induce colitis, C57BL/6J mice were administered 3.0% dextran sulfate sodium (DSS) in their drinking water for 5 days and were subsequently given drinking water alone. A total of 77 and 92 metabolites were detected in serum and colon tissue, respectively, and among the metabolites the compositions of TCA cycle intermediates and amino acids changed depending on the degree of colitis. Then, partial least square discriminant analysis (PLS-DA), a multiple classification analysis, showed distinct clustering and clear separation of the groups according to the degree of colitis, and PLS-DA loadings plots revealed that succinic acid, indole-3-acetic acid, glutamic acid, and glutamine were the main contributors to the separation of each stage of colitis. In addition, it was revealed that supplementation with glutamine, the level of which was significantly decreased in the acute phase of colonic inflammation, attenuated DSS-evoked colitis. Our results suggest that metabolomics is capable of representing the various degrees of colitis, and our findings will aid in the discovery of therapeutic agents for IBD and other inflammatory disorders by metabolomic approaches.

Biography

Masaru Yoshida is the chief of Metabolomics Research at Kobe University Graduate School of Medicine. Dr. Yoshida received his Ph.D. training at Kyoto University and carried out postdoctoral training in Brigham and Women's Hospital & Harvard Medical School. His laboratory study focus on metabolomics research by mass spectrometer and these technologies have been used for Clinical Medicine. He has published more than 100 articles in scientific journals/books.