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QUANTITATIVE ASSESSMENT OF CYSTEINYLATED HUMAN SERUM ALBUMIN USING ESI-TOF/MS AND ITS CLINICAL SIGNIFICANCE IN CHRONIC LIVER DISEASE

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ABSTRACT

It is well known that redox states of cysteine 34 (Cys34) in human serum albumin (HSA) is a sensitive marker for oxidative stress in plasma. Although chronic liver disease (CLD) is a typical disease related to oxidative stress, little is known regarding the redox state of Cys34 in CLD, and its influence to the functions of HSA, such as anti-oxidative property and ligand binding. In this study, we attempted to develop the method which estimates the redox states of Cys34 using ESI-TOF/MS, and hence examined its influence to HSA's functions. Using ESI-TOF/MS, we found that the cysteinylation at Cys34 in HSA was markedly increased in CLD patients. Interestingly, the cysteinylated HSA ratio was increased with the severity of illness and significantly correlated with the oxidative stress in plasma. An increase in cysteinylated HSA ratio was also significantly related to the reductions of radical scavenging action and ligand binding ability in HSA. In addition, the treatment of blanched chain amino acid (BCAA) preparation that is a standard therapy for chronic hepatitis significantly ameliorated the increases in the cysteinylated HSA ratio and the reductions of HSA's functions in CLD. These results indicate that the structure and function of HSA are impaired in CLD due to the enhancement of oxidative stress. Moreover, the monitoring of the cysteinylated HSA ratio by ESI-TOF/MS has a potential to a novel biomarker for the prediction of the disease exacerbation and judgment of the effectiveness of medications in CLD patients.