Quantitative proteomics study of carnosine effect in an animal model of Western diet-induced nonalcoholic fatty liver disease

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Abstract

The nonalcoholic fatty liver disease (NAFLD), which is closely related to westernized dietary (WD) patterns, displays a rising epidemiological and economic burden. Since there is no pharmacological therapy approved for this disease, mechanistic studies are warranted. In this work, we investigated the action of carnosine (CAR), a natural dipeptide with several protection roles against oxidative stress in the liver of NAFLD rats. NAFLD was induced by WD-rich sugars and fat, verifying the histological evidence of steatosis. As intraperitoneal administration of CAR reversed liver steatosis, the protein profiles of NAFLD liver and CAR NAFLD liver were evaluated by label-free proteomics approach. A total of 2531 proteins were identified and the 230 and 276 were significantly up- and downregulated, respectively, by CAR treatment of NAFLD rats and involved in fundamental pathways such as oxidative stress and lipid metabolism. Perilipin 2 and apolipoprotein E, components of the plasma membrane of vesicle, resulted in highly downregulated in the CAR-treated NAFLD liver. The advanced bioanalytical approach demonstrated the efficacy of CAR in overcoming the main symptoms of NAFLD, ameliorating the steatosis in the liver.