

ABSTRACT

Charles University
Faculty of Pharmacy in Hradec Králové
Department of Biochemical Sciences

Author: Bc. Lucie Zemánková

Supervisor: Assoc. Prof. PharmDr. Iva Boušová, Ph.D.

Title of diploma thesis: Effect of diet on activity and expression of antioxidant enzymes in an in vivo model of hepatic steatosis

This thesis deals with metabolic dysfunction-associated steatotic liver disease (MASLD). MASLD represents the most common form of chronic liver disease and is closely associated with the increasing prevalence of obesity, insulin resistance and other components of the metabolic syndrome. An important factor in the pathogenesis of MASLD is oxidative stress, which disrupts the redox balance in the liver and contributes to disease progression. Diet and its composition have a major influence on the development of steatosis.

The aim of this thesis was to expand the knowledge about the effect of MASLD on the activity and expression of selected antioxidant enzymes during its pathogenesis. In the experimental part, C57BL/6N male mice were fed either a standard diet (STD) or a high fat, fructose, and cholesterol diet (FFC) for 24 weeks. One group of mice was switched from FFC to STD before the end of the experiment. Differences in protein expression, mRNA expression, and specific activity of selected antioxidant enzymes were assessed in liver tissue. Specifically, these included superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase 4 (GPx4) and 7 (GPx7), glutathione S-transferase P (GSTP), and NAD(P)H:quinone oxidoreductase 1 (NQO1). These parameters were evaluated to compare differences between individual dietary groups.

For all studied enzymes, except for GST, there was an increase in specific activity in FFC diet fed mice during the experiment, indicating increased levels of oxidative stress in these mice. After switching from FFC to STD diet, there was a significant decrease in the activity of SOD, GPx, CAT, and NQO1, suggesting that the changes induced by FFC diet are reversible. Statistically significant changes in the protein expression were observed only for the enzymes GPx4, NQO1, and GSTP. Significant difference in the mRNA expression of *Sod1*, *Gstp*, *Nqo1*, and *Gpx7* was observed.