Suppression of acute ethanol-induced hepatic steatosis by docosahexaenoic acid is associated with downregulation of stearoyl-CoA desaturase 1 and inflammatory cytokines.

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OBJECTIVE: Excessive alcohol consumption can lead to hepatic steatosis. Omega-3 (n-3) polyunsaturated fatty acids (PUFA) have been shown to be effective in reducing hepatic accumulation of triglycerides (TG) by downregulation of TG biosynthesis in the liver. The aim of this study was to examine whether supplementation with the n-3 PUFA, docosahexaenoic acid (DHA), can effectively reduce acute alcohol-induced hepatic steatosis.

METHODS: Acute alcohol-induced hepatic steatosis was generated in 9-week-old male mice (C57BL/6J) by oral gavage of ethanol (4.7g/kg BW) diluted in water (60%, v/v), with or without DHA (250mg/kg BW), every 12h for 3 administrations.

RESULTS: Compared to the control (ethanol-alone) group, animals supplemented with DHA were protected against ethanol-induced TG accumulation in the liver. Accordingly, hepatic stearoyl-CoA desaturase-1 (SCD-1) expression, serum alanine aminotransferase (ALT) activity, and the levels of inflammatory cytokines (such as IL-6 and TNF-α) in the liver were significantly reduced, whereas the expression of heme oxygenase-1 (HO-1), an enzyme that can improve cell survival in liver tissue, was markedly increased in DHA-supplemented mice compared to the control animals. There were no differences in serum TG level and hepatic production of reactive oxygen species (ROS) between the two groups.

CONCLUSION: Our findings demonstrate that DHA supplementation protects against acute ethanol-induced hepatic steatosis, which may be associated with reduced expression of SCD-1 and inflammatory cytokines.

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