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Biochemical and Immunological Basis of Silymarin, a Milk Thistle (Silybium Marianum) Against Ethanol-Induced Oxidative Damage

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The metabolism of ethanol gives rise to the generation of excessive amount of reactive oxygen species and is also associated with immune dysfunction. We examined the efficacy of silymarin on the immunomodulatory activity and vascular function in mice with liver abnormalities induced by chronic ethanol consumption by measuring the protein, liver-specific transaminase enzymes, antioxidant enzymes and non-enzymes such as reduced glutathione (GSH) content, thiobarbituric acid reactive substance (TBARS) level, nitrite level, and activities of superoxide dismutase (SOD), catalase (CAT), glutathione reductase (GR), glutathione peroxidase (GPx) and glutathione-S-transferase (GST), and cytokines such as interleukin (IL)-2, IL-4, IL-10, tumor necrosis factor (TNF)-α, gamma interferon (IFN-γ), vascular endothelial growth factor (VEGF)-A and transforming growth factor (TGF)-β1 in mice blood. Ethanol (1.6 g/kg body wt/day) exposure for 12 wks significantly increased TBARS and nitrite levels and GST activity, and significantly decreased GSH content and the activities of SOD, CAT, GR and GPx in whole blood hemolyzate of 8-10 wks-old male BALB/c mice (weighing 20-30 g). Ethanol exposure also elevated the activities of transaminase enzymes (AST and ALT), IL-10, TNF-α, IFN-γ, VEGF-A and TGF-β1, while decreasing the albumin concentration and IL-4 activity in the serum. Silymarin treatment significantly reduced AST, ALT, GST, IL-10, TNF-α, IFN-γ, VEGF-A and TGF-β1 activities and levels of TBARS and nitrite, and elevated albumin content, GSH level and activities of SOD, CAT, GR and GPx, compared to ethanol-treated group. The results suggests that silymarin can effectively ameliorate ethanol-induced oxidative challenges, immunomodulatory activity and angiogenesis processes.