



# Camel Whey Protein Protects B and T Cells from Apoptosis by Suppressing Activating Transcription Factor-3 (ATF-3)-Mediated Oxidative Stress and Enhancing Phosphorylation of AKT and I $\kappa$ B- $\beta$ in Type I Diabetic Mice

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## Abstract:

**Background:** Diabetes mellitus (DM) is associated with severe immune system complications. Camel whey protein (CWP) decreases free radicals (ROS) and modulates immune functions, but its effect on DM-impaired immune systems has not been studied. We investigated the impact of CWP on the immune system in a Type 1 diabetes mouse model. **Methods:** Three experimental groups were used: (1) non-diabetic control; (2) diabetic; and (3) CWP-treated diabetic mice. **Results:** Induction of diabetes by streptozotocin was associated with reduction of body weight and insulin level, increase in glucose level and pro-inflammatory cytokines (IL-1 $\beta$ , IL-6, and TNF- $\alpha$ ), and reduction in IL-2 and IL-4 levels. Upregulated ATF-3 expression was followed by a marked elevation in ROS levels. Lymphocytes from diabetic mice exhibited increased apoptosis through decreased phosphorylation of AKT and I

## Keywords:

Apoptosis  $\square$  Camel whey protein  $\square$  Diabetes mellitus  $\square$  Free radicals  $\square$  Lymphocytes

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