



Camel whey protein protects lymphocytes from apoptosis via the PI3K/AKT, NF- κ B, ATF-3 and HSP-70 signaling pathways in heat-stressed male mice.

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Abstract:

Heat stress (HS) is an environmental factor that depresses the immune systems mediating dysfunctional immune cells. Camel whey protein (CWP) can scavenge free radicals and enhance immunity. The present study investigated the impact of dietary supplementation with CWP on immune dysfunction induced by exposure to HS. Male mice (n = 45) were divided into three groups: control group; HS group; and HS mice that were orally administered CWP (HS+CWP group). The HS group exhibited elevated levels of reactive oxygen species (ROS) and pro-inflammatory cytokines (IL-1 α , IL-6, TNF- α) as well as a significant reduction in the IL-2 and IL-4 levels. Exposure to HS resulted in impaired AKT and I κ B- α phosphorylation; increased ATF-3 and HSP70 expression; and aberrant distribution of CD3+ T cells and CD20+ B cells in the thymus and spleen. Interestingly, HS mice treated with CWP presented significantly restored levels of ROS and pro-inflammatory cytokines near the levels observed in control mice. Furthermore, supplementation of HS mice with CWP enhanced the phosphorylation of AKT and I κ B- α ; attenuated the expression of ATF-3, HSP70 and HSP90; and improved T and B cell distributions in the thymus and spleen. Our findings reveal a potential immunomodulatory effect of CWP in attenuating immune dysfunction induced by exposure to thermal stress.

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