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Milk-derived supplement inhibits *in vitro* lymphocyte proliferation and IL-2 production

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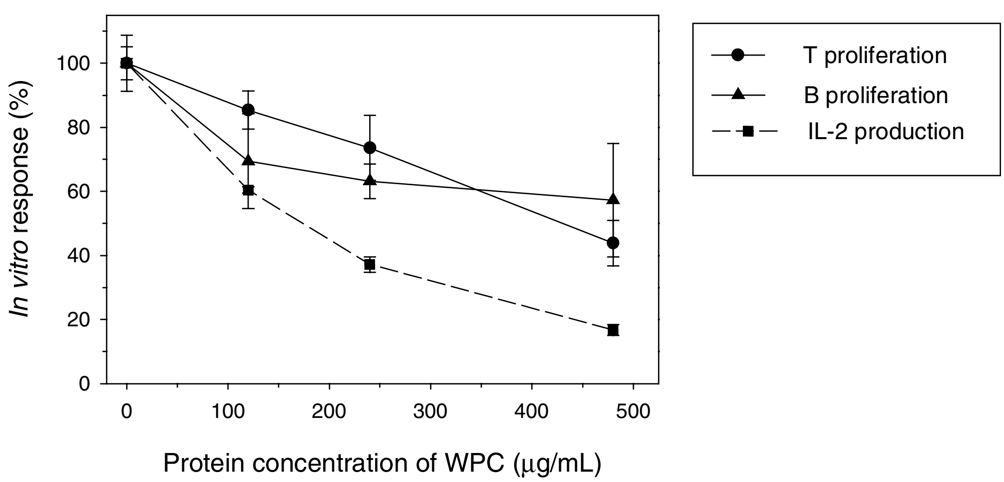
Recently, significant progress has been made in the characterisation of milk components affecting the function of the immune system. The aim of the present report was to study the effect of a premium ultra-grade freeze-dried bovine whey-protein concentrate (WPC) on the functional capacity of lymphocytes. Thus, the immunomodulating properties of this dairy extract were evaluated in relation to the proliferative response of spleen T and B lymphocytes. Splenocytes from adult Wistar rats were incubated in a medium supplemented with WPC (60–480 μg protein/ml), which contains (g/kg) $<$0.1 fat, 750–900 proteins and 35–50 carbohydrates, and also lactoferrin 9.2; IgG 300–600, IgA 50–70 and IgM 70–90 and high proportions of active compounds, e.g. natural growth factors and hormones, vitamins and amino acids. Standard commercial infant formula (SIF; 40–415 μg protein/ml) and BSA (250–500 μg protein/ml) were also added as milk-derived and inert control proteins respectively. Concanavalin A (ConA; specific stimulus for T-cells) or pokeweed (*Phytolacca americana*) mitogen (specific for B-cells) were added to the cell culture for 72 h. Proliferating cells were quantified by means of the BioTrak™ cell proliferation system (BioTrak, Carlsbad, CA, USA) based on 5-bromo-2′-deoxyuridine incorporation. IL-2 levels were quantified by ELISA in 24 h-culture supernatant fractions obtained from ConA-stimulated lymphocytes. Statistical analysis was performed by conventional ANOVA and when an experimental group variable had a significant effect on the dependent variable *post hoc* comparisons (LSD test) were performed. Significant differences were accepted at $P<0.05$.



Results showed a dose–dependent inhibitory effect of WPC on both spleen B- and T-lymphocyte proliferative response induced by mitogen stimulation (see Figure). The inhibitory effect on T- and B-cell proliferation was approximately 55 % and approximately 40 % respectively. In parallel, a WPC dose-dependent inhibition of IL-2 production was also found (approximately 80 %). Cell viability was not modified by WPC addition. SIF produced similar inhibitory effects. However, non-milk-derived proteins such as BSA did not modify these lymphocyte responses. WPC and SIF, both milk-derived components, inhibited lymphocyte proliferation and IL-2 production *in vitro*. This immunomodulatory effect may prevent the newborn from over-reacting immunologically to the environmental antigens during early life.