In vitro immunomodulatory and cellular activities of bovine colostrum protein hydrolysates

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ABSTRACT

Colostrums provide all the necessary nutrients, growth factors and immunological components a healthy term infant needs. Bovine colostrums are the first milk produced postpartum, and are typically defined as the first six postpartum milkings collected during the period of transition from colostrums to milk. In this study the skimmed milk, caseins and whey proteins isolated from colostrums collected on the first to the fifth days postpartum were hydrolyzed by different enzymes (alcalase, flavourzyme, and porcine small-intestinal enzymes), and the effects of the protein hydrolyastes on the leukemic U937 cell growth via direct / indirect reaction and immunomodulatory activities were investigated. The results showed that protein hydrolysates leading to U937 cell death exhibited dose-and-time-dependent characteristics. This study also found that the proteins hydrolyzed by porcine small-intestinal enzymes have more significant effects in regard to cell death, compared to other enzymes. This research found that colostrum protein hydrolysates could inhibit U937 cell growth; moreover, the protein hydrolysates from skimmed milk were better than those from caseins and whey. This research also investigates the effects of bovine colostrums and their protein hydrolysates on human mononuclear cell (MNC) growth and on the secretion of cytokines (IL-1β, IFN-γ and TNF-α) as well as nitric oxide. The results indicate that the colostrum hydrolysates obtained by porcine small-intestinal enzymes (PIS) exhibit more significant inhibitory effect on U937 cell growth than do the caseins (PIC) and the whey (PIW) hydrolysates (PIS 57.45%, PIC 42.58% and PIW 48.47% at 1000 μg/mL). The greatest growth index of MNC, up to 1.43, was achieved by a treatment of PIS at 300 μg/mL for 3 days. The cytokines (IL-1β, TNF-α and IFN-γ) secretion of MNC by a treatment of PIS for 3 days (at 800 μg/mL) was 4443.35, 325.04 and 4649.67 pg/mL, respectively. The results suggest that bovine colostrum protein hydrolysates may be utilized in functional food.

Keywords : bovine colostrums、cytokines (IL-1β, IFN-γ and TNF-α)、leukemic U937 cells、protein hydrolysates 、immunomodulatory activities

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