Effect of 28-day oral administration of silver nanocolloid on the peripheral blood leukocytes in mice

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Abstract

Silver nanoparticles, which have found a wide range of applications owing to their antimicrobial properties, are also recommended as dietary supplements in alternative medicine. Studies on rodents confirm that nanosilver is absorbed from the digestive tract into the bloodstream, which implies its possible interactions with leukocytes. The objective of the experiment discussed herein has been to determine the effect of 28-day oral administration of different doses (0.25, 2.5, 25 ppm) of commercial silver nanocolloid on hematological parameters, percentages of particular lymphocyte populations and activity of the peripheral blood leukocytes in mice. All the tested colloid doses decreased the counts of monocytes in the animals’ blood and induced phenotypic modifications among lymphocytes: an increase in CD4+/CD8+ T cell distribution, a decrease in NK and NKT cell distribution (doses of 0.25 and 2.5 ppm) and an increased CD4+:CD8+ ratio (25 ppm). Silver nanocolloid also affected the activity of cells, depressing the proliferation of lymphocytes (0.25 ppm) and stimulating phagocytosis as well as the respiratory burst of granulocytes and monocytes (all doses). The results verify the influence of orally administered silver colloid on the peripheral blood leukocytes, at the same time implying the potential risk of developing an inappropriate immune response of an organism exposed to prolonged administration of this substance.

Key words: silver nanocolloid, oral administration, hematology, immunophenotyping, leukocyte activity, mice

Introduction

Owing to its antimicrobial properties, silver nanoparticles (AgNPs) are among the most broadly used nanomaterials, and a growing number of their applications in industries, medicine and households increases risk of the organisms’ exposure to their adverse effects (Pelkonen et al. 2003, Kim et al. 2008). Furthermore, for some time now, silver nanocolloids have been available as dietary supplements among other marketable pharmaceuticals. The gastrointestinal tract is also the principal route through which nanosilver used as a disinfectant penetrates into the organism. Changes in the red blood cell parameters observed in rodents administered AgNPs p.o. and the accumulation of nanosilver in all analyzed animal tis-