The splenocyte proliferative response and cytokine secretion in mice after oral administration of commercial gold nanocolloid

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Abstract

Owing to their unique physicochemical properties, gold nanoparticles find numerous biomedical applications. Experiments on rodents prove that the main target organs of gold nanoparticles entering an organism are the liver and spleen, whose reticuloendothelial system removes foreign particles from the bloodstream. Through interactions with resident tissue macrophages, nanoparticles can evoke a systemic immunological response.

The aim of this study has been to determine the effect of oral administration of commercial gold nanocolloid, recommended by the producer inter alia as a dietary supplement, on the proliferative activity and cytokine secretion by murine splenocytes. The colloid was given to the animals in three different doses (0.25, 2.5, 25 ppm), for three different time periods (7, 14, 28 days). The influence of nanogold on splenocyte functions was time-dependent and the various doses were distinguished by distinct modes of action. The lowest dose had a pro-inflammatory or immunostimulating effect, enhancing the synthesis of pro-inflammatory cytokines (IL-1β, IL-6, TNF-α). The effect of the highest dose can be considered as a pro-inflammatory, or immunotoxic one, because the stimulated cytokine synthesis was accompanied by a drastic decline in the proliferative activity of lymphocytes. The medium dose, while inhibiting the synthesis of pro-inflammatory cytokines of macrophages, simultaneously stimulated the proliferation of lymphocytes. All the doses also modulated the synthesis of IL-2, which may implicate their effect on the immunoregulatory mechanisms of an organism. The effect of alimentary administration of gold nanocolloid on the immune system seems to be difficult to predict, hence a risk that this type of dietary supplements might have some adverse impact on the immunity cannot be excluded, especially after their chronic administration.

Key words: gold nanocolloid, mice, splenocyte activity, cytokine response

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