

# 1 Immunomodulatory properties of nanoparticles obtained by ultrasonic spray pyrolysis from gold scrap.

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## 2 Source

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## 3 Abstract

We prepared 5 different fractions of nanoparticles from the gold scrap, by using a new technology, Ultrasonic Spray Pyrolysis (USP). The aim of this study was to characterize the microstructure and cytotoxicity of the nanoparticles along with their immunomodulatory properties, using Concanavaline A (ConA)-treated rat splenocytes as a model of activated immune cells. Fractions 1 and 2, composed of pure gold nanoparticles, although non-cytotoxic, reduced cellular proliferation. Fraction 2, containing particles smaller in size and lesser agglomerated than fraction 1, up- and down-regulated the production of IL-2 and IL-10, respectively, by activated splenocytes. Fraction 3, containing nanoparticles composed of Au and up to 3 at.% Cu, was non-cytotoxic, but reduced IL-2 production and cell proliferation. Fractions 4 and 5, contaminated with alloying elements from the gold scrap, were cytotoxic. The extent of cytotoxicity and subsequent reduction of cytokine production, as well as the mode of cell death, depended on their composition. In conclusion, we showed that USP enables the synthesis of gold nanoparticles, which could be suitable for various biological applications, and that ConA-treated splenocytes represent a reliable model for fast and accurate evaluation of the immunotoxicological profiles of these particles. However, it is necessary to improve this technology and investigate further some of the immunomodulatory mechanisms using more specific immunological tests.

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