

## Biological effects induced by silver and gold nanoparticles: *in vitro* study.

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### Abstract

Nanotechnology allows an efficient exploitation of the antimicrobial properties of silver and gold in the form of nanoparticles. These are commonly used in applications such as preservatives in cosmetics, textiles, water purification systems, coatings in catheters and wound dressings. Wide spread use of nanoparticles has increased the risk of nanoparticle-induced toxic effects in the environment and in humans [1]. Recent reports in nanotoxicology suggest that the interaction and distribution patterns of the nanomaterials are diverse in different cell types [2]. In response, many studies investigating the effects of various types of silver and gold nanoparticles in different test systems are now emerging in the scientific literature.

The aim of our study was to compare the toxicity of two types of silver nanoparticles (colloidal metallic and ionic solutions) and gold nanoparticles (colloidal gold solution). Furthermore, we studied the influence of these nanoparticles on the selected parameters of inflammation.

As the model cell system we have used normal human dermal fibroblasts (NHDF). These cells have diverse functions like wound repair and production of cytokines. They are known to play a role in wound healing process which makes them a suitable model for inflammation studies. NHDF were isolated from skin specimens with the informed consent of the Ethical Committee of the University Hospital in Olomouc and the patient's written consent. NHDF ( $1 \times 10^5$  cells/cm<sup>2</sup>) were grown in Dulbecco's modified Eagle's medium supplemented with 10 % fetal calf serum in humidified atmosphere with 5% (v/v) CO<sub>2</sub> at 37°C. At confluence, the nanoparticles (0.1- 200 pp m) in serum-free medium were applied for 24 h. Cell viability was evaluated by activity of cellular dehydrogenases. The pro- and anti-inflammatory parameters were monitored in the collected media by Bio-plex suspension array system and by specific ELISA kits. The expression of pro- and anti-inflammatory markers in the cells was evaluated by western blot analysis.

The different effect of silver and gold nanoparticles on the selected pro- and anti-inflammatory parameters in normal human dermal fibroblasts will be discussed.

**Acknowledgement:** This work was supported by Ministry of Trade and Commerce (FT-TI2/205).

### References

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- [2] Xia T, Kovochich M, Liong M, Zink JI, Nel AE, American Chemical Society nano, **2** (2008) 85-96.