

Influence of silver nanoparticles on *in vitro* wound healing model

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Abstract

The complex and multiple processes leading to wound healing are controlled by cytokines, growth factors and matrix metalloproteinases within the healing wound. It begins with homeostasis followed by inflammation, cell proliferation and tissue remodelling. Due to the importance of inflammation properties in wound healing, some products and their components have been tested for anti-inflammatory properties. For the centuries silver has been known for its antibacterial and anti-inflammatory properties. As a metal, silver is relatively inert and is poorly absorbed by mammalian and bacterial cells. In the presence of wound fluid and other secretion, it readily ionizes and becomes highly reactive in binding to protein and cell membrane [1]. Therefore we tested two types of nanosilver solution (metallic silver and ionic silver) for comparison of different wound healing properties.

Normal human dermal fibroblasts (NHDF) were used in our study. Cells were isolated from tissue section from plastic surgery with the informed consent of the Ethical committee of the University Hospital Olomouc and the patient's consent. According to the MTT (3-(4, 5-dimethylthiazolyl-2)-2, 5-diphenyltetrazolium bromide) test we selected three non-toxic concentrations for *in vitro* wound healing model. For study of wound healing *in vitro* the modified scratch assay [2] was used and the tested solutions were added for 24 and 48 hours incubation periods. To detect pro-inflammatory, anti-inflammatory parameters and matrix metalloproteinases, the Bio-plex suspension array system, ELISA and western blot were used.

The difference between the influence of silver nano particles on the wound healing process *in vitro*, anti-inflammatory cytokines and matrix metalloproteinases will be discussed.

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References

- [1] Atiyeh BS, Costagliola M, Hayek SN, Dibo SA, Burns, **33** (2007) 139-148.
- [2] Wolf NB, Kűchler S, Radowski MR, Blaschke T, Kramer KD, Weindl G, Kleuser B, Haag R, Schäfer-Korting M, European Journal of Pharmaceutics and Biopharmaceutisc, **73** (2009) 34-42.