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Silver nanoparticles decrease nuclear fractal dimension in buccal epithelial cells

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Recently, it was suggested that silver nanoparticles (AgNPs) may have substantial cytotoxic and genotoxic potential in cell cultures. In this study, we present the evidence that AgNP treatment significantly affects fractal dimension of buccal cell nuclei.

Epithelial buccal cells were kept in RPMI 1640 cell culture medium supplemented with L-glutamine at 37 °C and treated with 10 mg/L colloidal silver NPs (size 7-20 nm). Before the treatment, as well as immediately after the treatment, digital micrographs of the cell nuclei in a sample of 40 cells were created using Pro-MicroScan DEM 200 camera (Oplenic Optronics, Hangzhou, CN), mounted on the American Optical Spencer 1036A light microscope (Buffalo, NY, USA) (Figure 1). The micrographs were analyzed using fractal analysis (FA) and grey level co-occurrence matrix (GLCM) methods [1, 2]. For each nucleus, values of fractal dimension, lacunarity, entropy, angular second moment and inverse difference moment were determined.

Fractal dimension of the cell nuclei significantly decreased after the AgNP treatment, while the lacunarity increased ($p < 0.01$). Nuclear entropy, angular second moment and inverse difference moment remained unchanged. These results indicate that treatment with AgNPs may affect fractal properties of buccal cell nuclei similarly as during the cellular senescence and apoptosis, previously reported [1, 2]. These findings further suggest that AgNPs might have significant genomodulatory and cytotoxic effects in human epithelial cells in *in vitro* conditions.

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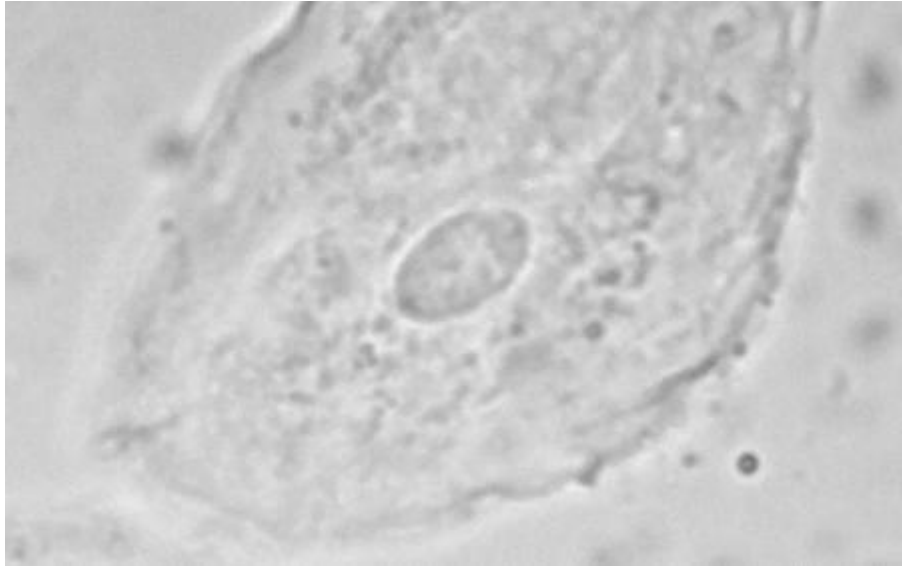


Figure 1. Buccal epithelial cell with visible nucleus after treatment with silver nanoparticles