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DIFFERENTIATION ABILITY AND BIOLOGICAL EFFECT OF MESENCHYMAL STEM CELLS BY CHITOSAN-NANOGOLD COMPOSITE FILMS

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Abstract

A series optimal concentrations of nanogold particles (AuNPs) (25, 50 and 100 ppm) while incorporation with chitosan (Chi) matrix comprising a thin coating surface modification method for mimicking stem cell growth and differentiation microenvironment was developed in this study. The nanogold composites (Chi-AuNPs) from chitosan and AuNPs were characterized by the UV-Vis spectrophotometry (UV-Vis) and Fourier transform infrared spectroscopy (FTIR). SEM image indicate that human mesenchymal stem cells (MSCs) had the better adhesion ability to Chi-AuNPs than that on pure Chi. The formation of spheroid by Chi-AuNPs of MSCs was confirmed by CD44 positive immunofluorescence staining. We supposed that spheroid formation by Chi-Au composite films helped to increase and maintain the stemness property of MSCs. Cell colony formation and differentiation assay showed that Chi-AuNPs were favorable for viability and differentiation of MSCs. The performance on Chi-AuNPs particularly that containing 25 and 50 ppm of AuNPs exhibited better biocompatibility capacity and biological function. In summary, this work indicated that biomaterials based on Chi-AuNPs can be used for tissue engineering applications such as mediates neural conductive from MSCs.

Keywords: chitosan, nanogold nanoparticles, mesenchymal stem cell