

ABSTRACT

In the field of regenerative medicine, regeneration of cartilage defects (caused either by injury or age-related degeneration, such as osteoporosis) has become a widely discussed topic. Nanofibrous scaffolds provide a suitable environment for cell adhesion, proliferation, differentiation, and also local involvement of bioactive substances. Nanofibrous scaffolds mimic the extracellular matrix (ECM) of hyaline cartilage and thus have the potential to treat cartilage defects.

The aim of the work was modulation of chondrogenic differentiation medium through finding the ideal concentration of chondrogenic supplements, composed of ascorbate-2-phosphate and dexamethasone, in the culture of primary chondrocytes of pig origin seeded on a nanofibrous polycaprolactone (PCL) scaffold.

The effect of different concentrations of the chondrogenic supplements on chondrocyte adhesion to the scaffold and their proliferation and differentiation was studied. Firstly, the influence of each of the supplements alone in the medium was studied, followed by study of effects of their combinations. Then, the supplements were incorporated into the nanofibers and their effect upon their release from the nanofibers was investigated.

The supplements were studied in 21-day experiments. The chondrogenic re-differentiation was best induced by the PLM group containing double concentrations of chondrogenic supplements in the standard differentiation medium. Supplements were spun into PCL nanofibers, from which they gradually released.

KEY WORDS: chondrocytes, chondrogenic differentiation, centrifugal spinning, ascorbate-2-phosphate, dexamethasone