

ABSTRACT

Osteogenic differentiation of mesenchymal stem cells (MSCs) would be possible to induce by creating of a cell bioactive scaffold that mimic the properties of bone extracellular matrix (ECM). This induction will be not only due to the addition of osteogenic supplements, but also due to the addition of differentiation peptides. These peptides activate signaling pathways leading to cell differentiation. The aim of this study was to evaluate the effect of selected peptides on adhesion, metabolic activity, proliferation and osteogenic differentiation of porcine MSCs. Four peptides with amino acid sequences of DGEA, IAGVGGEKSGGF, GQGFSYPYKAVFSTQ and KIPKASSVPTELSAISTLYL were selected. These peptides were derived from receptor binding sequences of collagen I, collagen III, BMP-7 and BMP-2 respectively. Scaffolds were prepared from a biocompatible and biodegradable poly-ε-caprolactone (PCL) polymer, suitable for cell cultivation. Cells were cultured on scaffolds for three weeks. Various concentration of differentiation peptides were added to the culture medium. As observed in the experiment of cells cultured in basal medium supplemented with differentiation peptides no effect on adhesion, proliferation or metabolic activity of porcine MSCs was observed. In groups treated with peptides derived from BMP-2 and BMP-7, a greater amount of osteocalcin was detected compared to other groups. Osteogenic differentiation was observed in cultured cells with osteogenic supplements due to the addition of differentiation peptides derived from proteins BMP-7 and BMP-2. The peptide derived from collagen III contributed to increased formation of the osteocalcin. The peptide derived from collagen I had no important effect on osteogenic differentiation.

KEY WORDS: Differentiation peptides, mesenchymal stem cells, osteogenic differentiation