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Expression of matrix metalloproteinases in full-term human umbilical cord and Human Umbilical Vein Endothelial Cells

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Background Matrix metalloproteinases (MMPs) are extracellular zinc-dependent endopeptidases involved in breakdown and remodelling of extracellular matrix in physiological and pathological processes. MMPs have also a role on cell proliferation, migration, differentiation, angiogenesis and apoptosis.

Umbilical cord is a special organ subjected to many changes during pre-natal life and whose cells can maintain a certain degree of plasticity also in post-natal period; for example recently they have been used as a source of stem cells. For these reasons we believe it is interesting to investigate the expression of some remodelling enzymes in this tissue.

Human Umbilical Vein Endothelial cells (HUVEC) have shown to be endowed with an high degree of plasticity; they have the potentiality to differentiate into different cell types and can be considered one of the territories of umbilical cord more dynamic and involved in remodelling/renewal phenomena, for this reason we decided to extend our research investigating the expression of MMPs also in these cells.

Aim In this study we investigated by immunohistochemistry and RT-PCR the expression of the gelatinases MMP-2 and MMP-9, the collagenases MMP-8 and MMP-13 and the stromelysin MMP-3 and MMP-10 in the whole human umbilical cord and in HUVEC.

Results MMP-2 protein is expressed in the amniotic epithelium of human umbilical cord and in few sub-epithelial fibroblasts, while MMP-3 and MMP-10 only in the umbilical epithelium. MMP-8, MMP-9 and MMP-13 immunoreactivity is localised in the epithelium and in Wharton's jelly mesenchymal cells. Immunohistochemistry also revealed protein expression for MMP-2, 3, 8, 9 and 10 in cultured Human Umbilical cord Vein Endothelial Cells.

In agreement with immunohistochemical data, RT-PCR analysis performed on samples of whole umbilical cord confirmed the transcriptional expression for the genes encoding all the six matrix metalloproteinases investigated, while in HUVEC cells only the expression of MMP-2, 3, 9, 10 and 13 mRNAs was detected.

Key words

Matrix MetalloProteinases, human umbilical cord, HUVEC