

NON-ENDOTHELIAL CD34 POSITIVE STEM CELLS OF THE UMBILICAL CORD AND PLACENTAL TISSUE

Globa Lilian^{2,3}, Globa Tatiana^{1,2,4*}, Pelin Elina^{1,2}, Globa Elena⁵, David Valeriu^{1,2}

¹Laboratory of Morphology, *Nicolae Testemitanu* SUMPh, Chisinau, Republic of Moldova.

²Department of Histology, Cytology, and Embryology, *Nicolae Testemitanu* SUMPh, Chisinau, Republic of Moldova.

³Department of Anatomy and Clinical Anatomy, Chisinau, Republic of Moldova.

⁴Laboratory of Tissue Engineering and Cell Cultures, *Nicolae Testemitanu* SUMPh, Chisinau, Republic of Moldova.

⁵Department of General Chemistry, *Nicolae Testemitanu* SUMPh, Chisinau, Republic of Moldova.

Background. Stem cells are unspecialized cells, but with a high capacity for differentiation, multiplication, and self-renewal, essential for the tissue regeneration. The placenta and umbilical cord are rich sources of stem cells, especially mesenchymal stem cells, which hold great promise for a regenerative medicine due to their plasticity and their immunomodulatory and anti-inflammatory properties. Mesenchymal stem cells can be easily collected from umbilical cord blood through non-invasive methods. However, one of the main obstacles in their use is the limited availability in umbilical cord blood.

Aim of the study. Studying the presence, characteristics, and distinctive features of potential hematopoietic mesenchymal stem cells within various regions of the umbilical cord and placental tissues.

Material and methods. The study included 56 umbilical cord and 26 placental specimens, resulting from normal vaginal deliveries at the Mother and Child Institute of the Republic of Moldova, during the period of 2012-2013. Hematopoietic precursor stem cells were quantified using anti-CD34 monoclonal antibody staining (clone QBEnd/10, prediluted, Leica Biosystem Newcastle Ltd, UK). Antigen retrieval used Bond Epitope Retrieval Solution 2 (Leica Biosystems, UK). Statistical analysis included calculating mean (X) and standard deviation (SD), with parametric Anova tests (F) for significant differences ($p < 0.05$).

Results. In the umbilical cord, CD34⁺ cells were observed in arterial and venous vessels. Non-endothelial CD34⁺ cells were identified in the peripheral (14.19 ± 2.14) and perivascular (5.92 ± 1.13) zones of the Wharton's jelly. Morphologically, these cells were characterized by cytoplasmic extensions and a large oval/round nucleus, which was euchromatic. CD34 marker expression was membranous and/or cytoplasmic. H-score analysis revealed statistically significant differences between groups ($F = 96.0299$, $p < 0.001$). In placental tissue, CD34⁺ cells were observed in placental vessels of chorionic villi and chorionic plate. In the stroma of villi, two populations of non-endothelial CD34⁺ cells with distinct characteristics of size and CD34 marker expression were identified.

Conclusions. Our data suggest that the umbilical cord and components of the placenta at term, such as the chorionic plate, amniotic epithelium, and stroma of chorionic villi, contain groups of hematopoietic cells that are not associated with fetal or maternal circulation and are distinct from endothelial cells expressing CD34.

Keywords: stem cells, CD34 positive cells, mesenchymal stem cells, umbilical cord, placenta.