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RESEARCH AREA

Stem cells present in the human adult body play a crucial role in the maintaining of homeostasis, and in the regeneration of tissues and organs. The loss or alteration of their function have been shown to have an important role in the pathomechanism of certain diseases. Mesenchymal stem cells (MSCs) can be isolated from many tissues and organs, and can be differentiated under appropriate conditions towards osteoblasts, fat cells, chondrocytes, myoblasts, fibroblasts, epithelium and other tissues as well. The MSC is capable of controlling humoral and cellular immune responses to prevent inflammation, tissue and organ rejection. They have an extremely important role in inducing local immunosuppression, in which both T cells and dendritic cells are affected by MSC. Due to their immunosuppressive capacity and their high potential for differentiation they became the most researched objects of regenerative medicine. As cell therapy product MSC able to regenerate the damaged tissues or organs and inhibit inflammatory processes. Our research mainly focuses on the role of mesenchymal stem cells in tissue regeneration, and immunomodulation under healthy and pathological conditions According this knowledge we create artificial tissues, tissue engineered products using 3D bioprinting from stem cells and bioscaffolds. We characterize the biochemical and immunological properties of these bioprinted tissues as well. We also investigate how MSC can participate in tumor formation and metastasis.

TECHNIQUES AVAILABLE IN THE LAB

Isolation of stem cells and progenitor cells from various tissues, *in vitro* and *ex vivo* cultivation of isolated cells. Phenotype analysis of cells is performed by immunocytochemistry and flow cytometry. Gene expression studies using PCR and high throughput gene arrays. Measurement of *in vitro* differentiation assays, wound healing and migration tests by high content screening microscopy. Detection of proteins, secreted factors by Western blots, ELISA and protein arrays. Three-dimensional cell cultures and 3D bioprinting.

SELECTED PUBLICATIONS

Klusóczki, Á., **Veréb, Z.**, Vámos, A., Fischer-Posovszky, P., Wabitsch, M., Bacso, Z., Fésüs, L., Kristóf, E. (2019) Differentiating SGBS adipocytes respond to PPARγ stimulation, irisin and BMP7 by functional browning and beige characteristics. **Sci Rep 9(1):** 5823.

Veréb, Z., Póliska, S., Albert, R., Olstad, OK., Boratkó, A., Csortos, C., Moe, MC., Facskó, A., Petrovski G. (2016) Role of Human Corneal Stroma-Derived Mesenchymal-Like Stem Cells in Corneal Immunity and Wound Healing. **Sci Rep 6:** 26227.

Veréb, Z., Albert, R., Póliska, S., Olstad, OK., Akhtar, S., Moe, MC., Petrovski, G. (2013) Comparison of upstream regulators in human ex vivo cultured cornea limbal epithelial stem cells and differentiated corneal epithelial cells. **BMC Genomics 14:** 900.

Veréb, Z., Lumi, X., Andjelic, S., Globocnik-Petrovic, M., Urbancic, M., Hawlina, M., Facskó, A., Petrovski, G. (2013) Functional and molecular characterization of ex vivo cultured epiretinal membrane cells from human proliferative diabetic retinopathy. **Biomed Res Int 2013:** 492376.

Varga, N., **Veréb, Z.**, Rajnavölgyi, E., Német, K., Uher, F., Sarkadi, B., Apáti, A. (2011) Mesenchymal stem cell like (MSCl) cells generated from human embryonic stem cells support pluripotent cell growth. **Biochem Biophys Res Commun 14(3):** 474-80.