DEVELOPMENT OF A PERICYTE-BASED THERAPY FOR DIABETIC RETINOPATHY

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Diabetic retinopathy (DR) is one of the most common and severe complications of diabetes mellitus, leading to early disability and vision loss among people of working age. Current treatment methods, including laser photocoagulation, vitreoretinal surgery, corticosteroids, and anti-VEGF drugs, are mostly effective only at the advanced stages of the disease, when significant retinal damage has already occurred. At the same time, therapeutic options at the early stages of DR remain limited, which highlights the need to develop new strategies aimed at preventing disease progression.

One of the promising directions in regenerative medicine is the use of pericytes—cells of the microcirculatory system that possess unique properties similar to stem cells. Pericytes play a key role in maintaining endothelial and vascular wall function while also demonstrating immunomodulatory and tissue-regenerative capacities. This project aims to investigate the therapeutic potential of human adipose tissue–derived pericytes, as well as their exosomes, in a preclinical model of diabetic retinopathy.

The scientific novelty of this work lies in a comprehensive study of the immunomodulatory and regenerative functions of activated human adipose tissue pericytes. For the first time, their ability to influence inflammatory processes, angiogenesis, and vascular network regeneration in diabetic retinopathy will be evaluated. In addition, the therapeutic potential of pericyte-derived exosomes will be investigated, opening opportunities for the development of cell-free therapeutic approaches.

The methodological part of the project involves a stepwise implementation of *in vitro* and *in vivo* experiments. At the first stage, pericytes will be isolated and characterized, conditions for their cytokine-induced activation will be determined, and their immunomodulatory properties will be studied in co-culture with endothelial cells, dendritic cells, and T lymphocytes. At the second stage, *in vivo* studies will be conducted using an animal model of streptozotocin-induced diabetic retinopathy. The therapeutic efficacy of both activated pericytes and their exosomes will be assessed. The analysis will include ophthalmological diagnostic methods (optical coherence tomography), as well as histological and immunohistochemical studies of retinal tissue.

Successful implementation of the project will help identify the optimal strategies for activating pericytes and their exosomes to enhance therapeutic effectiveness in DR.

Keywords: cell therapy**,** diabetic retinopathy, exosome, pericyte, streptozotocin.

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