

## CELLULAR THERAPY IN DIABETIC RETINOPATHY

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**Introduction.** Diabetic retinopathy is one of the most common microvascular complications of type 1 and type 2 diabetes and a major cause of visual impairment and blindness in adults. Its pathogenesis involves complex mechanisms, including chronic hyperglycemia, oxidative stress, inflammation, and microvascular dysfunction, which cause progressive deterioration of retinal structures. Although conventional treatments, such as anti-VEGF agents, laser photocoagulation, or intravitreal corticosteroids, can slow disease progression, they do not regenerate the affected retinal cells. In this context, stem cell therapy represents a promising avenue of research in regenerative medicine. The objective of this study was to evaluate and synthesize the recent studies on the efficacy of cell therapies in diabetic retinopathy.

**Material and methods.** This work was conducted through a review of the national and international literature. Eighty references published between 1989 and 2025 were analyzed. They were selected from scientific databases such as PubMed, ClinicalTrials.gov, Elsevier, Google Scholar, and Medscape. The analysis included original articles, preclinical studies, and clinical trials related to the use of cell therapies in diabetic retinopathy, as well as the pathogenic mechanisms involved in the development and progression of this disease.

**Results.** The literature review highlights the therapeutic potential of various types of stem cells, particularly mesenchymal stem cells derived from bone marrow, adipose tissue, umbilical cord blood, and perinatal tissues. These cells exert beneficial effects through multiple mechanisms, such as the secretion of paracrine factors, modulation of the inflammatory response, reduction of oxidative stress, and stimulation of tissue regeneration. Preclinical studies have shown that stem cell transplantation or the administration of stem cell-derived exosomes can protect retinal structure, reduce neuronal degeneration, and improve microvascular integrity. Preliminary clinical studies suggest that cell therapies could improve visual function and reduce retinal inflammation, but the results remain limited and require validation.

**Conclusions** Cell therapy represents an innovative and promising strategy for the treatment of diabetic retinopathy. It could target the pathogenic mechanisms of the disease and promote the regeneration of affected retinal structures. However, further studies are needed to evaluate the safety, efficacy, and long-term clinical applicability of these therapies.

**Keywords:** diabetic retinopathy, cell therapy, regenerative medicine, mesenchymal stem cells.