

IN VIVO LOCALIZATION OF HUMAN PERICYTE-LIKE ADIPOSE-DERIVED MESENCHYMAL STEM CELLS IN THE DIABETIC RETINA: IMPLICATIONS FOR BLOOD-RETINAL BARRIER INTEGRITY

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Diabetic retinal diseases are increasingly recognized as complex alterations of the retinal microvasculature and disruption of the neurovascular unit. Pericytes play a critical role in retinal vascular homeostasis and blood-retinal barrier (BRB) integrity, while their dysfunction impairs vascular stability and increases permeability under diabetic conditions. Adipose-derived mesenchymal stem cells (ASCs) have emerged as a potential source for regenerative cell-based approaches, and their differentiation toward a pericyte-like phenotype may provide a strategy to specifically target the retinal vascular compartment. Our group previously established and characterized human pericyte-like ASCs (P-ASCs), demonstrating their pericyte-associated phenotype and protective effects on retinal endothelial cells under high glucose conditions. In the present study, we investigated the in vivo localization of human P-ASCs following intravitreal administration in a diabetic rat model. Human P-ASCs were characterized before transplantation by expression of the pericyte-associated markers α-SMA and NG2. Following intravitreal administration, human nuclear antigen (HNA) immunostaining was used to localize transplanted human cells in the rat retina, and α-SMA immunostaining to verify that pericyte-like differentiation was maintained. Retinal vascular alterations and BRB integrity was assessed by quantifying Evans Blue extravasation as a measure of vascular permeability. It was found that HNA-positive human cells were detected within the retinal tissue, confirming their migration from the vitreous toward the retinal perivascular compartment. Notably, P-ASC-treated diabetic animals showed reduced Evans Blue extravasation compared with untreated diabetic animals, indicating decreased vascular permeability and improved BRB integrity. Overall, these results support the potential role of pericyte-like cells in improving the diabetic retinal microvascular environment and provide a rationale for investigations of P-ASCs as a cellular strategy to preserve neurovascular unit and BRB function. Further studies will be needed to clarify the mechanisms underlying their beneficial effects.