Mesenchymal stem cells and potential applications in treating ocular disease.

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Source

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Abstract

Mesenchymal stem cells (MSCs) are remarkable in stem cell biology. Not only do they have significant tissue regeneration potential, but more recently their paracrine effects (either innate or through genetic augmentation) have become increasingly recognized as useful therapeutic approaches. In particular, clinical roles for MSC therapy in neuroprotection and immune suppression are likely to emerge. These therapeutic effects will be particularly advantageous in work on neurological tissues, because MSC-based molecular therapy could overcome some of the difficulties of long-term drug delivery to tissues, such as the eye, which are relatively inaccessible to systemic delivery (for example due to the blood retina barrier). MSC therapy is, therefore, poised for significant impact in ocular molecular therapeutics, particularly for chronic diseases, such as retinal degeneration, glaucoma, and uveitis. Other molecular and tissue regeneration effects of MSCs are also likely to have impact in the management of ocular surface disease and oculoplastics.

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Abstract

Mesenchymal stem cells (MSCs) are multipotent cells that are being clinically explored as a new therapeutic for treating a variety of immune-mediated diseases. First heralded as a regenerative therapy for skeletal tissue repair, MSCs have recently been shown to modulate endogenous tissue and immune cells. Preclinical studies of the mechanism of action suggest that the therapeutic effects afforded by MSC transplantation are short-lived and related to dynamic, paracrine interactions between MSCs and host cells. Therefore, representations of MSCs as drug-loaded particles may allow for pharmacokinetic models to predict the therapeutic activity of MSC transplants as a function of drug delivery mode. By integrating principles of MSC biology, therapy, and engineering, the field is armed to usher in the next generation of stem cell therapeutics.

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