



# Mesenchymal stem cells: an early yet promising prospect for Asthma

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Asthma is a common pulmonary condition typified by airway inflammation and hyper-reactivity that clinically presents with shortness of breath, wheezing, and cough (1). Most acute asthma exacerbations respond quickly to inhaled bronchodilators with/without systemic corticosteroids (2). However, a small percentage of asthmatics are plagued with chronic and refractory symptoms that do not respond to current interventions. Given the widespread prevalence of asthma and the incumbent financial strain on healthcare systems, new therapies are warranted (3,4).

The review by Yu *et al.* describes the therapeutic potential of mesenchymal stem/stromal cells (MSCs) for asthma (5). MSCs are characterized by their pleotropic properties, including their ability to secrete factors that offset inflammation and apoptosis, while simultaneously stimulating wound healing and tissue regeneration (6). There is mounting evidence that MSCs have demonstrated clinical benefit in multiple medical conditions (7-10). Herein, the authors describe methods by which MSCs may be a novel approach to abate or mitigate pulmonary changes oftentimes observed in asthmatics. Fueled by preclinical studies, Yu and colleagues supply a robust summary of the mechanisms by which MSCs may provide benefit in patients with asthma.

Aside from describing the potential role of MSCs in the different types of asthma, the authors also highlight ways to optimize the novel therapy. For instance, one method entails ‘priming’ the cells to promote the expression of specific factors whether that be through pretreating with certain molecules or environments or genetically altering the release of distinctive molecules by the MSCs. Other approaches emphasized in the review, include a ‘cell-

free’ approach, whereby the MSC conditioned media or extracellular vesicles produced by MSCs were utilized instead of the cells themselves.

While the findings seem promising, there are several barriers that need to be released prior to widespread use of MSCs as an asthma therapy. To fully receive buy in from the scientific community, the cells should be thought of and should undergo the methodologic testing required in a new drug. Factors to consider include how to store a cell, or cell byproduct, that not only remains stable for long periods of time but that also consistently produces the same concentration of the factors produced from batch to batch. Along the same lines, many tissue sources have been investigated (e.g., umbilical cord, bone marrow, placenta, adipose tissue) but the optimal source has not been identified. Timing/frequency of administration, route of administration, and number of cells to deliver are other criteria that must also be considered. A bridge to the patient bedside should also include the safety and efficacy of MSCs in larger animal models. In this way, results from preclinical work have a higher probability of translational success. In summary, MSC research is still in a nascent stage and has the potential to improve multiple processes underpinning asthma pathology; however, more work is needed before it can become a mainstream clinical therapy.

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