

# Evidence for the Effects of Adipose-Derived Stem Cell Conditioned Medium on Allergies

## Overview

Multiple studies have reported that adipose-derived stem cell conditioned medium (ADSC-CM) may have beneficial effects on allergic diseases. The evidence suggests that bioactive substances in ADSC-CM exert immunomodulatory effects that can regulate allergic reactions.

## Mechanisms of Action

### Inhibition of Mast Cell Degranulation

Research has shown that ADSC-CM can suppress key features of allergic inflammation. Specifically, ADSC-CM prevents the increase in  $\beta$ -hexosaminidase activity induced by antigens and inhibits the elevation of prostaglandin E2 (PGE2) and histamine in mast cell models (such as RBL2H3 cells). The suppression appears to be mediated by interfering with the interaction between  $Fc\epsilon RI\beta$  and various signaling molecules (HDAC3, SOCS1, Lyn), thus reducing mast cell degranulation, a central event in allergic reactions.

### Suppression of Pro-inflammatory Cytokines

ADSC-CM has been shown to downregulate the expression of various cytokines and chemokines that are elevated in allergic conditions. In mouse models, the expression of inflammatory mediators such as IL-5, MIP-1 $\beta$ , MIP-2, CCL5, and IL-17 was reduced after treatment with ADSC-CM. Studies using human dermal fibroblasts and keratinocytes also found that ADSC-CM suppressed pro-inflammatory factors and promoted tissue regeneration and repair.

## **Effects on Allergic Rhinitis**

### **Improvement of Nasal Inflammation**

Extracellular vesicles (EVs) derived from human ADSCs have shown significant effects in mouse models of allergic rhinitis. Treatment led to a marked reduction in eosinophil numbers and improvement in goblet cell hypertrophy and proliferation in the nasal mucosa.

### **Modulation of Immune Balance**

Conditioned medium from bone marrow-derived mesenchymal stem cells (BMSCs) also alleviated allergic symptoms and reduced eosinophil infiltration in the nasal mucosa of allergic rhinitis models. After administration, levels of ovalbumin-specific IgE and interleukin-4 decreased, while interferon-gamma increased, indicating a shift in the Th1:Th2 balance toward immune regulation.

## **Effects on Atopic Dermatitis**

### **Clinical Improvement**

In BALB/c mouse models, ADSCs alleviated clinical symptoms of atopic dermatitis. There was a reduction in the number of degranulated mast cells, serum IgE levels, released histamine, and PGE2 levels.

### **Suppression of Skin Inflammation**

Studies using human skin models have shown that conditioned medium from adipose-derived mesenchymal stem cells (ASCs) may be effective in treating inflammatory skin diseases. ADSC-CM promoted cell proliferation and prevented morphological changes induced by IL-1 $\beta$ . In mouse models, treatment with ASC-conditioned medium reduced erythema and thickening associated with dermatitis.

### **Clinical Application Potential**

In Japan, some medical institutions have begun applying stem cell conditioned medium therapy for allergic diseases. The Japan Society for Regenerative Medicine Clinical Practice lists "immunomodulatory effects" among the expected benefits, stating that ADSC-CM can

normalize immune function to prevent abnormal immune responses such as allergies, and may be effective for allergic rhinitis and atopic dermatitis.

## **Conclusion**

There is accumulating evidence from experimental studies that adipose-derived stem cell conditioned medium has beneficial effects on allergic diseases. The mechanisms involve inhibition of mast cell degranulation, suppression of pro-inflammatory cytokines, and modulation of immune balance. Positive effects have been observed in models of allergic rhinitis and atopic dermatitis, suggesting potential for clinical application. However, further large-scale clinical trials are needed to confirm efficacy, identify active components, and optimize treatment protocols.

## **References:**

- Lee, S. H., et al. (2013). "Human adipose tissue-derived mesenchymal stem cells suppress allergic inflammation by inhibiting the degranulation of mast cells." *Journal of Investigative Dermatology*, 133(5), 1353–1361. [Link](#)
- Kim, H. S., et al. (2019). "Therapeutic Effects of Human Mesenchymal Stem Cell Conditioned Medium on Atopic Dermatitis." *International Journal of Molecular Sciences*, 20(23), 6111. [Link](#)
- Japan Society for Regenerative Medicine Clinical Practice [Link](#)

If you need more detailed references or specific study summaries, please let me know!