ATOPIC ECZEMA/DERMATITIS

THERAPEUTIC EFFECTS OF MESENCHYMAL STEM CELL-DERIVED EXOSOMES IN ATOPIC DERMATITIS

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Introduction: Atopic dermatitis (AD) is a chronic, relapsing, highly pruritic inflammatory skin disease that can significantly reduce the quality of life. Current evidence suggests that the pathogenesis of AD is attributed to both epidermal barrier dysfunction and Th2/Th22-deviated immune reactions within the skin. Exosomes are nano-sized membrane-bound vesicles (30 – 200 nm) actively secreted by almost all types of cells. The ability of exosomes to deliver their cargo, such as microRNAs and proteins, makes them a promising cell-free therapy option to treat various diseases by overcoming many drawbacks of cell-based therapy. In particular, exosomes derived from mesenchymal stem cells (MSCs) were shown to facilitate tissue repair and regeneration, and reduce inflammation.

Objective: In the present study, we investigated whether human adipose tissue-derived mesenchymal stem cell-derived exosomes (ASC-exosomes) can ameliorate AD.

Materials and Methods: Human ASC-exosomes were isolated from the serum-free conditioned media by sequential filtration method and characterized as recommended by the International Society for Extracellular Vesicles (ISEV). AD-like skin lesions were induced in mice by treatment with a house dust mite antigen or a chemical irritant. The effects of ASC-exosomes were tested in murine models.

Results: When injected either intravenously (IV) or subcutaneously (SC) into murine model of AD, ASC-exosomes were found to attenuate AD-like symptoms and improved skin barrier function as evidenced by reduced levels of serum IgE, pro-inflammatory cytokines such as interleukin (IL)-4, IL-23, IL31, and tumor necrosis factor-α (TNF-α), trans-epidermal water loss (TEWL), and enhanced skin hydration in skin lesions.

Conclusions: Our findings suggest that systemic administration of ASC-exosomes improves skin barrier function and reduces inflammation, providing a new perspective for the use of ASC-exosome as a cell-free therapeutic option for the treatment of AD.