

## Design and Development of Mesenchymal Stromal Cell Secretome Nano Transferosomes for Anti-Inflammatory Activity

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### Abstract

Nano Transferosomes (NTs) are the lipoidal systems extensively used in transdermal drug delivery. Wharton's Jelly derived Mesenchymal Stromal Cells (WJ-MSCs) are proven to have immunomodulatory properties through their paracrine action, hence they can be used to treat various inflammatory diseases. Current work is aimed at the encapsulation of WJ-MSC secretome into the NTs. The WJ-MSCs were preconditioned in the presence of the IL- $\beta$ , TNF- $\alpha$ , and IL-17 inflammatory proteins, mRNA expression was checked using qPCR, and the secretome was collected. The secretome-loaded NTs were formulated using the classical organic solvent evaporation technique followed by sonication. Formulated NTs were tested for particle size, entrapment efficiency, and other characteristics. The optimized NTs were subjected to the *in vitro* macrophage polarization assay using RAW 264.7 cell lines. The secretome showed higher levels of anti-inflammatory proteins. From the particle size analysis, it was found that all the formulations in the nanometer range with good zeta potential and entrapment efficiency. From the SEM analysis, it was found that the optimized formulation is in a spherical shape. The macrophage polarization assay revealed that the anti-inflammatory M2 phenotype was increased compared to inflammatory phenotype M1. This can be formulated for further applications in the management of inflammatory diseases by non-invasive, topical application of the anti-inflammatory secretome, where the nano-transferosomes would permeate the skin barriers and deliver the secretome directly to the diseased area.

**Keywords:** Nano Transferosomes, Wharton's Jelly derived Mesenchymal Stromal Cells, Secretome, *In vitro* functional assay, inflammatory proteins