



### APP ABSTRACT- APP 2026-002

## Mesenchymal Stem Cell–Derived Exosomes as Nanocarriers: Biogenesis, Isolation, and Mangiferin Encapsulation for Targeted Drug Delivery”

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### ABSTRACT

**Introduction:** Exosomes are small extracellular vesicles (30-150 nm) naturally secreted by cells and play an essential role in intercellular communication. They originate through a regulated intracellular process known as exosome biogenesis, where early endosomes mature into multivesicular bodies (MVBs) containing intraluminal vesicles that are later released as exosomes upon fusion with the plasma membrane. Due to their nanoscale size, biocompatibility, and ability to transport proteins and bioactive molecules, exosomes have emerged as promising drug delivery systems. Mesenchymal stem cells derived from umbilical cord blood are an efficient source for exosome production because of their high proliferative capacity and regenerative properties. Mangiferin, a bioactive phytochemical obtained from *Mangifera indica*, possesses significant antioxidant, anti-inflammatory, and anticancer activities, making it a potential therapeutic candidate.

**Methods:** Umbilical cord blood was utilized for the isolation and culture of mesenchymal stem cells under sterile in vitro conditions. After achieving sufficient cell proliferation, exosomes were isolated from the conditioned culture medium using standard exosome isolation techniques. The isolated exosomes were then purified and prepared for drug loading. Mangiferin was subsequently incorporated into the exosomal vesicles to evaluate their potential as nanocarriers for targeted therapeutic delivery.

**Results:** The isolated mesenchymal stem cell-derived exosomes possess suitable characteristics for its use as biological nanocarriers. Loading of mangiferin into the exosomal vesicles was successfully achieved, indicating the feasibility of utilizing these vesicles for phytochemical delivery.

**Conclusion:** The study highlights the potential of mesenchymal stem cell-derived exosomes as effective drug delivery vehicles. Loading mangiferin into exosomes may enhance targeted therapeutic delivery and improve the pharmacological potential of natural compounds in future disease treatment strategies.