

CHARACTERIZATION OF HUMAN UMBILICAL CORD BLOOD MESENCHYMAL STEM CELL-DERIVED EXOSOMES BY SIZE AND ZETA POTENTIAL ANALYSIS

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Background: Exosomes are cup-shaped lipid bilayer extracellular vesicles with a diameter of 30–200 nm, secreted by various cell types, including mesenchymal stem cells (MSCs) [1–3]. MSC-derived exosomes (MSC-Exo) play an important role in tissue regeneration and show therapeutic potential in psoriasis and other inflammatory, autoimmune, and degenerative diseases [3,4]. For exosome characterization, measurement of their size and zeta potential is essential, as these parameters provide key information about their stability and biological interactions [5]. This study aimed to characterize exosomes derived from human umbilical cord blood mesenchymal stem cells (hUCB-MSC-Exo) by measuring their size and zeta potential.

Materials and methods: Human umbilical cord blood MSC-derived exosomes (hUCB-MSC-Exo) were characterized by dynamic light scattering (DLS) and scanning electron microscopy (SEM). Particle size was measured using a NanoBrook 90Plus Zeta Analyzer (Brookhaven Instruments, USA) with three 15-minute runs at a 90° scattering angle. Zeta potential was determined using the same instrument equipped with a solvent-resistant electrode (BI-SREL) at 25 °C. For SEM, hUCB-MSC-Exo were coated with a 15 nm gold layer and examined using a Carl Zeiss Crossbeam 540 microscope (Carl Zeiss AG, Germany). High-resolution images were analyzed to determine particle size.

Results: The average diameter of hUCB-MSC-Exo was 85.34 nm by DLS and 95.93 nm by SEM, both within the characteristic exosome size range (30–200 nm). The zeta potential ranged from –21.24 to –25.16 mV, indicating stable dispersion in solution and suggesting favorable interactions with target cell membranes due to the negative sur-

face charge.

Conclusion: The analyzed hUCB-MSC-Exo demonstrated size and surface charge consistent with typical exosomal characteristics, confirming the reliability of the applied methods for their physicochemical characterization.

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Keywords: exosome, mesenchymal stem cell, characterization, size, zeta potential.

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