

## Isolation, identification and comparison of exosomes extracted from neural stem cells and astrocytes of rat brain and the importance of their therapeutic potential in neurodegenerative diseases

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### Abstract

**Introduction:** Exosomes are a new approach to treatment that is of great interest, especially for diseases related to the nervous system. The innovation of this study lies in providing a comparative analysis of the biomolecular and morphological properties of exosomes derived from neural stem cells (NSCs) and brain astrocytes, which have not been thoroughly investigated in previous laboratory research. This study aims to extract exosomes from these cells, identify them, validate them, and compare them to advance therapeutic goals.

**Materials and Methods:** It seems that, probably NSCs and astrocytes were extracted from the brain of newborn rats and their surface markers were confirmed by immunocytochemistry. Exosomes were isolated using the Anacell kit. To confirm the presence of exosomes, the presence of CD markers (CD9, CD63, CD81) was confirmed by Western blotting and the concentration of exosomes was determined by the Bradford method. The morphology and diameter of exosomes were examined using transmission electron microscopy (TEM) and DLS.

**Results:** Immunocytochemistry showed the presence of Nestin, Tuj-1, and GFAP markers. The concentration of extracted exosomes in NSCs and astrocytes was 330.52 and 454.19 µg/ml, respectively. Western blot confirmed the presence of CD9, CD63, and CD81 markers on the surface of extracted exosomes. The average diameter of exosomes extracted from neural stem cells and astrocytes using DLS was 50.45 and 38.61 nm, respectively.

**Conclusion:** Astrocyte-derived exosomes will likely attract more attention as a novel therapeutic approach in nervous system diseases due to their higher protein content and smaller size than from NSC-derived exosomes. However, further studies are suggested to confirm and investigate these exosomes' biological function and efficacy in neural repair processes.

**Keywords:** Exosomes, neural stem cells, astrocytes, rats.