The effect of M1 and M2 polarized microglia-derived exosomes on neural stem cell differentiation

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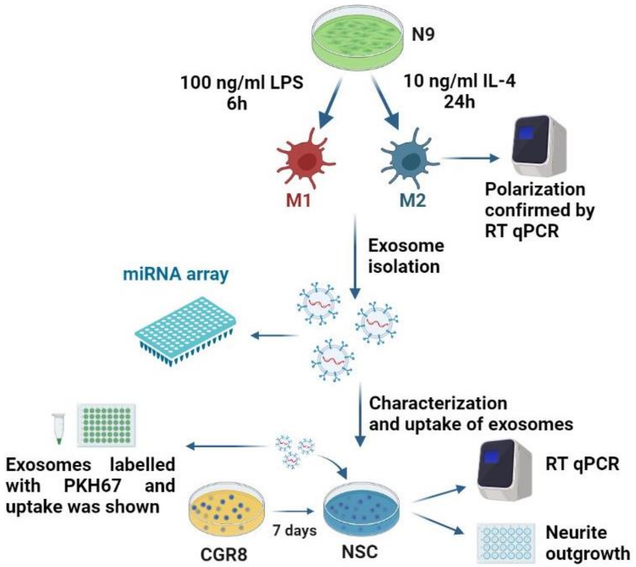
INTRODUCTION

Microglia are the immune cells of the CNS and are involved in numerous processes including development, homeostasis, disease conditions (1). Microglia are able to polarize into M1 and M2 phenotypes, that are considered as pro-inflammatory and anti-inflammatory phenotypes, respectively (2). Almost all cells of the body including microglia secrete extracellular vesicles to their immediate microenvironment. Exosomes are small extracellular vesicles that have distinctive cargo that might be protein, mRNA or noncoding RNAs; and are involved in cell-cell communication (3). miRNAs are noncoding 18-24 nucleotide long RNAs that regulate gene expression (4).

Neural stem cells (NSCs) are significant in terms of providing cell reservoir in the CNS and are able to differentiate into neurons, oligodendrocytes and astrocytes. The distinctive polarization phenotypes of microglia influence neurogenesis (5). In this study, it was aimed to determine the differential miRNA content of exosomes from M1 and M2 polarized microglia and their effect on NSCs.

MATERIAL/METHOD



RESULTS

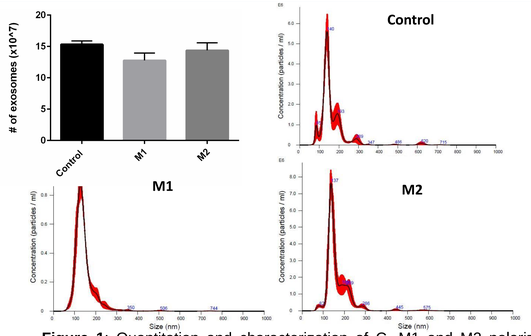


Figure 1: Quantitation and characterization of C, M1 and M2 polarized microglia derived exosomes via ExoCET quantitation kit and NTA analysis. Average sizes were determined as 140, 128, 137 nm, respectively.

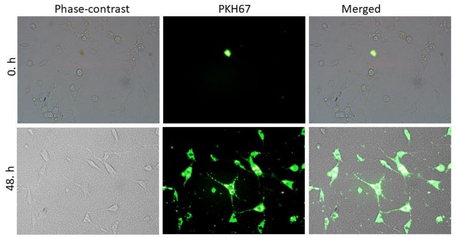


Figure 3: Uptake of PKH67 labelled exosomes by NSCs.

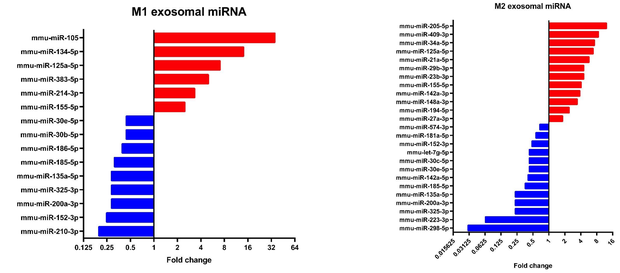


Figure 2: Differential miRNA content of M1 and M2 microglial exosomes was determined by PCR array.

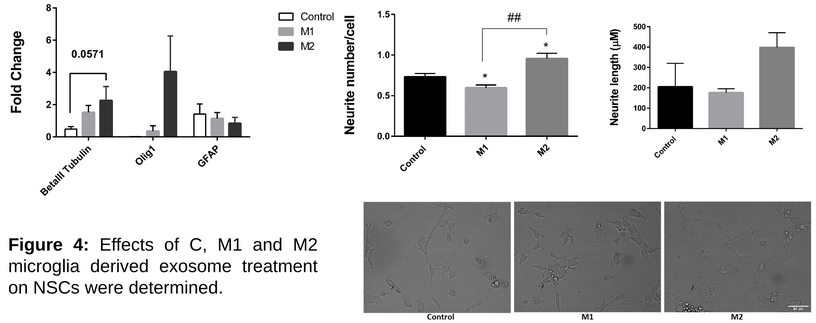


Figure 4: Effects of C, M1 and M2 microglia derived exosome treatment on NSCs were determined.

CONCLUSION AND FUTURE PERSPECTIVES

An increasing tendency in BetaIII tubulin upon M2 polarized microglia derived exosome treatment was determined. Neurite number per cell was also increased via M2 exosomes treatment. As miRNA content of exosomes changes upon polarization, effect of microglia polarization on NSCs might be through exosomal miRNA.
The observation of altered neural differentiation through microglial exosomes is promising to highlight the pathogenesis of several inflammation-related disorders and will eventually provide a new approach in terms of diagnosis and treatment.

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