POLSKY Center for Entrepreneurship and Innovation
THE UNIVERSITY OF CHICAGO

Exosomes for Remyelination in Progressive Multiple Sclerosis

SUMMARY

Researchers at the University of Chicago have developed a novel method for treating the demyelination associated with multiple sclerosis (MS) using exosomes derived from dendritic cells, which promote remyelination of neurons. No current therapies have achieved effective levels of remyelination needed to treat the more progressive stage of the disease.

KEY RESULTS

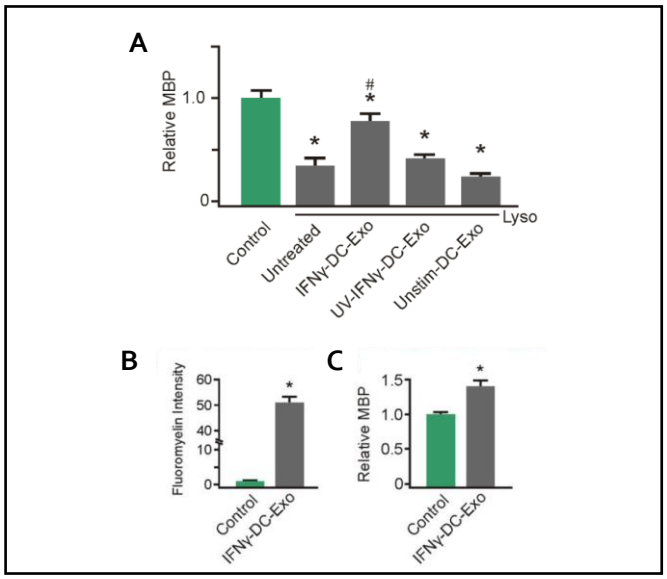
Application of exosomes derived from dendritic cells stimulated with low-level of IFNγ (IFNγ -DC-Exos) promotes remyelination following demyelination modeled in slice culture. In normal rats, nasal administration of IFNγ- stimulated-DC-Exos increases myelin levels over baseline. miRNA 219 has been identified as critical component of IFNγ -DC-Exos effect on myelination. Further preclinical investigations focusing on this novel treatment for multiple sclerosis are supported by a Common Fund Grant from the NIH with clinical trials expected to begin in 2018.

ADVANTAGES

- Fewer potentially harmful side-effects associated with current immune suppression treatments.
- Exosomes not anticipated to produce adverse immune reactions.
- Exosomes can be frozen for storage.
- Methods of scalable IFNγ -DC-Exos production are anticipated.

APPLICATIONS

- Remyelination of neurons in demyelinating diseases such as MS, traumatic brain injury, and migraine.
- Bioreactor for scalable source of therapeutic exosomes



(A) Treatment of hippocampal slice cultures with dendritic cell exosomes significantly increased remyelination five days after lysolecithin injury, compared to controls. (B-C) Nasal delivery of exosomes to rats increased myelin levels over baseline. MBP= myelin basic protein.

TECHNICAL DESCRIPTION

Exosomes easily cross the blood-brain barrier and intranasal administration delivers exosomes directly to affected brain tissues. Dendritic cell-derived exosomes are absorbed preferentially by oligodendrocytes, suggesting that they contain specific agents on their surface that enable targeting to myelin-producing cells. miRNA-219, which plays an essential role in myelin formation and is deficient in multiple sclerosis lesions, is highly enriched within IFNγ-stimulated-DC-Exos.

REFERENCE
UCHI 2146, 2229, 2344, 2410

DEVELOPMENT STAGE
Pre-clinical

THERAPEUTIC AREAS
Demyelinating Diseases
Multiple Sclerosis

PUBLICATIONS

Pusic KM, et al. Cell Mol Neurobiol. 2016 36(3):313-25

Pusic AD, et al. J Interferon Cytokines Res 2015 35(10):795-807

Pusic AD, et al. J Neuroimmunol. 2014 266(1-2); 12-23.

Pusic AD, et al. Glia 2014 62(2):284-99.

Pusic AD et al. Expert. Rev. Neurother. 2014 14(4):353-5

INTELLECTUAL PROPERTY
PCT/US2013/055187
Patents pending in US, EU, JP, CA, AU

INVENTORS

Richard Kraig, MD, PhD
Dr. Richard Kraig is the William D. Mabie Professor in the Neurosciences, Departments of Neurology and Neurobiology, Pharmacology and Physiology as well as the Director of the Migraine Head-ache Clinic and Cerebrovascular Disease and Aging Laboratories.

Contact: Cristianne Frazier, PhD | frazierc@uchicago.edu | 773-834-8752