

NEURO-PROTECTIVE EFFECT OF HUMAN PLURIPOTENT STEM CELL-DERIVED SECRETOME IN ALS

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PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20240180972	06/06/2024	2021-036

BRIEF DESCRIPTION

This invention illustrates that the secretome of hESCs, iPSCs and moreover, ALS patients' iPSCs, robustly protect neuronal cells from apoptosis, diminish mislocalization of TDP43, and significantly improve the formation and maintenance of neurites of ALS-MNs. Such neuro-protection manifests in the genetic and in an acquired neuro-toxicity models. Importantly, administration of CM from ALS-iPSCs (ALS iPSC-CM) to transgenic mice that model human disease (SOD1^{G93A}) prevented MN degeneration, maintained the innervation (neuro-muscular junctions), delayed onset of symptoms, and prolonged lifespan. Comparative proteomics and fractionation of conditioned medium outline specific proteins and fractions that are responsible for this neuroprotection. Translationally, this work suggests the rapid development of a new therapeutic for ALS.

SUGGESTED USES

Pluripotent stem cells (PSCs), e.g. embryonic stem cells (ESCs), and induced pluripotent stem cells (iPSCs), are used in various biomedical fields due to their capacity of unlimited self-renewal and the ability to differentiate into multiple cell types. However, control of stem cell differentiation remains limited, and concerns of oncogenic side-effects persist. Stem cell-derived conditioned medium (CM) has emerged as a safer alternative to cell transplantation.

ADVANTAGES

The secretomes of mesenchymal and adipose stem cells were shown to broadly improve wound healing and to increase the health of neurons in experimental animals; and we reported on capacity of hESC secretome to promote muscle regeneration and enhance proliferation of neuro-precursor. Moreover, when stem cells are transplanted, the improvement in tissue regeneration is often caused by their secretome rather than the cells themselves.

iPSCs from patients with ALS (ALS-iPSC) have been established and the pathological characteristics of derived MNs (ALS-MNs) are similar to those manifesting in ALS: diminished neurite length, protein aggregation, and an enhanced apoptosis that is reversible by over-expression of Bcl-2

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ CRISPR-based Graphene Biosensor for Digital Detection of DNA Mutations

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OTHER INFORMATION

KEYWORDS

ALS, stem cells

CATEGORIZED AS

- » **Biotechnology**
- » Proteomics
- » **Medical**
- » Stem Cell
- » Therapeutics

RELATED CASES

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