Induced Pluripotent Stem Cell-Derived Glial Enriched Progenitor Cells For The Treatment Of White Matter Stroke

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SUMMARY

UCLA researchers in the Department of Neurology and the Department of Molecular, Cell & Developmental Biology have developed novel therapies for cerebral ischemic injuries, including white matter stroke, using glial-enriched progenitor cells.

BACKGROUND

During the normal human aging process, the white matter regions of the brain suffer progressive damage related to both overt and clinically silent ischemia. The degree of white matter injuries closely correlates with abnormalities in cognition, balance, and gait, additionally carrying an increased risk of death. Progressive accumulation of cerebral white matter lesions is indicative of white matter stroke (WMS), which results in dementia over time or worsens symptoms when combined with Alzheimer's disease. Currently, there is no therapy available for WMS.

The neural elements damaged in WMS include oligodendrocytes, oligodendrocyte progenitor cells (OPCs), astrocytes and axons. Astrocytes promote OPC survival and differentiation into the myelinating oligodendrocytes. Astrocyte- or glial-restricted progenitor cells have been shown to mitigate to injuries and promote stabilization of injured axons and growth of new connections in spinal cord injury transplant therapies. However, routine production of astrocyte- or glial-restricted progenitor cells from fetal-derived neural precursors is not possible for use in treatment in WMS because of the large volumes of cells that would be required for human therapy. In addition, production of glial-restricted or glial-enriched progenitors from embryonic stem cells or induced pluripotent stem cells is time-consuming and extremely inefficient.

Therefore, there is a need to develop novel therapies for cerebral ischemic injuries, including WMS. Moreover, there is a need for production of glial-enriched progenitor cells for use in cellular treatment for conditions requiring myelin repair and/or remyelination, such as WMS.

INNOVATION

Researchers at UCLA have developed novel therapies for treatment of cerebral ischemic injuries, including white matter stroke, that involve the administration of induced pluripotent glial-enriched progenitor cells. This new approach is able to repair neuronal networks disrupted by ischemic stroke. Experiments have shown increased myelination within the damaged white matter and reduced measures of reactive astrocytosis and inflammation post treatment.

APPLICATIONS

- Cerebral ischemic injury therapy
- White matter stroke therapy
- Production of glial-enriched progenitor cells

ADVANTAGES

Provides a renewable and scalable source of glial-enriched progenitors for therapeutics and research

STATE OF DEVELOPMENT

Successfully tested *in vivo* in mouse models.

PATENT STATUS

Country	Type	Number	Dated	Case

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OTHER INFORMATION

KEYWORDS

Ischemic injury, white matter stroke, therapeutic, stem cell, pluripotent, glial-enriched progenitor cell, myelination, research tool

CATEGORIZED AS

- **Biotechnology**
  - Health
- **Medical**
  - Disease: Central Nervous System
  - Stem Cell
  - Therapeutics

RELATED CASES

2016-170-0

Japan	Issued Patent	7156943	10/11/2022	2016-170
Switzerland	Issued Patent	3355898	11/25/2020	2016-170
Germany	Issued Patent	3355898	11/25/2020	2016-170
France	Issued Patent	3355898	11/25/2020	2016-170
United Kingdom	Issued Patent	3355898	11/25/2020	2016-170
United States Of America	Published Application	20180271911	09/27/2018	2016-170

Additional Patent Pending

RELATED MATERIALS

- Xie, Y., Zhang, J., Lin, Y., Gaeta, X., Meng, X., Wisidagama, D.R., Cinkornpumin, J., Koehler, C.M., Malone, C.S., Teitell, M.A. and Lowry, W.E., 2014. Defining the role of oxygen tension in human neural progenitor fate. Stem Cell Reports, 3(5), pp.743-757.
- Llorente, I.L., Cinkornpumin, J., Lowry, W.E., Carmichael, S.T. 2014. Stem cell neural repair after white matter stroke. Neuroscience.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Increasing Brain Excitability For Recovery After Stroke

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