WINNER OF RESEARCH GRANT 2020 – 2021

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Molecular mechanism of Centella asiatica-enriched Exosomes in Mediating Neural Stem Cell activity in vitro: A fundamental understanding towards cell-free therapy for brain diseases.

- 1 November 2020 - 31 October 2023
- 3 years

Allocation

RM 185, 200

What the project aims to achieve?

This study investigates the therapeutic potential of exosomes originating from neural stem cells (NSCs) transdifferentiated from Centella asiatica (CA)-enriched amniotic fluid stem cells (AFSCs).

Why is it important?

- Presently, there is no cure for brain defects such as neurodegenerative diseases (NDs) and brain injury.
- One possible approach for the treatment of these diseases is through neuro-transplantation. Unfortunately, the low survival, migration, differentiation and integration efficiency of transplanted NSCs in the brain remains poor.
- Recent studies have suggested the possibility of exogenous NSCs to execute their therapeutic effects through secreting exosomes. These naturally occurring lipid-bound nano-vesicles protect, transport and deliver bioactive molecules from stem cells to target cells in the brain as they can pass through the blood-brain barrier.
- These exosomes could be the answer for treating neurodegenerative diseases and brain injury, particularly from high-quality exogenous NSCs, through treatment using exosomes delivering pharmaco-molecules for future cell-free or acellular therapy.
- Herbal extract such as CA, known for its antioxidant and neurogenic properties, could be utilised to stimulate the production of valuable therapeutic molecules from NSC-derived AFSCs as cargo in the exosomes.

How will it be done?

This study Involves *in vitro* study of the exosomes from CA-enriched AFSC-derived NSCs using a cell line established in-ho rat full-term amniotic fluid stem cell (R3).
We are interested in unravelling the valuable factors in the exosomes and understanding the mechanism by which the exosomes mediate their effect on endogenous rat brain-derived NSCs in culture conditions.

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Industrial Collaborator:
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The study is divided into three parts:
a) To isolate the exosome and identify the factors cont exosomes secreted from AFSC-derived NSCs treated wi
b) To assess how these exosomes promote proliferatio (neurospheres) at cellular and molecular levels.
c) To determine how these exosomes affect the differe NSCs at cellular and molecular levels.

Expected output?

- Novel therapeutic cell-free therapy approach in treating brain defects. Fundamental knowledge for the generation of high quality exogenous neural stem cells where a continuous supply of cell sources for neuro-transplantation could be initiated. This study would have a high impact on the well-being of not only humankind but also of animals.
- Publications: Two research articles.
- PhD student: One.
- Intellectual Property (IP): One IP on generating CA-treated amniotic fluid stem cell-derived neural stem cell exosomes.