PGM Book Prize

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Siti Sarah was born on 12th April 1998 in Petaling Jaya, Selangor. She received her early education in Selangor and continued her secondary education in an all-girls boarding school in Negeri Sembilan. Siti Sarah has recently graduated from Universiti Putra Malaysia in Biomedical Science with a CGPA of 3.82. She has been very passionate about genetics and molecular biology since her foundation studies at Universiti of Malaya and it developed even further during her undergraduate years, especially after her attachment at UKM Molecular Biology Institute (UMBI) for her industrial training where she was involved in a project related to cancer genetic. And for her final year project, she was attached with AP. Dr. Norshariza to incorporate her interest in genetics to study characterizing the rat full-term amniotic fluid stem cells. On the same topic, she was the first runner-up for poster competition in the 11th Malaysian e-Symposium of Biomedical Science 2021 (11th MYSYMBIOS) organized by the International Medical University (IMU) Society of Biomedical Sciences. Currently, she is enrolling for PhD study majoring in Neuroscience which also involving genetics and molecular biology, neuroscience, stem cells and regenerative medicine.

**The PGM Book Prize is awarded to final year university students who have accomplished outstanding final year project in the field of genetics. The award, which carries a gift voucher worth RM500, is established to bring increasing recognition of the scholarly interests and to promote the culture of research among students. Universities will be invited to submit their nominations for the winners of the prize. At present, 10 students have been awarded the book prize from various universities since its establishment in 2011.*

ABSTRACT

Generation and characterization of Amniotic Fluid Stem Cells (AFSCs) line-derived Neural Stem Cells (NSCs)

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Introduction: Neural stem cell (NSC) serves as a high prospective cell for neuro-transplantation as one of the treatments for neurodegenerative diseases (NDs). The inaccessibility of the brain-sourced NSCs limits its application and leads to the idea of generating NSCs from non-brain sources. Amniotic fluid stem cells (AFSCs) are neurogenic and a potential non-brain source of NSCs. Due to its accessibility and therapeutic potential, the isolation of AFSCs from full-term gestation has garnered a lot of attention, including as a potential non-brain source for NSCs. Objective: Our study aims to evaluate the proof of concept on the potential of full-term rat amniotic fluid stem cell line (R3) to generate NSCs and the ability of the R3-derived NSCs to form neurospheres and differentiate into neurons. **Methodology**: R3 was cultured in a medium containing GMEM supplemented with 10% fetal bovine serum (FBS), other essential supplements and 20 ng/ml leukemia inhibitory factor (LIF) before transdifferentiation into NSCs through monolayer differentiation (MD) assay in NSC culture medium for two days. Optimization on the NSC induction media was performed at this stage using two different NSC induction media (with serum and without serum). The generation of NSCs was then confirmed by immunocytochemistry (ICC) analysis on the expression of NSC protein markers (Nestin, Sox2). R3-derived NSCs were further tested on their ability to form multicellular aggregates, neurospheres, by plating NSCs in low attachment plates in NSC medium for 3 days. The diameter and the ability of the neurospheres to form neurons were examined using the Cell Sens Standard computer software and immunocytochemistry (ICC) for neuronal markers expression (Tuj1, MAP2), respectively. **Results**: NSC induction medium with serum provides optimum condition to promote transdifferentiation of R3. R3 has successfully transdifferentiated into NSCs and expressed Nestin, one of the NSC markers. Unfortunately, due to technical error, Sox2 expression could not be detected. The R3-derived NSCs successfully formed neurospheres and further differentiated into neurons expressing the neuronal markers -Tuj-1 and MAP2 by ICC analysis. **Discussion**: The addition of serum in the NSC induction medium provides crucial factors to promote the regulation and maintenance of neural lineage stem cells as marked by the expression of Nestin marker. Generation of neurosphere with the appropriate size is crucial for an adequate supply of nutrients and metabolites for viability and differentiation into neural cells. The expression of post-mitotic (Tuj-1) and mature neuron (MAP2) markers reveal the ability of R3-derived NSCs to form neurons. **Conclusion**: Findings of this study signify the ability of stem cells from the amniotic fluid at full gestation as a potential non-brain source of NSCs, which could prospectively be useful for the treatment of NDs.