UNIVERSITI SAINS MALAYSIA
GERAN PENYELIDIKAN UNIVERSITI PENYELIDIKAN
LAPORAN AKHIR

EOIGENETIC REMODELING OF MESENCHYMAL STEM CELL (MSC), BY TARGETING SPECIFIC MICRORNAS TO INDUCE LONG TERM NEUROGENESIS: AN IN VITRO ANALYSIS OF MSC PLASTICITY

PENYELIDIK

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Fasa 2/2010.

BORANG FRGS – P3(R)

F0550

Kod Projek :	FRGS/FASA1-2009/(BIDANG)/(NAMA IPT)/(NO.RUJ. KPT)

FINAL REPORT
FUNDAMENTAL RESEARCH GRANT SCHEME (FRGS)

Laporan Akhir Skim Geran Penyelidikan Asas (FRGS) IPT
Pindaan 1/2009

A

RESEARCH TITLE : Epigenetic Remodeling of Mesenchymal Stem Cell (MSC), by Targeting Specific microRNAs to Induce Long Term Neurogenesis: An In Vitro Analysis of MSC Plasticity
Tajuk Penyelidikan

PROJECT LEADER : Prof Dr Hasnan Bin Jaafar
Ketua Projek

PROJECT MEMBERS (including GRA) : 1. Prof Dr Jafri Malin Bin Abdullah
2. Dr Soumya Pati
Ahli Projek

PROJECT ACHIEVEMENT *(Pencapaian Projek)*

B

ACHIEVEMENT PERCENTAGE			
Project progress according to milestones achieved up to this period	**0 - 50%**	**51 - 75%**	**76 - 100%**
Percentage			100%

RESEARCH FINDINGS		
Number of articles/ manuscripts/ books	**Indexed Journal**	***Non-Indexed Journal***
	1	-
Paper presentations	**International**	***National***
	-	2
Others (Please specify)		

HUMAN CAPITAL DEVELOPMENT

Human Capital	Number		Others (Please specify):
	On-going	Graduated	
PhD Student			
Masters Student	1	1	
Undergraduate Students			
Temporary Research Officer			
Temporary Research Assistant			
Total	2		

EXPENDITURE (Perbelanjaan)

C

ADDITIONAL RESEARCH ACTIVITIES THAT CONTRIBUTE TOWARDS DEVELOPING SOFT AND HARD SKILLS (Aktiviti Penyelidikan Sampingan yang menyumbang kepada pembangunan kemahiran insaniah)

D

International		
Activity	Date (Month, Year)	Organizer
(e.g : Course/ Seminar/ Symposium/ Conference/ Workshop/ Site Visit)	-	-
National		
Activity	Date (Month, Year)	Organizer
17th National Conference of Medical and Health Sciences	May, 2012	School of Dental Sciences, Universiti Sains Malaysia.

PROBLEMS / CONSTRAINTS IF ANY (Masalah/ Kekangan sekiranya ada)

E The main problem of this research is the delay in obtaining the reagents for the experiments. Most of the reagents are custom-made and need to be ordered from oversea.

RECOMMENDATION (Cadangan Penambahbaikan)

F Nil

RESEARCH ABSTRACT – Not More Than 200 Words *Abstrak Penyelidikan – tidak melebihi 200 patah perkataan*

G

Recently, there has been an increasing interest in MSCs plasticity and their potential to transdifferentiate into neural lineages. To have an in-depth understanding of optimal transdifferentiation and its microenvironment, we have transdifferentiated MSCs in different combinatorial treatment of growth factors. Based on previous studies about the roles of IGF-1 in the laboratory, we hypothesized that IGF-1 can provide an optimal microenvironment for long-term maintenance and efficient neural induction. Here, we also analysed the roles of differential microRNAs in the transdifferentiation of MSC into neural lineage in the presence of IGF-1. Neuronal induction was carried under four different micorenvironments: (A) EGF/bFGF, (B) EGF/bFGF/IGF, (C) EGF/bFGF/LIF, (D) EGF/bFGF/BDNF and (E) without growth factor as negative control. Neurospheres formed were characterized by immunofluorescence staining against nestin and the expression was measured by flow cytometry. The cell proliferation and apoptosis was also studied by MTS and Annexin V assay respectively at three different time intervals (24 hours, Day 3 and Day 5). All groups showed significant higher in nestin expression as compared to negative control group. Interestingly, IGF-1 treated group shows better enhancement in cell proliferation and cell survival efficiency. To delineate the exact miRNA signatures in IGF-1 treated sample, we performed miRNAs profiling and analyzed using Genespring software. Among the 21 miRNAs differentially expressed, let-7b, miR-181a, and miR-26a were found to be specially espressed in IGF-1 treated group. All of them are involved in apoptosis suppression, improve cell proliferation and promote neuronal differentiation. Our results demonstrate that IGF-1 enhanced cell proliferation and suppressed cell death by triggering the expression of specific miRNAs. This information will be beneficial for improving both cell-based and cell-free therapy of neurodegenerative diseases in the long run.