



**BORANG 3.1**  
**LAPORAN AKHIR PENYELIDIKAN**  
**PUSAT PENYELIDIKAN & INOVASI**  
**UNIVERSITI MALAYSIA SABAH**



**Panduan:**

- Borang Laporan Akhir yang lengkap diisi beserta dengan lampiran sinopsis, penyata kewangan yang terperinci dan senarai penerbitan hasil penyelidikan hendaklah dikemukakan.
- Sila sertakan hasil lengkap penyelidikan menggunakan kertas berukuran A4 yang berjilid dengan kulit keras (mengikut warna gugusan) dalam 3 **SALINAN** (PPI, Perpustakaan dan Agensi Pembiayaan).
- Sila sertakan salinan kertas kerja dan penerbitan yang berkaitan sekiranya ada.

**1. MAKLUMAT PENYELIDIK**

A. KETUA PENYELIDIK	Prof. Dr Perumal Ramasamy
B. PENYELIDIK LAIN	Prof Zahurin Mohd, UMS A/P Charles Vairappan, UMS
C. SEK/PUSAT/INS/UNIT	Perubatan, UMS

**2. PROJEK PENYELIDIKAN**

A. TAJUK PROJEK	Gene Expression in Learning & Memory										
B. KOD PROJEK	02-01-10-SF0068										
C. TARIKH DILULUSKAN	2007										
D. TARIKH DIMULAKAN	2008										
E. TARIKH TAMAT	2010										
F. TAMBAHAN MASA	Tempoh Masa : 3 Bulan Tarikh Lulus tambahan masa :										
G. PERUNTUKAN	Asal :RM 270, 000 Tambahan :RM 270, 000										
H. TELAH BELANJA											
VOT	V11000	V14000	V21000	V220000	V23000	V24000	V26000	V27000	V28000	V29000	V35000
PERUNTUKAN DILULUSKAN	36,000	-	11,000			10,000	175,000	-	10,000	20,000	8,000
BAKI SEMASA	13,000	-	10,630			10,000	89,463	-	10,000	20,000	4,706
JUMLAH DILULUSKAN											
BAKI TERKINI	13,000	-	10,360			10,000	89,463	-	10,000	20,000	4,706
I. BAKI											



## **Part 1: Protein expression during spatial learning in the Morris water maze in mice**

### **Abstract**

Learning and memory are two important physiological and biochemical processes that enable a living organism to adapt to the challenging environment. During learning there are changes in behaviour relative to experience and consequently leading to changes in memory. The mechanism of learning and memory involves synaptic plasticity and long-term potentiation. These processes involve changes in the protein chemistry in different parts of brain. And are believed to be dependent on synthesis of new protein which is the basis of memory. Memory as a whole cellular protein synthetic mechanism which is consolidation in the hippocampus. Memory formation occurs via a number of signalling pathways associated with the activation of many synaptic plasticity-related proteins in the brain, such as N-Methyl-D-aspartic acid receptor,  $Ca^{2+}$ / calmodulin dependent protein kinase II (CaMKII), mitogen-activated protein kinases (MAPKs),... The hippocampus is a part of brain that plays an important role in spatial cognition and memory. This study is to investigate the role of the hippocampus in the formation of the spatial learning and memory in the Morris water maze in mice as an experimental animal. The mice were sacrificed by cervical dislocation and total protein in the hippocampus was extracted. During this study the protein expression involved in the learning process, comparison and identification of expressed protein levels in the brain region of control and trained mice were done. The protein expressed was estimated by using the two-dimensional gel-electrophoresis based on separation of the various protein according to their isoelectric points and molecular weight. 26 spots were identified with 1.2 Fold increased with a significant  $P < 0.05$ . the protein expressed were estimated twice and there was a significant increase in the level of ( $P < 0.05$ ). These spots were analysed by using LC/MS Mass Spectrometry. Based on LC/MS Mass Spectrometry the proteins involved in learning were categorised in to neurogenesis (Cytoskeletal), carbohydrate metabolism, signal transduction and transport, such as:  $\alpha$ -internexin, fructose-bisphosphate, dihydropyrimidinase-related protein 2, voltage-dependent anion channel.. In summary, by using a proteomics approach, this study explained that training affect a difference network of proteins pertaining to energy metabolism and synaptic plasticity in the hippocampus, a brain region central to cognitive function. Further study can help to identify the spatial protein and path way of learning and memory mechanism.

