Postnatal Development of the Hippocampus in Male Albino Rats: A Histomorphometric Study

Thesis
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List of Abbreviations

1ry	:	Primary
2ry	:	Secondary
3ry	:	Tertiary
A	:	Alveus
ABR	:	Avidin Biotin Reagent
ADHD	:	Attention Deficit Hyperactivity Disorder
BDNF	:	Brain-Derived Neurotrophic Factor
CA	:	Cornu Ammonis
CARE	:	Committee of Animal Research Ethics
CH	:	Cortical Hem
CNS	:	Central Nervous System
D	:	Dorsal
DAB	:	Di AminoBenzidine
DG	:	Dentate Gyrus
DNE	:	Dentate NeuroEpithelium
EC	:	Entorhinal Cortex
ERK	:	Extracellular signal-Regulated Kinase
F	:	Fimbria
GABA	:	Gamma-AminoButyric Acid
GD	:	Gestational Day
GFAP	:	Glial Fibrillary Acid Protein

GL : Granule cell Layer

H : Hilus

HNE : Hippocampal NeuroEpithelium

HPF : High Power Field

HP : Hippocampus Proper

HPA : Hypothalamic Pituitary adrenal Axis

Hx &E : Hematoxlyin and Eeosin

IGF-1 : Insulin-like Growth Factor-1

List of Abbreviations (Cont.)

L : Lateral

LL : Lower Limb

LV : Lateral ventricle

M : Medial

mGluR5 : Metabotropic Glutamate Receptor

ML : Molecular Layer

MRC : Medical Research Center

MRI : Magnetic Resonance Imaging

NADPH : Nicotinamide Adenine Dinucleotide Phosphate

NGS : Normal Goat Serum

NPCs : NeuroProgenitor Cells

OL : Polymorphic Layer

PBS : Phosphate Buffered Saline

PL : Pyramidal Layer

PND : Post Natal Day

PTSD : Post-Traumatic Stress Disorder

RES : Reticulo Endothelial System

ROS : Reactive Oxygen Species

S : Subiculum

SD : Standard Deviation

SGZ : Sub Granular Zone

SHRP : Stress Hypo Responsive Period

SLS : Sever Life Stress

SPSS : Statistical Package for the Social Sciences

SVZ : Sub Ventricular Zone

TLE : Temporal Lobe Epilepsy

UL : Upper Limb

V : Ventral

VEGF : Vascular Endothelial Growth Factor

VZ : Ventricular Zone

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Introduction

The hippocampus has an important role in the process of learning and memory. It also functions as a part of the limbic system in the regulation of sexual and emotional behaviors. Damage to hippocampus leads to memory loss. So, it is difficult to imagine life without intimate memories with family and close friends (**Moser et al., 2014).**

The hippocampus is generally assumed to play a key role in the consolidation of memory i.e., the integration of relevant new information and its transfer from short-term to long-term memory especially spatial memory and learning (**Markovitch, 2000**).

Many diseases of the central nervous system accompanied by neuron damage of the hippocampus. Neurodegenerative diseases such as Alzheimer's disease, Schizophrenia and Parkinson's disease are examples of neuronal damage in the hippocampus (**Lee et al., 2013**).

The hippocampus is a curved elevation of grey matter that extends throughout the entire length of the floor of the inferior horn of the lateral ventricle. Its anterior end is expanded to form the pes hippocampus. It is named hippocampus because it resembles a sea horse in coronal section (**Snell, 2010).**

The hippocampal formation is composed of the hippocampus proper, the dentate gyrus and the subiculum. The hippocampus proper is the largest part and is subdivided into fields designated as Cornu Ammonis (CA) or Ammon's horn from CA1 to CA4. Ammon's horn is continuous with the subiculum, which acts as the main output source of the hippocampal formation. The subiculum connects with the parahippocampal gyrus, a region of the cerebral cortex that surrounds the hippocampus. The parahippocampal gyrus is involved in memory storage and recall (**El Falougy et al., 2008).**

The hippocampus proper is a three-layered archicortex formed of; polymorphic (OL), pyramidal (PL), and molecular (ML) layers. The dentate gyrus is also a three -layered archicortex formed of; molecular (ML), granule cell (GL) and polymorphic layers (OL) **(Abdelrahim and Eltony, 2011**).

In most regions of the brain, neurons are generated at specific periods of early development, and not born in adulthood. In contrast, hippocampal neurons are generated throughout development and adult life (**Kier et al., 1997; Insausti et al., 2010).**

The hippocampal dentate gyrus was reported to be one of the few regions of the mammalian brain where neurogenesis continue to occur throughout adulthood. The neurogenesis in the dentate gyrus was thought to play an important role in hippocampus-dependent learning and memory (**Gao et al., 2007; Li et al., 2008)**