

## TABLE OF CONTENTS

COVER .....	i
RATIFICATION PAGE .....	ii
ASSERTION.....	iii
ACKNOWLEDGEMENT .....	iv
TABLE OF CONTENTS .....	vi
LIST OF FIGURES .....	viii
LIST OF APPENDICES .....	ix
ABSTRACT.....	x
CHAPTER I .....	1
I.1. Background.....	1
I.2. Problem Formulation .....	4
I.3. Research Aim.....	5
I.3.1. General Aim.....	5
I.3.2. Specific Aim .....	5
I.4. Research Authenticity .....	5
I.5. Research Benefit .....	7
I.5.1. Theoretical Benefit .....	7
I.5.2. Clinical Benefit .....	7
CHAPTER II.....	8
II.1. Literature Review .....	8
II.1.1 Hippocampus in Rat .....	8
II.1.2 Ischemic reperfusion .....	10
II.1.3 Bilateral Carotid Communis Occlusion .....	14
II.1.4 Bilateral Carotid Communis Occlusion and Inflammation .....	15
II.1.5 Vitamin D .....	18
II.1.6 Vitamin D Effects on Inflammation .....	19
II.2. Theoretical Framework .....	22
II.3. Conceptual Framework .....	23
II.4. Hypothesis .....	23
CHAPTER III .....	24
III.1. Research Design.....	24
III.2. Time and Place .....	24

III.3. Experimental Subjects.....	24
III.4. Tools and Materials.....	26
III.3.1. Materials.....	26
III.3.2. Tools.....	27
III.5. Procedure .....	28
III.5.1. Preparation of the rats .....	28
III.5.2. Transient global cerebral ischemia injury model .....	28
III.5.3. Vitamin D supplementation .....	29
III.5.4. Termination and tissue extraction .....	30
III.5.5. RNA extraction .....	31
III.5.6. Complementary DNA (cDNA) synthesis.....	31
III.5.7. Reverse transcriptase polymerase chain reaction.....	32
III.5.8. Electrophoresis.....	33
III.6. Variables .....	33
III.6.1. Independent variable .....	33
III.6.2. Dependent variables .....	34
III.6.3. Control variables .....	34
III.7. Variable Operational Definition.....	34
III.7.1. Transient global cerebral ischemia.....	34
III.7.2 Vitamin D supplementation .....	34
III.7.3. Expression of <i>IL-1<math>\beta</math></i> and <i>TNF-<math>\alpha</math></i> mRNA.....	35
III.8. Data Analysis .....	35
CHAPTER IV .....	36
IV.1. Experiment Result.....	36
IV.1.1. BCCAO model.....	36
IV.1.2. mRNA <i>IL-1<math>\beta</math></i> expression measurement.....	36
IV.1.3. mRNA <i>TNF-<math>\alpha</math></i> expression measurement.....	38
IV.2. Discussion.....	39
CHAPTER V.....	43
V.1. Conclusion.....	43
V.2. Recommendation.....	43
REFERENCES.....	45
APPENDICES .....	54

## LIST OF FIGURES

Figure 1. The rat hippocampus.....	8
Figure 2. Arterial blood supply for the rat Hippocampus .....	9
Figure 3. Rat brain vasculature showing rat carotid artery .....	15
Figure 4. Potential mechanism of ROS production.....	16
Figure 5. Microglia mediated oxidative stress .....	17
Figure 6. Microglial reaction to inflammation .....	17
Figure 7. Mechanism of how vitamin D regulates macrophage-mediated innate immune responses (Aranow, 2011) .....	20
Figure 8. Theoretical framework.....	22
Figure 9. Conceptual framework.....	23
Figure 10. <i>IL-1<math>\beta</math></i> mRNA expression in rats' model of transient global ischemic stroke. ....	37
Figure 11. <i>TNF-<math>\alpha</math></i> mRNA expression in rats' model of transient global ischemic stroke. ....	38

## LIST OF APPENDICES

Appendix I. Ethical Clearance .....	54
Appendix II. Statistical Analysis of <i>IL-1<math>\beta</math></i> mRNA expression .....	55
Appendix III. Statistical Analysis of <i>TNF-<math>\alpha</math></i> mRNA expression.....	57