

AQUAPORINS: GATEKEEPERS OF OEDEMA IN TRAUMATIC BRAIN INJURY

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DECLARATION

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2014

DEDICATION

"How much truth can a spirit endure; how much truth can it dare? This became for me more and more the actual test of value. Error (the belief in the ideal) is not blindness; error is cowardice. Every conquest, every step forward in knowledge is the outcome of courage, of hardness towards one's self; of cleanliness towards one's self." - Ecce Homo, Preface, Friedrich Nietzsche

This thesis is dedicated in memory of Lesley Gillian and John Rex Kimber who instilled in me the significance and value of study. For without them I would not have come this far.

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From my earliest recollection I was blessed by Lesley and John by their imparting to me the true value of knowledge. Thus my decision to undertake a PhD was not one of if, but rather when. Indeed Plato's infamous Allegory of the Cave has remained a key part of my own ideology and in many respects has mirrored the early challenges I have so far faced throughout my life with an undying desire to seek the light.

There is also unquestionably a deep sense of sadness in closing this part of my studies, for not only am I taking a step away from a place of self-growth but so too the presence of those who have inspired me. My mentor and principle supervisor Prof. Robert Vink has not only guided me throughout my candidature academically, but so too has continually inspired within me my thirst for learning by his vast research experience and unique teaching approach, epitomising the ideal of evolving academia. There is yet so much I could and dearly wish to learn from him in all aspects of my life and so I only hope that I am fortunate enough to one day be in a position to continue my tuition. Thank you Bob, you will always remain to me a pillar of insight.

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I would also like to thank the various members of the Vink laboratory who have either assisted in experimental protocol or provided valued feedback on my work throughout my candidature. Indeed arguably the special maxim of the Vink team is one of comradely and so should be cherished as an example for other research groups to follow.

ABBREVIATIONS

ADC	Apparent diffusion coefficient
AMDA	A-amino-3-hydroxy-5-methyl-4-isoxazolpropionate
AQP	Aquaporin
ATP	Adenosine-5'-triphosphate
BBB	Blood-brain-barrier
CBF	Cerebral blood flow
CNS	Central nervous system
CPP	Cerebral perfusion pressure
CSF	Cerebrospinal fluid
DAI	Diffuse axonal injury
EAA	Excitatory amino acid
ECF	Extracellular fluid
HIF-1 α	Hypoxia-inducible factor 1-alpha
ICP	Intracranial pressure
ISF	Interstitial fluid
Kir4.1	Inward-rectifying potassium channel
MAP	Mean arterial pressure
MMP	Matrix metalloproteinases
MRI	Magnetic resonance imaging
Na ⁺ /K ⁺ -ATPase	Sodium-potassium adenosine triphosphatase pump
NMDA	N-methyl-D-aspartate
OAP	Orthogonal array of particles
PET	Positron emission tomography
TBI	Traumatic brain injury
TNF- α	Tumour necrosis factor alpha
VEGF	Vascular endothelial cell growth factor

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