



## In Memory of **John F. MacDonald, PhD, FRSC**

John Ferguson MacDonald was the quintessential Canadian scientist. A visionary and an insightful researcher who transformed the field of neuroscience, John was a man whose humility, generosity, and deeply rooted respect for all transcended his outstanding scientific achievements. John died April 22, 2014.

John was born in Vancouver, British Columbia where he spent most of his formative years. He received his undergraduate education at the University of British Columbia and completed a PhD degree in the University's Department of Physiology in 1975 under the supervision of Tony Pearson. After a postdoctoral stint with Glen Cottrell at the University of St. Andrews, John moved to the laboratory of Kris Krnjevic at McGill University. He also trained in the neurophysiology laboratory of Jeff Barker at the National Institute of Neurological and Communicative Disorders and Stroke (now the National Institute of Neurological Disorders and Stroke) in Bethesda, Maryland. John was recruited back to Canada in 1979 when he opened his own lab in what was then the Playfair Neuroscience Unit at the Toronto Western Hospital. John took up his first appointment at the University of Toronto, as an Assistant Professor in the Department of Pharmacology. He was promoted to Full Professor in 1991 in the Departments of Pharmacology and of Physiology. He successfully served as the Chair of the Department of Physiology from 2001-2008. Having shown not only outstanding scientific acumen but also great skill in administering academics, which is no mean feat, John was coaxed to London, Ontario to take the leadership of the Robarts Research Institute where he remained until retiring in 2013.

During his postdoctoral work, John developed a deep interest in chemical neurotransmitters in the brain. When he formed his own lab, he decided to focus his studies on the actions of excitatory amino acids such as glutamate, a decision that proved to be a turning point in cellular neuroscience. Although with his typical humility John often quipped that he made the decision to study excitatory amino acids because 'no one else was doing this', the move was nonetheless prescient as John discovered the voltage-dependence of a specific class of receptors in the mammalian central nervous system. These receptors (eventually termed NMDA receptors) were later found to be blocked by magnesium in a voltage-dependent manner, and required for long-term synaptic modifications thought to underlie some forms of learning. By virtue of their voltage-dependence, NMDA receptors act as molecular coincidence detectors, a characteristic

which, as depicted in virtually every textbook of neuroscience, allows a neuron to ‘learn’ to associate its firing activity with incoming synaptic signals.

Over the ensuing decades, John made many additional important contributions in the broad field of ion channels where he focused on their regulation by cell signaling pathways. He discovered the regulation of glutamate receptors by phosphorylation and postsynaptic scaffolding proteins. John also made major contributions that included the identification of nonselective cation channels in neuronal injury and the regulation of dopamine receptors by growth factor receptors. John published more than 200 scientific articles, many in top-tier journals, including *Science*, *Nature*, and *Cell*. His work was consistently supported by grants from the Canadian Institutes of Health Research, the Heart and Stroke Foundation of Canada, and the Natural Sciences and Engineering Research Council of Canada. His research contributions were recognized by his election to the Royal Society of Canada and to the Canadian Academy of Health Sciences. John’s research has broad implications for understanding the cellular basis of stroke, pain, and neuronal injury. He was a co-founding member of NoNO Inc, a biotechnology company that is developing new therapies for stroke and pain. His contributions to the field of neuroscience have been extraordinary.

In addition to his scientific achievements, John has mentored a generation of neuroscientists. More than 50 postdoctoral fellows and graduate students who trained with him are now working in various laboratories around the world. Through John, these trainees learned sound scientific principles, openness to new theories, experimental rigour, and the importance of collegial collaboration. His open-mindedness also provided fertile ground for highly productive collaborations with clinician-scientists. John empowered all his collaborators, as well as his trainees, to see beyond the ordinary and to boldly challenge dogma and the status quo. Through his discoveries, his collaborators and his trainees John’s stellar scientific impact will endure long into the future.

Even more important than his science was his family – John was an outstanding husband and father. He and Lidia had a relationship of love, respect and humour which was the envy of all who know them. He loved his daughter Kathy and son Jamie, unconditionally. He was extremely proud of Kathy’s exceptional talent as an animator and her deep love for her family. His son Jamie was also his pride and joy; he is a talented musician, extremely successful MBA graduate and a profoundly loving son.

John MacDonald was an outstanding scientist and colleague, a loving husband and father, and a dear friend. His passion for life, his warmth, his dry wit and his charm are greatly missed.

*Written by: Mike Salter, Beveley Orser, Steve Matthews, and Lu-Yang Wang*