



**UNIVERSITY OF
CALGARY**

NATURAL PRODUCT EXTRACTS TO PROTECT NEURONS

Research by Dr. Aldo Bruccoleri and Dr. V. Wee Yong

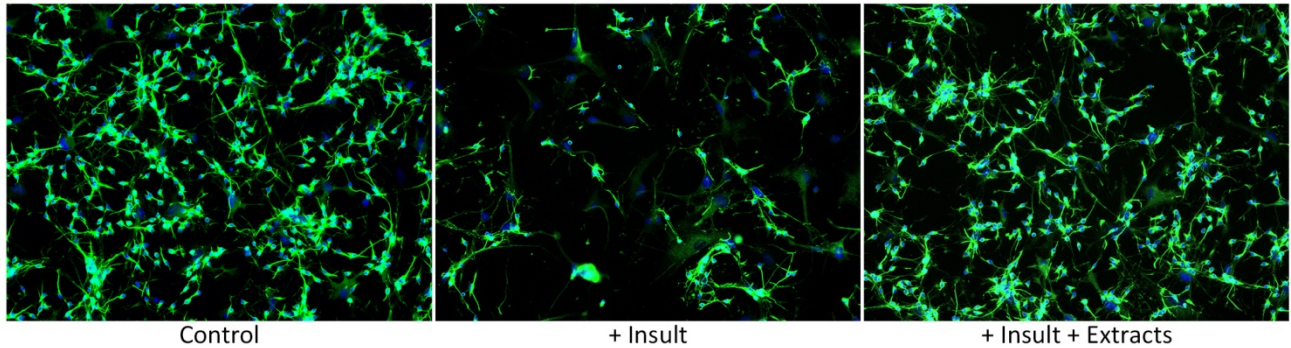
Executive Summary

Neurons, our brain's nerve cells, die from a variety of injuries. These injuries include stroke, spinal cord injury, concussions and multiple sclerosis. Neurons also die with the aging process and are lost prematurely in dementias such as Alzheimer's disease. A significant loss of neurons leads to permanent deficits of mobility and cognitive functions. Means to protect neurons following such neurological insults may ameliorate subsequent disability. Furthermore, the availability of potentially protective natural products consumed habitually to promote healthy brain aging may reduce the occurrence of strokes or protect against the development of Alzheimer's disease. Our goal is to further develop our unique capacity to extract products reproducibly from specific plants by using supramolecular antioxidant polymer nanotechnology. The resulting plant-derived products have demonstrated the capacity to bind free radical species and neutralize them. Importantly, all plant-derived extracts prevent injury to neurons inflicted by several toxic insults. Some of these extracts also reduce the growth of cancer cells in culture, and some have stimulatory activity on immune cells that may render them useful to harness the properties of a properly-directed immune response for health and recovery from injury.

A New Class of Neuroprotective Factors

A long-term interest in research on natural products has led Dr. Aldo Bruccoleri, a chemist and Adjunct Professor at Burman University, to collaborate with Dr. V. Wee Yong of the Cumming School of Medicine, University of Calgary. Dr. Yong's laboratory uses a range of brain and immune cells to guide its research into better treatments for neurological insults. The ongoing collaboration has uncovered several plant-derived natural extracts ("Aldonts") that potently neutralize the toxic damage to human neurons inflicted by several insults that include ferrous ion (relevant to multiple sclerosis, stroke and traumatic brain and spinal cord injury), amyloid-beta (relevant to Alzheimer's disease and aging), rotenone (relevant to Parkinson's disease) and thapsigargin (which increases cellular calcium content that causes death to neurons relevant to most neurological injuries). These results invite the promise of new treatments based on natural product extracts to counter the toxic environment in the brain following neural injury; they suggest also that the protective extracts may be used as a lifestyle choice to confer healthy brain aging or to reduce the undesirable consequences of future insults to the brain such as in concussion, stroke or dementias.

Protection of human neurons by natural product extracts



Neurons were identified by immunofluorescence for microtubule associated protein-2 (green). Following ferrous sulfate insult, neurons die in large numbers. The loss of neurons is prevented by extracts from specific plants prepared in a unique way.

Neuroprotective Factors with anti-cancer properties

The immune system is inactivated in cancers and immune cells are therefore unable to eradicate tumor cells. Some of the plant-derived extracts with neuroprotective actions have been found to stimulate T cells and macrophages and thus they may have the capacity to rejuvenate the compromised immune system in cancers. Moreover, at least one of the extracts has the capacity to directly prevent the growth of brain tumor stem cells. Further research into these plant-derived extracts may lead to new direction for treating certain cancers.

Please direct scientific inquiries to Dr. V. Wee Yong (vyong@ucalgary.ca) or Dr. Aldo Bruccoleri (bruccole@ucalgary.ca).

Dr. Yong's research can be found in <http://www.vweeyong.com/> or <http://www.ucalgary.ca/~vyong/>

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