

Title of Project: Tropical rainforest plants as a source of anti-inflammatory compounds for the treatment of Alzheimer's disease

(FOR Code/s): 1104

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Location of Project: Campbelltown

Project Background

In Alzheimer's disease, one of the major causes of neuronal degeneration is chronic inflammation of the brain. Chronic inflammation causes the production of oxygen free radicals ("oxidative stress"), which damage lipids, proteins and DNA, and thus cause cell death. Terrestrial plants have evolved sophisticated antioxidant defences against oxidative stress including radicals produced by exposure to UV light. One strategy they use is the production of small anti-oxidant compounds such as polyphenols that have been shown to possess antioxidant, anti-inflammatory and neuroprotective properties. Having evolved in tropical latitudes, where exposure to high UV intensities are part of the normal environment, tropical rainforest plants are expected to have also developed efficient defences against the potential damage of long-term solar irradiation and photo-oxidative stress. The identification of such compounds in collaboration with a leading biotechnology company in North Queensland in a variety of high throughput assays will be the major part of this honours project.

Aim of Study:

- 1) To determine the potency of a variety of extracts from tropical rainforest plants to down-regulate the LPS, IFN- γ - induced production of free radicals (superoxide and nitric oxide) and pro-inflammatory cytokines (IL-6 and TNF) in immortalized murine microglia (anti-inflammatory potential).
- 2) To fractionate potent extracts and ultimately isolate the active compound, and determine its / their chemical structure (s) using modern analytical and spectrometric methods

Methods:

Cell culture, ELISA, Natural products extraction, Chromatography, Gas chromatography / Mass spectrometry (GC or HPLC/MS), NMR

Ethics Application Requirements:

N/A

Key References:

Gunawardena D, Shanmugam K, Low M, Bennett L, Govindaraghavan S, Head R, Ooi L, Münch G. Determination of anti-inflammatory activities of standardised preparations of plant- and mushroom-based foods. *Eur J Nutr.* 2013 53(1):335-43

Steele ML, Truong J, Govindaraghavan S, Ooi L, Sucher NJ, Münch G. Cytoprotective properties of traditional Chinese medicinal herbal extracts in hydrogen peroxide challenged human U373 astroglia cells. *Neurochem Int.* 2013 Apr;62(5):522-9. doi: 10.1016/j.neuint.2012.08.018. Epub 2012 Sep 11.