2011 年臺灣國際科學展覽會

優勝作品專輯

國家：Singapore

編號：090019

作品名稱

The Interplay of Iron and α-synuclein in mediating Neuroinflammation in Parkinson's Disease

得獎獎項

二等獎

作者姓名

Tan Wei Quan Bryce

ABSTRACT

Neuroinflammation is implicated as a contributive factor to neurodegeneration in Parkinson's disease (PD). Increased iron accumulation and deposition of -synuclein within Lewy Bodies in PD brains have been observed. It has been hypothesized that unbound iron is able to react with H2O2 to generate free radicals. Using the Divalent Metal Transporter-1 (DMT1) as a vehicle to transport iron into the brain, a DMT1 transgenic mouse model (DTg) was generated to recapitulate iron deposition in PD. The DTg was crossbred with the SNCA (synuclein) transgenic mouse to produce a DMT1_SNCA (BTg) mouse model to study the link between iron, -synuclein and neuroinflammation in PD. Our hypothesis predicts that iron exacerbates -synuclein toxicity by inducing larger inflammatory responses and consequently compromising functions of biomolecules. Our study shows that –synuclein triggers a low-grade inflammatory response by microglia and astrocytes while iron exacerbates -synuclein toxicity by eliciting immunological responses mediated by glia cells in the brain observed both in the DTg and BTg mice. Elevated levels of nitrated proteins were observed in the DTg, suggesting the role of iron in inducing nitrosative stress via upregulation of iNOS in glia cells. With the BTg mice, we hope to understand the effect of iron accumulation as an environmental stressor in aggravating -synuclein toxicity which may lead to the selective demise of dopaminergic neurons.

評語

This study demonstrated the regulation of Fe^{+}ion in the brain by α-synuclein and its relationship to Neuroinflammation in Parkinson's disease using transgenic mons model. Although the concept is not completely novel in terms of α-synuclein, Fe^{+}ion and Parkinson disease, the results from in vivo study is quite impressive.