Links between adipose tissue expansion, insulin resistance and neuro-inflammation: Preventive effects of plant-derived molecules.

Project description

In obesity there is an accumulation of white adipose tissue which is the key site facilitating systemic inflammation and insulin resistance, contributing to increased circulating levels of pro-inflammatory cytokines such as TNF-α, IL-1β or IL-6, as well as feeding-related peptides such as leptin or resistin.

This low grade and chronic peripheral inflammation related to adipose tissue expansion can contribute to cognitive decline and dementia in later life. Peripheral cytokines can act on the brain to induce local production of cytokines. Cytokines such as IL-1β and IL-6 have been shown to disrupt neural circuits involved in cognition and memory. Persistent oxidative stress and neuro-inflammation are key factors in the development and maintenance of the progressive neurodegeneration process.

To protect neuronal cells against inflammation and ROS over production, a wide variety of plant-derived molecules have been suggested to prevent tissue damage because of their anti-inflammatory and antioxidant properties. Previous studies performed in our Laboratory at the University of Buckingham, have reported that medicinal plant extracts have an anti-inflammatory and insulin sensitizer effects in animal models of obesity-induced inflammation and insulin resistance, by reducing the plasma levels of the pro-inflammatory cytokines, increasing the levels of the anti-inflammatory cytokines, and improving insulin sensitivity. However this potential beneficial effect on nerve cells has not yet been investigated.

The main goals of the project are:

1) Investigate which adipose tissue depot (visceral or subcutaneous) is the most pro-inflammatory and might be involved in central inflammation and consequently in central insulin resistance.

2) Understand the mechanisms of the cross talk between adipose tissue and the central nerve system, and how obesity induced low grade inflammation could generate oxidative stress and inflammatory response in nerve cells and consequently the decline of cognitive functions.

3) Evaluate the neuro-protective properties of phytochemicals in terms of anti-inflammatory and antioxidant action by decreasing peripheral and/or central inflammation and oxidative stress and consequently preventing neurodegenerative diseases.

Entry Requirements

• It is expected that applicants will hold (or have completed by the start date) a Master’s degree in life Science or Biomedical Science with a passion for research and
drug discovery.
• First class or upper second class undergraduate degree or an equivalent overseas qualification with a high statistical content
• Standard English language entry requirements for the University of Buckingham
• Applicants with good knowledge of cell culture (primary and/or established cell lines), molecular biology (western blotting PCR, RT-PCR) and immuno-enzymatic methods (EIA, ELISA) are encouraged to apply.

If you have any general enquiries about the project please contact
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How to apply

Please send a CV, Covering letter (outlining your academic interests, prior research experience and reasons for wishing to undertake the project) by email
To: mohamed.zaibi@buckingham.ac.uk

Funding Notes
UK/EU applicants only.

The studentship is available for full-time registration and is payable as a full UK/EU tuition fee waiver for three years together with an annual tax-free stipend of £16,000.

The studentship will be awarded on the basis of merit for 3 years of full-time study to commence in September 2018.

References

