RESEARCH SCHOOL

# PhD Studentship in Biomedical Sciences – Nutritional Neurosciences

Closing date: Sunday 21st May 2017

Interview date: Week commencing 19th June 2017 (date TBC)

**Supervisory team**

***Director of Studies***:
Dr Allain Bueno Institute of Science and the Environment, University of Worcester

***Supervisors***:
Dr Steven Coles, Institute of Science and the Environment, University of Worcester
Dr Amy Cherry, Institute of Science and the Environment, University of Worcester

**The Project**

Alzheimer's disease (AD), other types of dementia and neurodegeneration are major health burdens in Western Europe [1]. Although ageing and genotype are important non-modifiable risk factors associated with AD, modifiable risk factors are now believed to play a significant role in the onset and progression of AD [2-5]. Redox signalling is relevant in key neural processes, such as energy metabolism, cell signalling and neurotransmission, and current evidence suggests disturbances in this system are related to AD pathogenesis [6].

Cell membrane phospholipid composition is related to key metabolic processes in healthy and diseased neural tissue [7-9], but the relationship between disturbances in the redox signalling system, lipid peroxidation and amyloidogenesis are yet to be fully elucidated. Furthermore, it has been observed that resveratrol can modulate the activity of the nuclear factor erythroid 2-related factor 2 (Nrf2), modulating redox signalling and oxidative stress levels [10, 11], but little information is available regarding the roles of resveratrol and Nrf2 activators in the pathogenesis of neurodegeneration.

The successful candidate will be part of the expanding Worcester Biomedical Research Group, which consists of experts within the fields of neurochemistry, cancer, immuno-oncology, protein structure and free radical biology. The student will employ chromatographic, mass spectrometric and molecular biology techniques to investigate biochemical pathways related to neurodegeneration in cultured cells. Collaboration with other researchers within the group and from other institutions will be expected, as well as assisting with seeking external sources of research funding.

**References**

[1] Jönsson et al. The cost of dementia in Europe: a review of the evidence, and methodological considerations. Pharmacoeconomics. 2009;27(5):391-403

[2] Pedditizi et al. The risk of overweight/obesity in mid-life and late life for the development of dementia: a systematic review and meta-analysis of longitudinal studies. Age Ageing. 2016 Jan;45(1):14-21.

[3] Yasuno et al. Low amyloid-β deposition correlates with high education in cognitively normal older adults: a pilot study. Int J Geriatr Psychiatry. 2015 Sep;30(9):919-26.

[4] Venigalla et al. Novel promising therapeutics against chronic neuroinflammation and neurodegeneration in Alzheimer's disease. Neurochem Int. 2016 May;95:63-74.

[5] Hashimoto et al. Neuroprotective and ameliorative actions of polyunsaturated fatty acids against neuronal diseases: beneficial effect of docosahexaenoic acid on cognitive decline in Alzheimer's disease. J Pharmacol Sci. 2011;116(2):150-62.

[6] Higgins et al. Oxidative stress: emerging mitochondrial and cellular themes and variations in neuronal injury. J Alzheimers Dis. 2010;20 Suppl 2:S453-73.

[7] Guan et al, Decrease and structural modifications of phosphatidylethanolamine plasmalogen in the brain with Alzheimer disease. J Neuropathol Exp Neurol. 1999 Jul;58(7):740-7.

[8] Conquer et al. Fatty acid analysis of blood plasma of patients with Alzheimer's disease, other types of dementia, and cognitive impairment. Lipids. 2000 Dec;35(12):1305-12.

[9] Fraser et al. Fatty acid composition of frontal, temporal and parietal neocortex in the normal human brain and in Alzheimer's disease. Neurochem Res. 2010 Mar;35(3):503-13.

[10] Shen et al. Resveratrol pretreatment attenuates injury and promotes proliferation of neural stem cells following oxygen-glucose deprivation/reoxygenation by upregulating the expression of Nrf2, HO-1 and NQO1 in vitro. Mol Med Rep. 2016 Oct;14(4):3646-54. doi: 10.3892/mmr.2016.5670. Epub 2016 Aug 24.

[11] Csiszár et al. Resveratrol encapsulated in novel fusogenic liposomes activates Nrf2 and attenuates oxidative stress in cerebromicrovascular endothelial cells from aged rats. J Gerontol A Biol Sci Med Sci. 2015 Mar;70(3):303-13.

RESEARCH SCHOOL

**The University of Worcester**
Research at the University of Worcester has grown significantly over the last 10 years. This growth is most clearly shown in the outcomes of the Research Excellence Framework (REF 2014). Worcester was the most improved University in the UK based on Research Fortnight's "Research Power" measure, reflecting a more than four-fold increase in the number of staff submitted compared to RAE 2008 and a commensurate increase in the quality of the research. As a consequence of its REF 2014 submission, Worcester's QR income for 2015-16 is up by 341% from 2014-15.

The University is committed to further developing its research profile in the coming period, through a strategic approach to its support for and investment in research. As part of this investment it is funding a number of full-time PhD studentships in its areas of particular research strength.

**Institute of Science & Environment**
The successful candidate will join the Institute of Science and the Environment (ISE), a dynamic, multi-professional Institute that has experienced significant growth in recent years, particularly in staffing and research output. Staff in the Institute contribute to the development of knowledge and practice by engaging in a wide range of research and consultancy activities. Working in collaboration with different disciplines and with other universities, private industry and the public sector, research is always grounded in the aim of achieving real-life benefits. We have research groups in the following areas: Biomedical Science, Atmospheric Science & Palynology, Plant Molecular Genetics, Crop Protection, River Science, Rural Research, Socio-ecological Systems and Sustainability, Ecology and Environment, and Archaeology.

**Research School**
The Research School is a focal point for all our research students. It provides:

- day-to-day support for our students, both administrative and practical, through our dedicated team
- a Research Student Study Space with both PCs and laptop docking stations
- a comprehensive Researcher Development Programme for students and their supervisors
- a programme of student-led conferences and seminars

**Details of the studentship**
During the period of your studentship you will receive the following:

- a tax free bursary of £13,863 for a period of 3 years
- a fee-waiver for 4 years
- a laptop
- use of the Research Student Study Space in Research School
- access to the Research Student Support Scheme to cover costs and expenses related to your research

You will be expected to play an active role in the life of both the Research School and of the Institute of Science and the Environment. You will be given opportunities to gain experience in learning and teaching within the Institute under the guidance of your Director of Studies.

**Research School** University of Worcester Henwick Grove Worcester WR2 6JA
Tel: 01905 542182 **www.worcester.ac.uk/researchstudentships**

University of Worcester

**Qualifications needed**
**Essential:**
Applicants should have or be able to evidence:

- A First or Upper Second (2.1) Honours Degree within a relevant Biological background such as Human Biology, Biochemistry or Biomedical Sciences, or a closely related and relevant discipline;
- Proficiency in oral and written English;
- Computer literacy;
- Ability to organise and meet deadlines;
- Good interpersonal skills;
- Ability to work independently and contribute to a team;
- Commitment and an enthusiastic approach to completing a higher research degree;
- Ability to work under self-initiative with meticulous attention to detail
- Experience of scientific data handling and statistical analysis

**Desirable:**

- Education to Masters Degree level in Nutrigenomics, Molecular Biology or a related Biomedical Science discipline
- Research experience in cell culture, gene expression and protein detection
- Research experience in gas and liquid chromatographic techniques
- Research experience in mass spectrometry

As part of its mission statement the University is committed to widening participation for its higher degrees. Although most candidates will have an undergraduate and/or a Masters degree, the University is happy to accept applications from candidates with relevant professional qualifications and work related experience

**The Interview**
The interview will provisionally be held during the week commencing 19th June. All successful applicants will be interviewed. You will be asked to make a short presentation on a topic related to the study. You will also be asked to provide an example of your written work (e.g. a dissertation) ahead of the interview.

**For further information** or an informal discussion on this project, please contact Dr A Bueno (Director of Studies) via email at a.bueno@worc.ac.uk

**Application forms are available at:**

http://www.worcester.ac.uk/researchstudentships

Completed application forms should be sent by email to: research@worc.ac.uk or sent via post to: Research School, Jenny Lind Building, Henwick Grove, St Johns, Worcester, WR2 6AJ