Professor Stephen Payne (潘斯文教授)

Research group

Cerebral Haemodynamics Group
(currently based at both NTU and University of Oxford)

Brief CV

I was awarded my DPhil (PhD) by the University of Oxford in 2001. Following a period as a post-doctoral researcher, I was then a Departmental Lecturer (2003), University Lecturer (2006), Associate Professor (2015), and Full Professor (2018) at the University of Oxford. Since 1st August 2021, I have been a Full Professor at the Institute of Applied Mechanics, National Taiwan University, as well as a Visiting Professor at the University of Oxford. I have also been awarded a Yushan Scholarship for 2021-24. I have published >100 journal papers and 3 books (see Google Scholar for details) and supervised 26 PhD students to successful completion. I have chaired a number of international conferences, as well as organising the UK Royal Society meeting on 'Integrated Control of Cerebral Blood Flow' in 2018.

Research interests

My research interests lie in the **computational modelling of cerebral blood flow and metabolism (腦血流和代謝功能電腦計算模型)**. In particular I am interested in how the brain controls blood flow and how this is affected in different clinical conditions. Stroke and dementia are both major causes of death worldwide and my work aims to understand better how changes in blood flow and its regulation are involved in these diseases, to help clinicians in diagnosis and treatment.

Research projects

I propose the following 3 projects, but there is a lot of flexibility in these, depending on your particular interests. Note that although I have some elementary Chinese language skills, you will need to have good English language skills to carry out these projects.

1. **Cerebral autoregulation (腦血流自動調節)**: We will develop a new model of the control of cerebral blood flow that explicitly considers the effects of systemic variables (i.e. the control of arterial blood pressure and heart rate) to understand better the integrated control of cerebral blood flow through both control of arterial blood pressure and the cerebral vasculature.

2. **Micro-emboli (腦栓塞)**: After thrombectomy (the removal of blood clots after stroke), there can often be a shower of micro-emboli that travel into the microcirculation. This can lead to reduced blood flow and irreversible tissue damage. We will investigate this using detailed models of the transport of micro-emboli through the cerebral vasculature.

3. **Vasomotion (血管舒縮作用)**: It has recently been suggested that cerebral blood vessels oscillate in order to increase the clearance of proteins from the brain, so that when this reduces there is an increased build-up of proteins that might lead to Alzheimer's disease. We will investigate this theory through developing a new model of vasomotion and protein clearance.

Please contact me on stephenpayne@ntu.edu.tw for further details