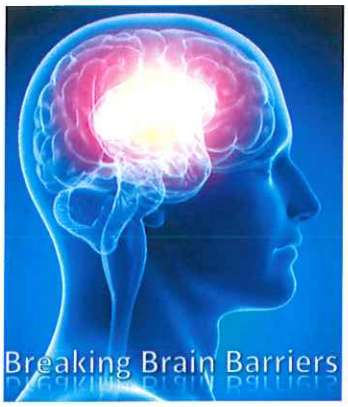
Enhancing the delivery of drugs across the blood-brain barrier: a molecular and formulation approach



Supervisor: Dr Raj K. Singh Badhan
http://www.aston.ac.uk/lhs/staff/az-index/dr-raj-k-singh-badhan/

The brain and central nervous system (CNS) are delicate organs, and evolution built very efficient ways to protect them. Unfortunately, the same mechanisms that protect the CNS against toxins can also make designing effective drugs very difficult.

Many existing pharmaceuticals are rendered ineffective in the treatment of CNS diseases due to our inability to effectively deliver and sustain them within the brain. General methods that can enhance drug delivery to the brain are, therefore, of great interest. Despite aggressive research, patients suffering from fatal and/or debilitating CNS diseases, such as brain tumors, HIV encephalopathy, epilepsy and neurodegenerative disorders, far outnumber those dying of all types of systemic cancer or heart disease.

This project will focus on how we can enhance drug permeation at blood-brain barrier and how we can obtain specific localised delivery to different brain regions.

You will be using a newly developed porcine primary cell culture model of the blood-brain barrier, along with immortalised cell lines (hCMEC/D3 and PBMEC-C1/2) and porcine brain tissue sections to examine factors governing the regional delivery of drug to the brain hemispheres. This project will employ techniques such as equilibrium dialysis, LC-MS, cell culturing, tissue isolation, HPLC, qPCR and SDS-Page/Western blotting and some pharmacokinetic modeling.

The project would be suitable for someone with the following background(s):

- Pharmaceutical sciences/Pharmacology/Pharmacy graduate (**M.Sc.**)
- Pre-clinical experience working in the pharmaceutical industrial
- Basic understanding of pharmacokinetics or toxicokinetics