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Application of microarrays to develop an *in vitro–in vivo* correlation screening toolbox

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Microarrays are powerful tools utilised in genomics allowing high throughput analysis of mRNA abundance. They have found application in many areas of drug discovery and development including comparative assessment of normal and diseased state tissues, transcription and expression profiling, side-effect profiling, pharmacogenomics and identification of biomarkers. In this application they were utilised to examine Caco-2 cells used in transport studies, investigating potential correlations between expression flux of genes coding for transpoter proteins known to interact with model drugs, and *in vitro* and *in vivo* permeability of the drugs, with a view towards developing a tool for predicting drug bioavailability early in the drug development pipeline. Lisinopril, Ramipril and Spironolactone formulations developed in house were used as model formulations. *In vitro* and *in vivo* uptake data was gathered for each formulation and focus was on genes coding transporters ABCB1, SLC15A1, SLC15A2, ABCC2 and SLCO1A2 following microarray analysis. Shortlisted genes of interest, all exhibited non-significant flux in expression levels in Caco-2 following analysis after transport studies using model formulations. There were however numerous SLC and ABC genes for which the expression had changed significantly. These were subsequently investigated using the Koyoto Encyclopaedia of Genes and Genomes (KEGG) to identify their function and seek clarity about the findings. Athough no clear cut revelations were derived from this study, the data strongly suggested that further research is warranted in this area, where future work intends to utilise a much larger formulation repertoire in conjunction with novel computational approaches currently in development to illucidate trends.

Speaker Biography

Craig Russell has completed his BSc (Hons) in Human Biology at the University of Huddersfield in 2010 and later obtained his PhD from Aston University. After which, he carried out his Post-doctoral research in the same institution. Upon completion of this work, he then became a Lecturer in Physiology and Pharmacology at Coventry University College before recently returing to Aston University in his current position as Lecturer in Pharmacy. He has multiple publications in reputable journals and serves as an Editorial Board Member for the *Journal of Research and Reviews: Drug delivery*.

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