**Title: Understanding Human Health and Disease with LC/MS Based Metabolic Phenotyping**

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***Abstract***

The MRC-NIHR National Phenome Centre, Imperial College London, is the first of its kind facility. Born out of the UK Olympic Legacy its mandate is to provide “high throughput, forensic quality, metabolic phenotyping to support large scale epidemiological studies as well as basic medical research into disease understanding and patient stratification”. As global life-styles change we are seeing increasing cases of obesity, diabetes, and mental health issues. This not only affects a person’s quality of life but also places increased strain on the health-care systems to provide the right treatment whilst managing costs closely. Metabolic Phenotyping offers a valuable and unique insight into the underlying biochemistry of diseases as well as the patients’ individual biochemistry “phenotype”, diet, health status, age and stress. To deliver this information the analytical data generated in processed via a variety of chemometric modeling and analysis methodologies to deliver the relevant biochemical information. These chemometric platforms employed vary from simple multivariant analysis to highly complex model based analysis and is presented in a format ready for interpretation by medics. This facility comprises of high field NMR instruments, accurate mass LC/MS instruments, and tandem quadrupole LC/MS systems as well as dedicated training facility. In this presentation we will discuss the development of analytical platforms both LC/MS and NMR as well as a detailed discussion on the workflow, validation, reporting and decision makes process. The presentation will cover the development and validation of the “discovery’ screening methods for polar, non polar metabolites and lipid profiling using LC/MS methodology, as well as describe the use of proton NMR as an initial screen to eliminate contaminated samples. The quantitative targeted LC/MS assays will also be discussed the various compounds classes such as bile acids, amino acids, eicosanoids, and acyl cartanines.

***Biography***

Professor Robert Plumb is the Director of Metabolic Phenotyping and Stratified Medicine in the Waters Health Sciences Business Operations Division, based in Milford, Massachusetts. Professor Plumb has published over 100 papers on the subject of HPLC/MS and NMR for bioanalysis, metabolomics and metabolite identification. He is a recognized expert in the use of liquid chromatography with mass spectrometry, capillary scale LC, purifications scale LC and metabonomics, giving many invited papers at international meetings around the world. After obtaining an Honors Degree in Chemistry from the University of Hertfordshire in 1992, he started work at Glaxo Research and Development Drug Metabolism Department. During his time at Glaxo and later GlaxoWellcome he continued his research in liquid chromatography combined with NMR and mass spectrometry for metabolite identification and bioanalysis obtaining his Ph.D. in 1999. Dr. Plumb continued his work for GlaxoWellcome with the responsibility of metabolite identification using HPLC/MS/NMR and new analytical technology development. In 2001 he moved to Waters Corporation in Milford, MA, USA where he was responsible for the Life Science Chromatography Group and latterly LC/MS applications in the Pharmaceutical Market Development Group before becoming the Director of Metabolic Phenotyping. He is currently a Visiting Professor in Analytical Chemistry at Kings College London, Visiting Professor at Imperial College in the Department Surgery and Cancer and a Fellow of the Royal Society of Chemistry. In 2014 he was awarded Highly Cited Researcher by Thompson Reuters.