

3rd International Conference and Exhibition on Metabolomics & Systems Biology

March 24-26, 2014 Hilton San Antonio Airport, San Antonio, USA

Multi-omic approaches to envision the role of metabolites in biological systems

Karl Burgess

University of Glasgow, Scotland

Infectious disease remains one of the leading causes of mortality worldwide. Even in the developed world, complications from orthopaedic surgery often result from bacterial invasion and biofilm formation, leading to a need for surgical intervention and associated morbidity; while in the developing world, debilitating parasitic diseases such as leishmaniasis remain prevalent. Metabolomic techniques are at the heart of our approach to understand the mechanisms of pathogenesis of infectious disease. Metabolomics uniquely provides a state measurement of the phenotype of an organism, as well as allowing us to assay the inputs and outputs of metabolism, such as carbon sources, quorum sensing molecules and toxins. We apply hydrophilic interaction liquid chromatography–high-resolution mass spectrometry approaches to provide an unbiased view of the metabolome, providing both canonical compounds in central metabolism but also previously undescribed small molecule biomarkers and candidates for new pathways.

We describe two case studies: metabolome analysis of a *S. aureus* strain obtained from a failed medical implant, and analysis of a *Leishmania* glucose transporter knockout mutant. For *S. aureus*, we couple image processing for gross phenotypic analysis with untargeted metabolomic analysis. For *Leishmania*, we have coupled metabolomics to proteomics to analyse the metabolism of glucose transporter knockout mutants. Integration of multi-omic datasets is challenging, but provides significant additional insight into the molecular mechanisms of pathogen biochemistry.

Biography

Karl Burgess completed his Ph.D. at the age of 31 from the University of Glasgow and, after a short postdoctoral study in proteomics, became manager of the metabolomics facility at Glasgow University, part of the Glasgow Polyomics initiative. He is a member of the board of directors of the British Society for Proteome Research. In 2012, he obtained a Wellcome Trust ISSF Fellowship in metabolomic analysis of pathogen biofilms and their interactions with surfaces.

karl.burgess@glasgow.ac.uk