University of Birmingham

Dr Warwick Dunn BSc (Hons), PhD

Lecturer in Metabolomics

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About

Dr Warwick (Rick) Dunn's research group focuses on developing innovative chromatography, mass spectrometry, sample collection and computational resources and their application in the study of the complex role of metabolites in human ageing and diseases. Areas of biomedical study include endocrinology, inflammation and immunology including musculoskeletal health, cardio-renal diseases and complications of reproduction and pregnancy.

Qualifications

BSc (Hons), 1993, University of Hull, Chemistry with Analytical Chemistry and Toxicology
PhD, 1996, University of Hull, Mass Spectrometry

Biography

Dr Dunn completed his BSc studies at The University of Hull and subsequently performed PhD studies at BP Chemicals and The University of Hull to develop innovative mass spectrometry interfaces to allow on-line monitoring of liquid chemical process streams. From 1997 Dr Dunn has been employed in industry (Croda Chemicals) and academia (IACR-Rothamsted, University of Sheffield, University of Manchester) where he has developed and applied analytical techniques to the study of chemical and biological systems.

From 2001 Dr Dunn has focused his research on the development and application of metabolomic techniques, firstly at The University of Sheffield to study plant metabolism (2001-2002) and subsequently at The University of Manchester (2003-2012) where he focused on the study of microbial and mammalian systems. Dr Dunn attained a Lectureship in 2011 and moved to The University of Birmingham in early 2013 to continue his research in applying metabolomics techniques to translational biomedical research and stratified medicine as well as developing new tools to aid in the higher resolution study of complex samples and datasets.

Teaching

Programme lead for Professional Placements in undergraduate degree programmes

I lecture on metabolism in the following undergraduate modules

- BIO107 - Enzymes and metabolism
- BIO139 - Human Biochemistry
- BIO262 - Membrances, energy and metabolism

I lecture on metabolism in the following Masters course

- Microbiology and Infection MSc

I provide undergraduate and Masters research projects

Postgraduate supervision

For further information on PhD opportunities please visit **http://www.findaphd.com/search/?Keywords=Dunn%20Birmingham (http://www.findaphd.com/search/?Keywords=Dunn%20Birmingham)**

Currently available - BBSRC iCASE 4 year PhD in collaboration with Thermo Scientific focused on the development of dried blood spot and dried urine spot analysis in non-targeted metabolomics applications. Contact w.dunn@bham.ac.uk for more information.

Current students

- Riccardo Di Guida, School of Biosciences, main supervisor
- Karnpreet Chalal, School of Biosciences, main supervisor
- Martin Jones, School of Biosciences, co-supervisor
- Jelena Sostare, School of Biosciences, co-supervisor
- Kate Hollinshead, School of Cancer Sciences, co-supervisor
- Sharil Shafie, School of Computer Sciences, co-supervisor

Research

Research Theme within School of Biosciences: **Molecular Cell Biology and Signalling (http://www.birmingham.ac.uk/research/activity/molecular-cell-biology-**

signalling/index.aspx)

Keywords: metabolomics, mass spectrometry, biomedical research, translational medicine, stratified medicine

Development of metabolomic workflows

The study of the complex interactions of metabolites in biochemical networks (metabolomics) is becoming a routinely applied research tool to interrogate biological systems. Metabolites act as building blocks for many different types of biochemical and structures, are dynamically involved in many regulatory mechanisms (allosterism and epigenetics as examples) and they provide a sensitive and dynamic measure of the system phenotype. The first of my group's research objectives, in close collaboration with **Professor Mark Viant's (http://www.birmingham.ac.uk/staff/profiles/biosciences/viant-mark.aspx)** research group, is the development of experimental and computational workflows to study biological systems. Continuing developments are focused on

- metabolite annotation and identification with a focus on applying accurate mass, MS^n and retention time data acquired on chromatography-mass spectrometry platforms
- quality control samples and their application for quality assurance in non-targeted metabolomic studies
- sample collection and preparation of mammalian biofluids, cells and tissues
- non-targeted chromatography-mass spectrometry methods for metabolic profiling of diverse sample types
- targeted chromatography-mass spectrometry methods for quantitative studies of metabolites
- integration and interpretation of metabolomic and transcriptomic datasets

Investigating the role of metabolites in human health and disease

Systems Science for Health (http://www.birmingham.ac.uk/research/activity/ssfh/index.aspx) is a University of Birmingham initiative to integrate 'omics technologies with mathematical and computational methodologies to study human health and disease. The primary objective is to integrate key skills from different disciplines to develop new treatments for human diseases, to increase patient benefit and to improve patient outcome and longer-term health. An integral part of this initiative is to apply 'omics technologies including metabolomics, the second objective of my research group.

The non-targeted or targeted studies of metabolites can provide data applied to understand molecular pathophysiological mechanisms associated with human health and disease, to act as prognostic or diagnostic biomarkers of disease or to act as biomarkers to define efficacy and toxicity of disease interventions (for example, therapeutics) or to apply as biomarkers in stratified medicine. My group collaborates with clinicians and biomedical researchers in areas of biomedical research applicable for translation for patient benefit. Current areas of research include the following:

- Cardiovascular and renal diseases (Howell, Ferro, Cockwell)
- Endocrinology (Arlt, Tomlinson, O'Reilly, Lavery)
- Inflammation and Immunology (Lord, Buckley, Young)
- Musculoskeletal health and exercise (Lord, Philp, Wyn-Jones, Aldred; I am systems biology theme lead for the **MRC-ARUK Centre for Musculoskeletal Ageing (http://www.birmingham.ac.uk/generic/mrc-aruk/home.aspx)**)
- Complications of reproduction and pregnancy (Kilby, Coomarasamy)
- Cancer (Bunce, Khanim, Tennant, Guenther)

Continuing developments are applying systems medicine approaches through in-silico integration and analysis of 'omic datasets and this will continue to modeling of interaction networks specific to disease phenotypes.

Other activities

International Society membership includes:

- Member of The Metabolomics Society (2005 to present)
- Member of The British Mass Spectrometry Society (2003 to present)
- Member of The Royal Society of Chemistry (1991 to present)

Activities related to professional bodies and conference organization:

- Guest Editor for a special issue of the journal Metabolomics (2012-2013)
- Editorial board member of the journal Metabolomics (2012-present)
- Member of the Organising Committee for Metabomeeting 2012 (Manchester, September 2012)
- Director of The Metabolomics Society (2010-present)
- Chair of the Metabolite Identification Task Group of the Metabolomics Society (2013-present)

In the period 2010 to date, Warwick Dunn presented lectures at the following conferences, workshops and seminar series;

- MSACL-EU (Salzburg, Austria, 2014)
- ARVO – The Association for Research in Vision and Ophthalmology (Seattle, USA, 2013)
- 1st and 2nd International Workshops on metabolomics and proteomics, (Bilbao, Spain, 2011-2012)
- 5th European Human ex-vivo Placental Perfusion Workshop (Manchester, UK, 2012),
- 12th Plymouth Symposium on Obesity, Diabetes and the Metabolic Syndrome (Plymouth, UK, 2011),
- Metabomeeting 2011 (Helsinki, Finland),
- Max Rubner Conference 2011 – "Food Metabolomics" (Karlsruhre, Germany),
- The 7th International Conference of The Metabolomics Society (Cairns, Australia, 2011),
- British Yeast Group Annual Meeting (Brighton, UK, 2011),
- Advances in Metabolic Profiling conference (Florence, Italy, 2010),
- 2nd Australasian Symposium on Metabolomics 2010 (Melbourne, Australia),
- The Metabolomics Society's 6th Annual International Conference (Amsterdam, The Netherlands, 2010),
- Oxford Centre for Integrative Systems Biology seminar series, (Oxford, UK, 2010).

Public engagement activities include acting as a STEMNET Ambassador (2012-present) and involvement in outreach for students and the general public. This includes Christmas lectures at The University of Birmingham, stands at public engagement events (for example, The International Clinical Trials Day in 2012 and the British Science festival hosted in Birmingham in 2014), A-Level study days and Meet the Scientists workshops.

Publications

Mullard, G., Allwood, J.W., Weber, R., Brown, M., Begley, P., Hollywood, K.A., Jones, M., Unwin, R.D., Bishop, P.N., Cooper, G.J.S. and Dunn, W.B. . A new strategy for MS/MS data acquisition applying multiple data dependent experiments on Orbitrap mass spectrometers in non-targeted metabolomic applications. Metabolomics, 2015, in press

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