Molecular mechanisms of glucolipotoxicity

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A Biochemical Society Focused Meeting held at University College Dublin, 25–26 March 2008

We are experiencing a global epidemic of Type 2 diabetes. The World Health Organization estimates that, by 2016, the number of people with diabetes will double to 240 million worldwide. The cost of dealing with the treatment and management of diabetes and its complications is approximately €0.5 billion annually in Ireland and €10 billion annually in the UK. The pancreatic β-cells, skeletal muscle, liver, kidney, blood vessels and other tissue systems appear to be damaged by chronic exposure to the elevated glucose and lipid concentrations typical of the Type 2 diabetic state.

It was approximately 6 years ago that two key publications appeared that described the emerging phenomenon of glucose and lipid-dependent cellular dysfunction[1,2]. The current appreciation of the pervasive adverse impact of glucolipotoxicity on a whole spectrum of cells and tissues affected by diabetes was the major topic for presentation and discussion at the 'Molecular Mechanisms of Glucolipotoxicity' UCD Dublin conference. Identification of the underlying mechanisms of the cell failure that occurs as a consequence of glucolipotoxicity is vital to developing protection strategies and novel Type 2 diabetes therapies in the future.

The invited speakers covered topics that were focused on the regulation of β-cell function and death in relation to the function and dysfunction of the endoplasmic reticulum and mitochondria, and how chronic exposure to elevated glucose and lipids has an impact on patterns of cellular metabolism in diabetes. There were four oral presentations selected from 28 abstract submissions, from speakers from UCD Dublin, Peninsula Medical School in Plymouth, UK, Université Catholique de Louvain in Brussels, Belgium, and Department of Medicine, University of Wisconsin-Madison, USA. ■

Poster session at the Dublin glucolipotoxicity meeting

References

1. Poitout, V. and Robertson, R.P. (2002) Endocrinology **143**, 339–342
2. Prentki, M., Joly, E., El-Assaad, W. and Roduit, R. (2002) Diabetes **51** (Suppl. 3), S405–S413

Papers from this meeting will be published in Biochemical Society Transactions (volume 36, part 5).

Gene expression and analysis

Graham Pavitt (University of Manchester, UK)**, Stefan Roberts** (University of Manchester, UK) **and Nicola Gray** (MRC Human Genetics Unit, UK)

Biochemical Society Linked Focused Meetings, held at University of Manchester, 26–28 March 2008.

Over 200 scientists from around the world gathered at the University of Manchester, UK, for the Biochemical Society's first ever linked focused meetings. The idea was to bring scientists from related disciplines that normally attend separate meetings together under one roof to present their latest research findings and foster cross-talk and potential collaboration between disciplines. The meeting sessions were split between plenary lectures that all participants attended and parallel oral sessions on specific topics relating to transcription and post-transcriptional control themes. A third strand of new methods for study of protein–nucleic acid interactions was timetabled so that all participants could attend the oral presentations. In addition to the 59 oral presentations, about 70 poster presentations enabled participants not selected for oral communication to present their latest work.

Highlights of the meeting included two Biochemical Society Medal Lectures. The 2008 Heatley Medal Lecture was given by Dr Venki Ramakrishnan (MRC Laboratory of Molecular Biology, Cambridge) who gave a very entertaining overview of his studies into the structure and functioning of the ribosome in protein synthesis and how different antibiotics interact with and modify the ribosome. The 2008 Novartis Medal Lecture was given by Professor Adrian Bird (University of Edinburgh) on the subject of DNA methylation and disease. A highly informative lecture described a remarkable mouse model for Rett

syndrome and the role of the methylase MeCP2. Both medals were presented by Professor Steve Busby on behalf of the Biochemical Society. These lectures, in addition to the plenary talks, brought the threads of the meeting together, allowing the audience to appreciate both the complex mechanisms that span and control the regulation of gene expression and the diverse approaches researchers are using to unravel them.

Two competitions for junior researchers were also held. The Promega UK Young Biochemist 2008 Prize was awarded for the best short oral presentation by a UK-based postgraduate student or postdoc within 2 years of being awarded their PhD and was won by Rodoniki Athanasiadou (University of Edinburgh) with second and third places taken by Lynne Marshall (Beatson Institute, Glasgow) and Laura Smith (University of Leeds) respectively. Dr Susan Campbell (University of Manchester) won the *Biochemical Journal* Poster Prize. This was contested by all posters presented by PhD students and those within 7 years of being awarded their PhD. Many thanks go out from the organizers to all the entrants and the judges who had the difficult task of selecting winners from such strong entrants.

Overall, the meeting had a lively buzz and collegiate feel and a stimulating time was had by all. We are sure the linked focused meetings format is here to stay! ■

Papers from this meeting will be published in Biochemical Society Transactions (volume 36, part 4).

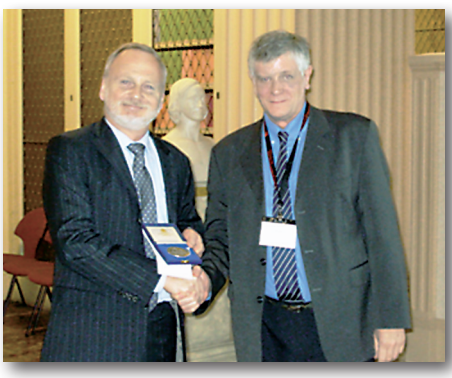
Integration of structures, spectroscopies and mechanisms

Peter Rich (University College London, UK)**, Uli Brandt** (University of Frankfurt, Germany) **and Steve Chapman** (University of Edinburgh, UK).

Second Joint German/UK Bioenergetics Conference, a Biochemical Society Focused Meeting held at University of Edinburgh, 2–4 April 2008

A second joint meeting between German and UK researchers involved in molecular bioenergetics took place in Edinburgh during April. It was a follow-up to a very successful first meeting that took place in Naurod, near Wiesbaden, Germany, during March 2005 (reported in the June 2005 issue of *The Biochemist* and papers published in volume 33, part 4 of *Biochemical Society Transactions*). The UK and Germany are particularly strong in this field, and many groups in the two countries have overlapping research interests. This Focused Meeting was supported by the UK and German Biochemical Societies, and further generous sponsorship was given by the United Mitochondrial Disease Foundation, Bruker Optics Ltd, Syngenta, Microcal and Portland Press. Peter Rich and Uli Brandt chaired the UK and German organizing committees. Steve Chapman acted as the on-site organizer, and Silvia Rabar of The Biochemical Society provided very professional infrastructure support throughout.

The meeting addressed advances on structures and mechanisms of the proteins that provide cellular energy. It opened in the magnificent Hall of the Playfair Library of Edinburgh University with the 2008 Keilin Memorial Lecture by Professor Hartmut Michel. He presented new analyses of crystal structures of cytochrome oxidase that suggest that an unsuspected peroxide ligand might be integral to the catalytic cycle. Further sessions then covered photosynthetic, mitochondrial and other diverse electron-transfer chains, together with ATP synthesis machinery and proteins involved in membrane transport processes. What became clear throughout were the tremendous advances that are occurring in structure elucidations, both at the atomic level of specific proteins and at the level of organization into supermolecular complexes involving many proteins. The atomic structures provide the platform for the application of advanced biophysical spectroscopic methods such as EPR, ENDOR (electron nuclear double resonance), IR spectroscopies and single enzyme movements. These have been used to probe the mechanisms and dynamics of the intricate catalytic cycles that these proteins catalyse and the involvement of functional groups and specific water molecules. Also presented were methodologies to study the larger structural organizations. Examples included confocal imaging of fluorescent proteins and cryo-electron microscopy of single particles. Alongside this was a substantial display of posters with many further examples of these and other diverse biochemical and chemical analytical methods. ■



Presentation of the Keilin Medal to Nobel Laureate Professor Hartmut Michel

Papers from this meeting, including the Keilin Memorial Lecture, will be published in Biochemical Society Transactions (volume 36, part 5).