UCD Conway Institute hosts MMI Clinical Scientist Fellows day

On 19th September 2008, UCD Conway Institute hosted a day of lectures and workshops for the Clinical Scientist Fellows on the Molecular Medicine Ireland Clinical Scientist Fellowship Programme (CSFP).

This programme, funded through PRTLI Cycle 4, is designed to provide world-class research training for those originally working in clinical positions – thus furthering the development of translational medicine in Ireland. There are currently 19 fellows in the programme and, on 19th September, they visited the UCD Conway Institute and took an in-depth look at some of its core technologies and cutting-edge research.

The morning began with a series of short lectures on animal models of disease. A number of Conway Investigators spoke on the relevance of animal models to different areas of human pathophysiology. The fellows heard from Prof. Catherine Godson on models for diabetes; Prof. Ciaran Regan on models for schizophrenia; Prof. Michael Keane on models for pulmonary diseases; Dr Ollie Blacque on using *C. Elegans* as a disease model and DrBreandan Kennedy on using zebrafish to understand colour vision and blindness.

In the afternoon the fellows split into smaller groups and took a tour of some of the Conway Institute's Core Technology facilities, where they got hands-on training in specific areas from Dr Giuliano Elia, Dr Dimitri Scholz, Mr Colin Travis, Prof. Liam Gallagher, Prof. Brendan Loftus and Dr David Cottell.

We would like to take this opportunity to thank all the researchers who contributed their time and expertise to make this day so successful. The Fellows were highly impressed with the infrastructure and research within the Institute, and will continue through the programme with a keen sense of UCD Conway Institute as a centre of excellence in translational medicine.

MMMI Clinical Scientist Fellows on their visit to the Conway Institutes

PRTLI 10th Anniversary Celebrations

The Programme for Research in Third Level Institutions is celebrating its 10th Anniversary in November 2008. Administered by the HEA, this initiative has transformed the research landscape in Ireland, and UCD Conway Institute has been a particular beneficiary of the programme, with the building itself, the core technology facilties, and key education programmes funded through PRTLI Cycles 1-3.

UCD is planning a series of exhibitions and presentations throughout the campus during October, November and December 2008 in order to highlight the achievements and successes that have been made possible by PRTLI. Look out for the displays in the foyer of the Conway Institute, including our core technologies stand. On 27th November, the HEA will launch a commemorative book, showcasing some of the most exciting PRTLI funded research underway in Ireland. The launch will open a ten-day exhibition and 'festival of research' in the Science Gallery, to which all will be welcome.

Conway Lecture & Seminar Series underway for a new year

The highly successful Conway Lecture and Seminar Series (CLASS) has recommenced after the summer hiatus. Already, the seminar committee have been working hard to attract a range of different speakers for the Friday lunchtime seminars, to which all are welcome.

Some of the speakers who will feature in the coming weeks include:
- October 3rd: Prof Jeremy Simpson, SBES, UCD
- October 10th: Dr. Patricia Finn, UCSD, USA
- October 17th: Dr. Jakub Golub, The Medical University of Warsaw: "Targeting Cytoprotective Mechanisms of Photodynamic Therapy - New Possibilities for Potentiated Anti-Cancer Effects"
- October 24th: Dr. Peter Crowley, UCD

Don't forget to keep an eye on the plasma screens and notice boards for further details as they become available. Lunch is served immediately before the seminars each week, so it's worth being on time for CLASS!

Funded through the Programme for Research in Third Level Institutions, administered by the HEA.

Elaine Quinn
Communications & Education Officer
UCD Conway Institute of Biomolecular & Biomedical Research
University College Dublin
Belfield, Dublin 4
Ireland

E: elaine.quinn@ucd.ie
T: (+353-1) 716 6706
F: (+353-1) 716 6701
W: www.ucd.ie/conway

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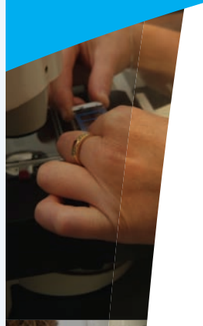

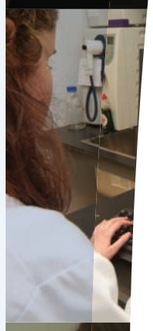

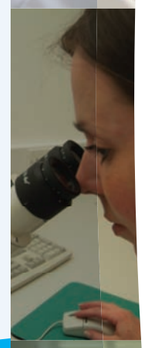

'Music of Life' played at UCD Conway Festival

Renowned scientist, Professor Denis Noble CBE, told the audience at the annual UCD Conway Institute Festival of Research on 25th September 2008 about the complexity of human biological systems – what he refers to as 'the music of life'.

Since scientists have discovered how to sequence the human genome, there has been immense excitement about the possibilities that are opened up by being able to understand human biology at the molecular level. The potential for the healthcare industry is perhaps the most obvious, with predictions that we would soon be able to identify the genes responsible for a variety of illnesses or conditions and therefore target them with new drug therapies.

But progress on this has been far slower than first imagined. Denis Noble sees this as a result of a nearly too-intense focus on science at the molecular level. We now have a very good understanding of many biological molecules - how they're made and what they do - but we have been less successful in seeing how these molecules interact together in processes that govern entire living systems. Denis Noble now says it is time to take the approach of "integration rather than reduction". We need to scale up rather than down.

It is this approach that underpins the relatively new discipline of systems biology, an area where UCD and the Conway Institute are working particularly hard to establish critical mass in Ireland. Professor Noble can rightly be regarded as the pioneer of this scientific approach, which involves using mathematical and computational methods to help us to understand enormously complex biological systems.

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Keynote speakers at the 8th annual UCD Conway Institute Festival of Research: (from l to r) Profs Ralf Baumeister, Denis Noble and Nick Turner

Director's Message

With this issue of Conway Focus, we bid farewell to Professor Janet Allen who has been Director of the UCD Conway Institute since December 2005. In that time she has led the Institute through its numerous achievements and successes, enabling it to become one of the most significant and sizeable institutes of scientific research in Ireland.

Professor Allen is now moving on to take up a post as Director of Research at the Biotechnology and Biological Sciences Research Council in the UK, where she will oversee six scientific research institutes. We wish her all the best in this new role.

"I would like to thank everyone within the UCD Conway Institute who has contributed to the ongoing success of the Institute during my time here", says Professor Allen. "I have been constantly impressed by both the standard of the science being done here, and the way in which people have cooperated to make this one of the foremost institutes in Ireland. I would also like to thank everyone for making me feel so welcome over the last two and half years."

Over the coming months the Institute will be managed on a day-to-day level by Assistant Director Michael O'Sullivan with the rest of the Directorate team. Professor Des Fitzgerald, UCD VP for Research, will oversee the academic affairs of UCD Conway while the search for a new director gets underway; "As a country and as a university, we are facing some challenging times", says Professor Fitzgerald, "but the UCD Conway Institute is in a very strong position to rise to these challenges and make the most of the exciting opportunities that are available."

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8th Annual UCD Conway Institute Festival of Research

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Professor Noble's book *The Music of Life: Biology beyond the Genome* is the first popular book on this subject, and he uses the analogy of music to explain his thinking. Like music, biological systems are much more than simply the sum of the molecules or 'notes' that are part of their structure.

Professor Noble has spent much of his career working to understand these systems. In 1960, he published the first computer model of the human heart – using computational processes to interpret function from the molecular level up to the whole organism – in this case a virtual organ. At the UCD Conway Institute Festival of Research, Professor Noble used this computer modelling of the heart to illustrate what he sees as the ten guiding principles of systems biology. The tenth principle is that there are many more yet to be discovered – "a genuine theory of biology does not yet exist"! Far from giving us the blueprint of life, therefore, sequencing the human genome has simply allowed us to better understand some of the instruments involved in playing 'the music of life'.

Systems biology also featured in the lecture given by Prof. Ralf Baumeister, University of Freiburg, where he spoke about being able to use an interdisciplinary systems biology platform to understand how protein networks operate in situations of aging and disease like Alzheimer's or Parkinsons. Prof. Nicholas Turner of the Manchester Interdisciplinary Biocentre opened the Festival of Research with his lecture on the directed evolution of enzymes – speeding up the work of nature, with obvious implications for the pharmaceutical industry.

The 8th Annual Conway Festival of Research was an unqualified success. Over 160 abstracts were submitted for display in the poster exhibition, while there were eight oral presentations and twenty moderated posters throughout the day. Prizes were awarded to Colm Duffy, Terence Bukong, Sinead Toomey and Jacqueline Whyte for their posters. Third prize for the oral presentations went to Michelle Nic Raghnaill, and Michael Johnston won 2nd prize. 1st prize and the Roche medal was awarded to Lydia Lynch for her presentation on "The policeman of the abdomen no longer undercover: the human omentum reveals itself as a unique immune organ, which is compromised in obesity."

UCD Conway Institute extends its thanks to all the sponsors who made the event possible, and in particular the primary sponsors Biosciences and Sarstedt Ltd. Prizes were also offered by Roche and MWG Operon.

Professor Janet Allen carried out her last function as Director of the UCD Conway Institute as she thanked the seminar committee and all who assisted them in ensuring the Festival ran smoothly and well.

Lydia Lynch, winner of the 2008 UCD Conway Research medal, with Dr Orina Belton, chair of the Festival Committee

Spotlight on UCD Conway Institute Core Technologies

The 2008 Festival of Research saw the unveiling of a new initiative to promote the Core Technology facilities that are such an intrinsic part of the UCD Conway Institute. A display stand featuring information on each of the technologies appeared in the conservatory of O'Reilly Hall, highlighting the extent of the infrastructure and professional expertise housed within the Institute.

The technologies are grouped into six main areas, and in each case there is a dedicated team of experts who manage the facilities and offer opportunities for collaboration on experimental design, data analysis, or publication of findings.

The main technologies are:

Flow Cytometry, run by Dr Alfonso Blanco; *Mass Spectrometry*, run by Dr Giuliano Elia; *Transcriptomics & Genomics*, also under Dr Elia; *Bioinformatics & IT Support*, run by Dr Peadar O'Gaora and Conway Tech support; *Electron Microscopy*, under Dr David Cottell; and *Imaging – both Microscopy and In Vivo* - under Dr Dimitri Scholz.

The UCD Conway Institute Core Technologies are available on a 'pay-per-use' basis to anyone within UCD who may have need of them, and can also be booked by researchers from other universities and institutes. The extent of these facilities is one of the unique selling points of the UCD Conway Institute, and has been instrumental in helping to attract international researchers through processes such as the SFI Stokes initiative.

Over the next few weeks the stand showcasing the Core Technologies will remain on display in the foyer of the UCD Conway Institute.

If you would like to know more about any particular area, or have a project you would like to collaborate on, just come along and meet some of the people involved.

Some of the Core Technology posters displayed at the Festival of Research

Understanding why cancer spreads

UCD Conway Institute researchers Professor Liam Gallagher and William Faller have been part of an international team working to understand the processes behind the development of metastases in cancer patients. The group has published its findings in the September issue of *PNAS*.

The research centres on MicroRNAs (miRNAs), which are small non-coded strands of RNA involved in influencing which genes are 'expressed' or 'switched on', and therefore which characteristics appear in an organism.

The research team - based in Spain, Texas, Ohio, the UK and UCD and led by Dr Manel Esteller - have discovered that a specific series of miRNAs can influence whether a tumour progresses or is inhibited. These miRNAs normally carry tumour suppressors, and so, when they are silenced tumours are able to grow and spread. Where the relevant miRNAs were reintroduced or 'reawoken' in a cancer cell of a model organism, tumour growth was found to be reduced and the progression of metastasis was halted.

The team discovered that a process known as DNA methylation is involved in the silencing of those miRNAs that carry tumour suppressors. This aberrant DNA methylation is therefore also implicated in the development of metastases, or 'secondaries'. The researchers have been able to tell which particular miRNAs are most involved in this process, and also which methylation signatures indicate metastasis.

This is of benefit in predicting how, or whether, a patient's cancer will progress, but will also provide a molecular basis for developing targeted drug therapies for patients with metastasis in the future.

UCD researchers identify key to Alzheimer's memory loss

Using new scientific techniques, researchers have unlocked the cascade of molecular events that lead to Alzheimer's disease. The scientific findings published in the June edition of *Nature Medicine* suggest a potential new target for the development of drug therapies to fight the irreversible and degenerative disease which affects more than 40,000 people in Ireland and some 29.8 million people worldwide.

Alzheimer's disease is marked by the build-up of plaques consisting of beta-amyloid protein fragments, as well as abnormal tangles of tau protein found inside brain cells. The team of Irish and international researchers have identified that the accumulation of a particular protein (called amyloid β-protein - Aβ) in the brain initiates Alzheimer's disease and that it directly alters the structure and function of brain cells. The findings place a significant emphasis on the development of new therapeutic strategies targeted at the reduction of the formation of Aβ as opposed to the reduction of the plaque burden associated with the disease.

"Alzheimer's disease is a major personal and societal tragedy," says Professor Ciaran Regan from the UCD School of Biomolecular and Biomedical Science, one of the co-authors of the report. "The disease progression is torturously long and debilitating, extorting a huge emotional and economic cost."

"The onset of the disease is insidious with the earliest symptoms often manifested as subtle and intermittent deficits of episodic memory," explains Professor Dominic Walsh, associate Professor of Pharmacology at the UCD Conway Institute, another co-author of the report.

"Our findings support the growing theory that Alzheimers's disease memory deficits may result from loss of dendritic spines and that this process is mediated by amyloid β-protein (Aβ) oligomers, not monomer or plaque Aβ as previously considered."

The research is supported by the Wellcome Trust, SFI and the US National Institutes of Health.

Diabetes Research Centre hosts international symposium

A condition that affects between 25% and 35% of all diabetic patients was the subject of a symposium hosted by the UCD Diabetes Research Centre on June 25th and 26th 2008. Diabetic nephropathy (DN) is the main cause of end-stage renal disease. Now, researchers know that DN is also associated with an increased risk of cardiovascular disease. The condition has a huge economic cost in addition to the human cost for diabetes sufferers and their healthcare systems.

UCD's Professor Catherine Godson was chair of the symposium's programme committee and collaborated with Profs. Peter Maxwell (QUB), Denise Sadlier, Finian Martin and Harry Holthofer (DCU) in putting together the four sessions on the subject of diabetic nephropathy that were held over the two days of the conference under the banner of 'Diabetic Kidney Disease: Genes, Signals and Cells'.

Delegates heard a series of presentations dealing with the area of genetic epidemiology – understanding genetic susceptibility to diabetic nephropathy. Dr Per-Henrik Groop of the University of Helsinki and Dr Andrzej Krolewski of Harvard Medical School spoke on this subject, while Drs Madeline Murphy and Derek Brazil of UCD, along with Roel Golschmeding of University Medical Centre Utrecht spoke on various research projects aimed at understanding the signalling pathways that influence the progression of diabetic nephropathy.

The greater level of insight researchers have into the initiation and progression processes of DN, the greater their ability to develop new therapeutic strategies for the disease by identifying specific targets for these therapies. Mark Cooper of the Baker Heart Research Institute of Australia; Valerie Clerin of Wyeth Research Cambridge, MA; John Coffmann of Duke University and Kumar Sharma of UC San Diego all spoke on their work in this regard.

The symposium organisers gratefully acknowledge the support of gold sponsor Roche and silver sponsors Baxter, Novartis, Astellas, Pfizer, Wyeth and Menarini for making the event possible.