

## Delivering on the Promise of Molecular Medicine

Bill Powderly

Professor of Medicine and Therapeutics, UCD

“Successful translation of biomedical research transcends the physical requirements of the laboratory. The support systems for patient education, trial recruitment and management, and for the implementation of trial findings into clinical practice are not sufficiently recognized as critical to medical research by academic spheres or funding agencies. In a world accustomed to rewarding single investigator-driven science, this discouraging absence of infrastructure is compounded by an institutionalized lack of recognition of team players.” *Nature Medicine, October 2004.*



In the last edition of *DMMC News*, Professor Brian Harvey described translational research as bench experiments being driven by clinical questions, and findings from the bench being converted into improved diagnosis and treatment at the bedside. The challenge and opportunity for the DMMC is to help deliver both aspects of this equation in Dublin. In this regard the Genome Resource Units (GRUs) being built at the Mater Misericordiae University Hospital and St. Vincent’s University Hospital are critical elements in the DMMC’s mission. Together with similar resources in Dublin’s other teaching

hospitals, they can provide an interface between clinicians, clinical scientists and bench scientists and greatly augment patient-oriented research.

One of our goals in developing the GRUs is to allow them to become the centres for patient-oriented research in the teaching hospitals. While the initial mission of the GRUs was largely centred on the collection of patient samples (especially DNA) and the development of biobanks that would be linked to clinical databases, the potential is greater. Indeed, the GRUs will allow us the physical infrastructure for translational research on our hospital campuses. We can then build upon it the other elements of successful patient-oriented research – clinician investigators, dedicated research nurses, epidemiologists, biostatisticians, and information technology - that can fulfil the promise of translational research.

In spite of the potential, there are key challenges facing the DMMC and others interested in delivering on the promise of molecular medicine. One of the most important missing links in developing clinical and translational research in Ireland is the lack of an appropriate career structure for clinical investigators. Many of the clinicians in our teaching hospitals have had excellent training and demonstrated productivity before returning to consultant positions in Ireland. However, the lack of protected time for research has limited opportunities for many and hindered clinical research development. Development of a clinical investigator career pathway is essential if we are to be competitive in this arena. Furthermore, although there are more opportunities for laboratory based training in Ireland, there is much less organised

## DMMC News

*DMMC News* is a forum for the molecular medicine community in Dublin to present the latest developments of interest to a local and international audience.

*DMMC News* is circulated widely in Dublin and to contacts further afield; it is also available to all from the DMMC website ([www.dmmc.ie/DMMC\\_News.htm](http://www.dmmc.ie/DMMC_News.htm)). It is an opportunity to present research, in the context of the developing cross-institutional collaborative environment, to fellow scientists and clinicians, funding agencies, government bodies, and the public. *DMMC News* also contains listings of events (seminars, meetings, courses and workshops). Contact [info@dmmc.ie](mailto:info@dmmc.ie) to contribute to future issues.

## On other pages

- 2 New DMMC agreement adds RCSI as equal partner
- 3 DMMC Research Consortia in Breast and Colorectal Cancers
- 4 Science Hands-On Workshops
- 5 Cancer 2005 & Irish Association for Cancer Research Meetings  
DMMC Translational Workshop: Immunity & Lung Disease
- 6 RESEARCH UPDATE: Oesophageal Cancer
- 7 News in Brief
- 8 Events

training in clinical investigation. It is our strong hope that the infrastructures in the GRUs can allow them to develop into the clinical laboratories in which training can be provided, both in didactic courses and practical opportunities for mentored clinical investigation.

Clinical research at its best involves clinical investigators asking critical questions usually in the context of patient care, generating hypotheses that can be tested in appropriate models with their bench colleagues, and then returning to the clinical arena to test their findings in patients. The DMMC's challenge and opportunity is to help complete this circle of patient-bench-patient for Dublin medicine by providing support, training and education at all levels of this circle.

### **New DMMC Agreement Adds RCSI as Equal Partner**

Pierre Meulien, CEO, DMMC

The Minister for Education and Science, Ms Mary Hanafin, TD, attended the signing of a new agreement between the three leading medical schools in Ireland which forms a single entity, the DMMC, for high level medical research and teaching in Dublin.



*Sitting from left:* Dr John Hegarty (Provost, TCD), Mr Michael Horgan (CEO & Registrar, RCSI), Dr Michael Kamarck (Chair of DMMC Board & Senior VP, Wyeth BioPharma), Dr Hugh Brady (President, UCD). *Standing from left:* Prof Niall O'Higgins (UCD & President of RCSI), Ms Mary Hanafin, TD (Minister for Education & Science), Dr Pierre Meulien (CEO, DMMC).

The agreement, signed on April 25, extends the ownership of the DMMC from its founding universities, Trinity College Dublin and University College Dublin, to include The Royal College of Surgeons in Ireland as an equal partner. The DMMC is a limited company with charity status, the formation of which was made possible with funding from the Higher Education

Authority (HEA) through the Programme for Research in Third Level Institutions (PRTL) cycle 2 and further developed in cycle 3 through The Programme for Human Genomics in partnership with RCSI. The RCSI brings excellent research capabilities, complementing those of UCD and TCD and, through their affiliation with Beaumont hospital, the DMMC can now build real critical mass in clinical research in specific disease areas. RCSI's established expertise in cardiovascular disease, inflammation, neuro-psychiatric disorders and certain cancers, is already being integrated and developed within the Programme for Human Genomics, the first ever programme involving all three institutions.



*Attending the signing in Newman House, from left:* Prof Muiris Fitzgerald (Dean of the Faculty of Medicine & Health Sciences, UCD), Prof Kieran Murphy (Chairman, Department of Psychiatry, RCSI), and Dr Terry McWade (Deputy CEO, RCSI).

The gap between the recent massive increase in scientific knowledge and our ability to translate that knowledge into patient benefit has never been wider and the DMMC gives us an opportunity to address this promptly and collectively. Indeed, the DMMC provides the perfect neutral platform on which cross-institutional multi-disciplinary research, education and training programmes can be built. The success of these initiatives will be key in bringing new technology, knowledge and treatments to the clinic. The creation of this single community facilitates collaborations with like-minded centres in Europe and in North America. As a small country, Ireland's contributions to biomedical breakthroughs will be most effective through collaborative efforts.

The DMMC has already been a catalyst for ambitious programmes in several areas and in the process has contributed to the breaking down of institutional barriers. We now look forward to operating at an even higher level, building more disease specific consortia where research and education are

developed in parallel (see further articles in this issue of DMMC News). The DMMC will act as a magnet not only to excellent scientists who will want to join our teams but also to Biotechnology and Pharmaceutical companies that will need access to our expertise in clinical research across the city.



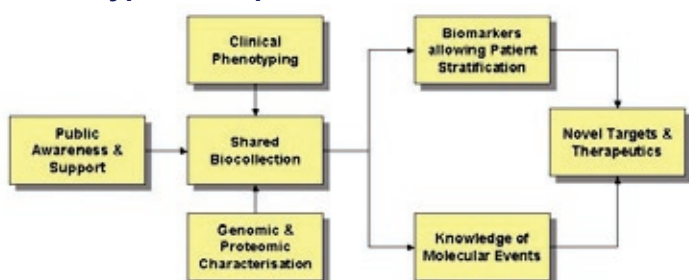
At the signing of the new DMMC agreement, from left: Prof Brian Harvey (Director, Institute of Biopharmaceutical Sciences, RCSI), Prof Ian Robertson (Dean of Research, TCD), and Prof John Hegarty (Provost, TCD).

## DMMC Research Consortia in Breast and Colorectal Cancers

Paul Harkin, DMMC Programme Manager

One of the benefits of the DMMC model is the ability to create critical mass by assembling multi-investigator cross-institutional collaborations. Two DMMC consortia have recently been created in the fields of breast cancer and colorectal cancer research. These consortia comprise surgeons, gastroenterologists, epidemiologists, pathologists, radiation & medical oncologists, genetic & research nurse specialists as well as fundamental academic researchers.

### Typical Scope of Consortia Activities



Cross-institution consortia allow investigators to address a bigger range of shared research objectives than they could as individuals, while maintaining focus on their area of strength.

The **Breast Cancer Research Consortium** aligns 40 fundamental and clinician scientists from 4 universities and 6 teaching hospitals across Dublin around an emerging research infrastructure. This core infrastructure includes an information portal to capture clinical & research data from participating sites as well as a molecularly characterised biobank of serum and tissue material drawn from an accurately phenotyped patient population. This shared resource will fuel individual investigator-led genomic and proteomic research within the consortium.

The **Breast Cancer Research Consortium** has established research objectives to:

1. Build a **biocollection** of serum and tissue materials from a well phenotyped patient population using harmonised standard operating procedures.
2. Apply sophisticated genomic, proteomic and imaging technologies to molecularly characterise biobanked materials with a view to identifying, in hypothesis-driven **research programmes**, novel biomarkers for earlier diagnosis and improved prognosis.
3. Combine both laboratory and clinical characterisations to allow more sophisticated **patient stratification** leading to the application of more targeted therapeutic strategies.
4. Explore aspects of the molecular and **cellular signalling** and control events underlying disease pathogenesis.
5. Exploit our knowledge of the disease processes at a molecular level to identify novel **biomarkers**, targets and **therapeutic strategies**.
6. Increase public **awareness** and support for breast cancer research.

The DMMC has also created the **Colorectal Cancer Research Consortium**, comprising over 40 academic and clinician scientists from 10 institutions, around common research objectives. It aims to advance earlier disease detection and improve patient stratification through cross-institutional translational science with specific objectives to:

- Build a compelling scientific, economic and strategic business case for the introduction of a **National Screening Programme** for the early detection of colorectal cancer by identifying and validating the best available screening tools and demonstrating their effectiveness in a pilot-screening project.
- Create a **Shared Biocollection** of human serum and tissue drawn from patients presenting at each of the participating hospitals. Materials will be collected

to the highest scientific and ethical standards using harmonised procedures and will be subjected to sophisticated molecular characterisation using genomic, proteomic and imaging technologies. When combined with detailed clinical assessment of donors, these materials will create a phenotypically well-defined, molecularly characterised bioresource.

- Conduct hypotheses-driven research that provides a better understanding the aetiology and pathogenesis of colorectal cancer leading to the discovery of **Biomarkers** for improved disease diagnosis and prognosis.
- Apply these biomarker discoveries to improve **Patient Stratification** in the clinical setting such that patients receive the most effective and appropriate therapeutic interventions.
- Promote better **Public Awareness** of the disease risk factors, early symptoms and intervention options as well as support for ongoing biobanking and research initiatives.

An initial research programme being advanced by this consortium investigates the hypothesis that the proteins involved in controlling genomic instability and DNA damage/repair will significantly alter the chemo-radiotherapeutic sensitivity profiles of colorectal cancer tumours. To explore this hypothesis, the consortium aims to conduct transcriptional RNA profiling and translational proteomic analysis of colorectal and rectal cancer patients undergoing adjuvant and neo-adjuvant treatment. The specific roles of DNA damage/repair mechanisms, clusterin and cyclooxygenase-2 in response to radio- and chemotherapy will be examined.

## Science Hands-On Workshops

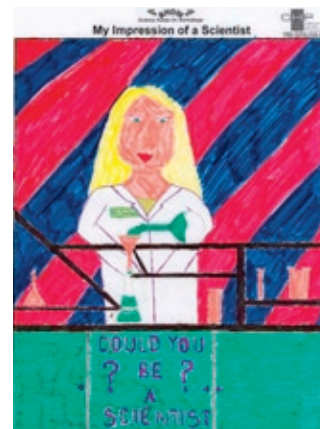
Caroline Ang  
Centre for Human Proteomics, RCSI

Over the past six months, the Centre for Human Proteomics (CHP) at RCSI has played host to over 175 junior scientists in training! The Science Hands-On Workshops (SHOW) programme was developed in response to the new primary school science curriculum, which emphasises 'being a scientist'. Up to two primary school classes a month visit RCSI to take part in a half-day programme that involves touring



the CHP labs, interviewing a scientist and conducting their own (safe and non-toxic) protein experiment in the lab.

Prior to the visit and to expand their experience beyond their time in the lab, we ask the students to draw their impression of a scientist. Many of these artworks depict some quite mad-looking researchers engaged in rather volatile experiments. The perils of research are often explored during the interviewing a scientist session along with other topics of interest including the use of animals, and the level of remuneration scientists receive (usually measured in terms of car model). By taking part in the programme, we hope to allow children to experience, briefly, the life of a scientist. We also hope these visits help dispel preconceived notions and stereotypes about who scientists are and what we do.



We are already fully booked for this academic year and feedback from teachers has been very positive. One 6<sup>th</sup> class teacher told us that "[the class was] so animated about all they had experienced. It's really great to see them so enthusiastic as they don't often get to do things like this, being from a disadvantaged area."

We will be working over the summer to develop new experiments and better integrate the programme into the school curriculum. SHOW will start again in September 2005, and we would be delighted to hear from any DMMC scientists who would like to volunteer and/or be interviewed.

## Cancer 2005 & Irish Association for Cancer Research Meetings

Mark Lawler, St James's Hospital & TCD

**Cancer 2005** took place in Dublin Castle on the 31 March and 1 April 2005. It was an extremely successful conference with over 230 delegates attending. There was significant representation from the National Cancer Institute, USA. Key themes in the meeting included *Cancer Strategy, Cancer and Public Health, New Perspectives in Cancer Care, Breast Cancer the Way Forward, Translational Medicine and Cancer Drug Discovery* and the *Future for Cancer Medicine*.



At *Cancer 2005*, from left: Prof Donal Hollywood, (Marie Curie Chair of Clinical Oncology, TCD), Mr John O'Brien (CEO, St James's Hospital), Ms Mary Harney, TD (Tánaiste and Minister for Health & Children), Dr Tom Mitchell (Chairman of Board, St James's Hospital), Prof Mark Lawler (Chief Molecular Geneticist, St James's Hospital & TCD), Prof John Reynolds (Professor of Surgery, St James's Hospital & TCD).

Prof Mike Richards, 'Cancer Tzar' and National Cancer Director in England, set the tone for the meeting with an excellent overview of the current state of play in England and some pointers as to how we can develop our cancer strategy here in Ireland. Dr John Kennedy (St James's Hospital) highlighted the role of cancer clinical trials in improving cancer care, indicating the important role that translational medicine will play in this area. Emphasising this theme, Prof Bob Pinedo (Director of the VUmc Cancer Center Amsterdam, The Netherlands) outlined the importance of translational medicine in moving from the laboratory to the clinic and back again.

In the *Translational Medicine and Cancer Drug Discovery* session, Prof Gordon McVie (European Institute of Oncology, Milan, Italy) gave an excellent

overview, while contributions from Prof Chris Michejda and Dr Janet Dancey (both National Cancer Institute) and Prof Mark Lawler (IMM, TCD) emphasised advances in this area. Prof Paul Workman (Director of Centre for Cancer Therapeutics, Cancer Research UK) encapsulated the enthusiasm and excitement at the conference in his excellent state of the art lecture on the 'Second Golden Age of Cancer Research.'

### The Irish Association for Cancer Research Meeting

took place in Kilkenny (11-12 March 2005). This is the main meeting of cancer researchers on the island of Ireland. A selection of free papers highlighted the best of Irish cancer research, together with special sessions on a number of topics. These included *Epigenetics of Cancer*, with excellent contributions from Dr Amanda McCann (Conway Institute, UCD), Dr Karen Woodson (National Cancer Institute), and Prof Bob Brown (University of Glasgow, UK); *Cytokines, Cell Signalling and Cancer* (Dr Rosemary O Connor at the National University of Ireland Cork, Dr Christiane Bruns from Munich, and Prof Jim Johnston from Queens University Belfast); and *Upper Gastrointestinal Inflammation and Cancer* (Prof John Reynolds, IMM, TCD; Dr Laurie Hardie, University of Leeds; Dr Jan Van Lanschot, Amsterdam, The Netherlands).

Prof Ian Stratford (University of Manchester) gave an excellent state of the art lecture on Hypoxia and Cancer. The Irish Cancer Society Lecture was given by Prof Nick Lemoine (St Bartholomew's Hospital) who looked at the advances in targeting viral gene therapy for cancer. Prizes for best presentations at the meeting went to Dr A McElligott (IMM, TCD) and Dr A Hill (Queens University Belfast).

This IACR-ICORG Translational Symposium was very successful, and an important bridge-building exercise to advance translational research in this country. DMMC researchers have been asked to contribute to an ICORG Scientific Meeting in October 2005. A Translational Research Modality has been set up within ICORG, chaired by Prof Mark Lawler, to provide added connectivity between clinicians and scientists in translational research in cancer.

## DMMC Translational Workshop: Immunity & Lung Disease

Len Poulter, James Connolly Memorial Hospital

The first 'Translational Workshop' organised by the DMMC offered a forum designed to promote interaction between clinical academics and basic

scientists. Focusing on lung disease and immunology, the programme contained six presentations, all by clinicians, who each summarised issues of pathogenesis in particular diseases that would benefit from investigation at the basic science level.

We learnt of the need to investigate the genetic basis of lung fibrosis in sarcoidosis (Dr Seamas Donnelly, St Vincent's University Hospital & UCD), the cause and effect issues between infection, inflammation and immunopathology in cystic fibrosis (Dr Charles Gallagher, St Vincent's University Hospital & UCD), and the complex pathogenic pathways that promote COPD, a public health problem of huge proportion (Dr Tim McDonnell, St Vincent's University Hospital & UCD). We further learnt that the pathogenesis of asthma particularly with regards to eosinophil activity remains ill defined (Dr Richard Costello, Beaumont Hospital & RCSI), and that information is now emerging showing diversity within patient groups not previously recognised.

In other presentations the audience were left in no doubt of the life threatening potential of pulmonary hypertension (Dr Sean Gaine, Mater Misericordiae Hospital & UCD) and the need for basic science to unravel the relationships between mechanisms at the molecular level and aberrant physiology in this condition. The few who left early to avoid Friday night traffic missed a fascinating presentation on TB (Dr Joe Keane, St James's Hospital & TCD), which highlighted the need to screen for latent infection and seek an understanding of those circumstances that cause such infections to 'awake', and in awakening avoid destruction by down-regulating apoptosis.

All the speakers were most informative, highlighting areas of pathogenesis in need of investigation and recognising the value of collaboration with the basic scientists of the audience. For this they should be both congratulated and encouraged. Whether the scientists will take up the challenge to institute collaborative investigations and 'translate' laboratory based knowledge into practical use within the clinical arena only time will tell, I really hope they do! Speaking personally I am only too well aware of the difficulties posed by the variability and inconsistency inherent in working with clinical samples from patients. However, such problems have motivated me for many years and the satisfaction of perhaps directly contributing to improved patient management cannot be overstated.

Initiatives such as this must be encouraged as there is no doubt that the evolution of 'Translational Medicine'

is the one thing that may short circuit the sometimes laboured progress from laboratory to clinic. Its success requires collaboration between the clinical and scientific communities, from the recognition of the problems, right through to the institution of new medical practice. The closer we can bring these two groups together the better.

*Professor Len Poulter is Programme Manager in the Department of Respiratory Medicine, James Connolly Memorial Hospital, Dublin.*

## RESEARCH UPDATE: Oesophageal Cancer

Mohamed Abdel-Latif & John Reynolds  
St James's Hospital & TCD

Oesophageal cancer is an aggressive disease which confers a poor prognosis. The incidence of a pathological subtype of oesophageal cancer, adenocarcinoma, has risen markedly in the Western world in the last 20 years. Ireland has one of the highest rates of oesophageal cancer among European countries. In men the rate is 11.7 per 100,000 in the Republic compared with an EU average of 9.5 per 100,000. In women the rate is 6.1 per 100,000 in the Republic of Ireland compared with a European Union average of 2.2 per 100,000.

There is a definite association between oesophageal adenocarcinoma and chronic gastro-oesophageal reflux disease (GERD). Reflux is prevalent in the Irish population, undoubtedly linked to diet and also to the increasing prevalence of obesity in Ireland. In some long-term sufferers with GERD, the lining of the lower oesophagus undergoes metaplasia to the specialised intestinal epithelium defined as Barrett's oesophagus. Barrett's oesophagus is associated with a 40-fold increase in the risk of oesophageal adenocarcinoma. Intuitively, prevention and effective management of GERD and Barrett's oesophagus in our society is likely to have the greatest impact on the problem of oesophageal cancer.

The interdisciplinary oesophageal research programme based at the Institute of Molecular Medicine (IMM), Trinity College Dublin and St. James's Hospital, is focussed in the following areas:

**1. Molecular analysis of gene expression and regulation along the inflammation- metaplasia- dysplasia- adenocarcinoma sequence in the oesophagus.**

In work from the Unit, oesophageal adenocarcinoma tissue showed high levels of activated NF- $\kappa$ B compared to normal oesophageal tissues, and there is a progression of NF- $\kappa$ B through Barrett's metaplasia to adenocarcinoma (Abdel-Latif et al., *Ann Surg.* 2004; 239: 491-500). Moreover, the pro-inflammatory cytokines IL-1 $\beta$  and IL-8 are elevated in oesophagitis and Barrett's epithelium, and markedly elevated in adenocarcinoma. The association of NF- $\kappa$ B activation with cytokine up-regulation was only evident in patients with adenocarcinoma (O'Riordan et al., *American Journal of Gastroenterology - In Press*). Moreover, expression of Bcl-2, a gene regulated by NF- $\kappa$ B, was significantly associated with tumour differentiation and Bcl-2-positive patients had a significantly improved survival compared with bcl-2-negative tumours (Raouf et al., *Dis Esophagus.* 2003; 16: 17-23).

A new research direction in the IMM is to establish oesophageal tissue explant cultures of freshly isolated normal, inflamed, Barrett's epithelium and tumour tissue, which is a direct analogy to *in vivo* carcinomas. Using organ culture model systems will allow the study of a wide range of molecular markers which occur during neoplastic progression of the oesophagus. This system also allows the evaluation of the possible roles of chemical carcinogens, radiation, and cellular oncogenes in Barrett's carcinogenesis.

## 2. Neoadjuvant chemoradiotherapy.

The use of neoadjuvant chemoradiotherapy prior to surgery in the treatment of oesophageal cancer has increased in recent years, and up to 25% of patients will have a complete pathological response to the neoadjuvant regimen. Many patients will not respond, however, and the knowledge of molecular factors predicting response or resistance to chemoradiotherapy is needed. At this time micorarray studies of responders and non-responders are underway.

## 3. Evaluation of Positron Emission Tomography (PET) scanning as an early response predictor to neoadjuvant regimens.

This project investigates the quantitative measurement of 18F-Fluorodeoxyglucose (18F-FDG) uptake by Positron Emission Tomography (PET) in oesophageal cancer, and to determine feasibility of quantitative sequential PET imaging as a prognostic factor for chemoradiation therapy. The studies also focus on the molecular regulation of glucose uptake, tumour hypoxia, and predictive and

prognostic features.

## 4. Development of an oesophageal biobank.

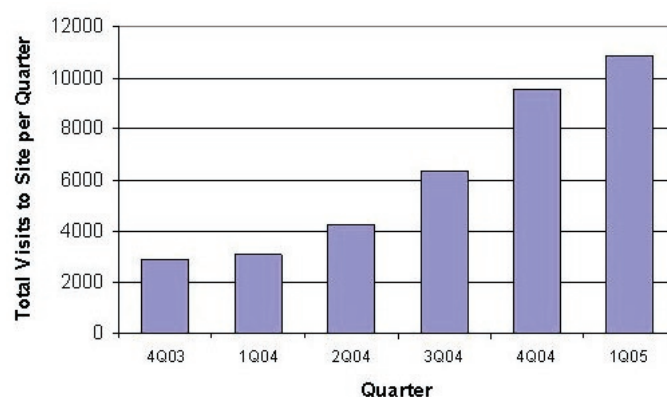
A Tissue Biobank is a repository of fresh-frozen tissue, DNA, RNA and serum which has been assembled from Barrett's patients and patients with oesophageal cancer. The purpose of storing these specimens is to facilitate current and future departmental research programmes. It is our intention that these samples are stored in accordance with best available practice guidelines with particular emphasis on patient confidentiality, sample collection, handling and annotation.

## News In Brief...

### Communicating DMMC activities

Besides *DMMC News*, other primary communication tools for promoting the activities of the DMMC include our website, and posters displayed at international meetings. A poster summarising current DMMC activities was most recently at the Molecular Medicine Tri-Conference in San Francisco (April 2005), accompanied by DMMC Chief Executive Dr Pierre Meulien.

The DMMC website (<http://www.dmmc.ie>) - which includes news, events, careers, education and research information - has been increasingly accessed since its launch in 2003 (see graph below). During April 2005 alone, there were over 7,000 visits (180,606 hits).



### DMMC Courses & Workshops

From February to June, five DMMC Courses and a Translational Workshop took place around the city. Highlights included very popular courses in *Microarray Analysis* (including a hands-on session), *Proteomics*, and *Cancer Biology to Cancer Medicine* (part II of this course runs in July, so there is still time to apply

online). From their inception in 2003, DMMC Courses & Workshops have attracted over 700 individuals based in academic institutions and hospitals across Dublin, with a growing number from further afield. The user base ranges from postgraduate students to

principal investigators and clinicians. New offerings for 2005/2006 will cover *Biopharmaceutical R&D* (in collaboration with Wyeth) and *SNP Analysis*. More information at <http://www.dmmc.ie/courses.htm> as soon as it's available.

## Events

See [www.dmmc.ie](http://www.dmmc.ie) for more information on these and other events  
Please send details of forthcoming events to [info@dmmc.ie](mailto:info@dmmc.ie)

DATE (2005)	EVENT	LOCATION
2–16 Jun Each Thursday	<b>DMMC Course: Proteomics, Methods &amp; Applications</b> <a href="http://www.dmmc.ie/courses.htm">www.dmmc.ie/courses.htm</a>	RCSI, St. Stephen's Green, Dublin 2
14 Jun – 1900	<b>RCSI Career Development Talk: Leo Enright</b> (Discover Science & Engineering)	RCSI, St. Stephen's Green, Dublin 2
15 Jun – 1600	<b>Lecture: Androgen Receptor Function in Prostate Cancer.</b> Prof Wayne Tilley (University of Adelaide)	Conway Institute <sup>2</sup>
16–17 Jun	<b>Royal Academy of Medicine in Ireland Summer (RAMI) Meeting - Biomedical Sciences</b> <a href="http://www.nuigalway.ie/ncbes/RAMI.htm">www.nuigalway.ie/ncbes/RAMI.htm</a>	NUI Galway
16 Jun – 1300	<b>Lecture: Selection and Maintenance of Virulence Strategies.</b> Dr Brendan Loftus (Institute for Genomic Research, Maryland, USA)	Conway Institute <sup>2</sup>
16 Jun – 1600	<b>Lecture: Mechanisms of acute and chronic lung injury: Changing pillars of wisdom</b> Prof Tom Martin (University of Washington, USA)	Conway Institute <sup>2</sup>
17 Jun 1000 – 1600	<b>Conference: HIV In the New Millennium</b> <a href="http://www.cpreregistrations.com/hiv/">www.cpreregistrations.com/hiv/</a>	O'Reilly Hall, UCD
20 Jun – 1300	<b>Lecture: Protein Kinase C phosphorylation and function in T lymphocytes</b> Dr. Michael Freeley (RCSI)	Durkan Lecture Theatre, IMM <sup>1</sup>
21 Jun	<b>Marie Curie Information Day</b> Contact: Siobhan Harkin - <a href="mailto:siobhan@chiu.ie">siobhan@chiu.ie</a>	The Conference Theatre, Enterprise Ireland, Glasnevin
27 Jun – 1300	<b>Lecture: A role for the leukocyte protein, L-plastin, in colorectal cancer progression.</b> Dr. Eilish Foran (RCSI)	Durkan Lecture Theatre, IMM <sup>1</sup>
7–8 July	<b>DMMC Course: Cancer Biology to Cancer Medicine Part II</b> <a href="http://www.dmmc.ie/courses.htm">www.dmmc.ie/courses.htm</a>	Durkan Lecture Theatre, IMM <sup>1</sup>
15 Sep	<b>5<sup>th</sup> Annual Conway Festival of Research</b> Abstract deadline: 1 July <a href="mailto:conway.festival@ucd.ie">conway.festival@ucd.ie</a>	O'Reilly Hall, UCD
22–23 Sep	<b>Upper GI Surgeons (AUGIS) Annual Scientific Meeting.</b> <a href="http://www.augis.org/augis/pages/augis.php">www.augis.org/augis/pages/augis.php</a>	Royal Hospital Kilmainham, Dublin
22 Sep – 1600	<b>Lecture: Cellular and molecular mechanisms in diabetic retinopathy.</b> Prof Alan Stitt (Queen's University, Belfast)	Conway Institute <sup>2</sup>
22–23 Sep	<b>INNSI (Irish Network of Neural Stem-cell Investigators) &amp; AIRRN (All Ireland Retinal Researchers Network) Conference</b> <a href="http://www.fightingblindness.ie">www.fightingblindness.ie</a>	Conway Institute <sup>2</sup>
18–19 Nov	<b>8<sup>th</sup> Annual Meeting of the Institute of Molecular Medicine</b>	Durkan Lecture Theatre, IMM <sup>1</sup>

<sup>1</sup> Institute of Molecular Medicine (IMM), St James's Hospital, Dublin 8

<sup>2</sup> Conway Institute of Biomolecular & Biomedical Research, UCD, Belfield, Dublin 4