Welcome to the spring TCBE newsletter.

As usual, the past few months appear to have been a very productive period for the Centre, with plenty of new journal papers published, awards made to PIs and students and a number of exciting new initiatives launched. Details of all our activities can be found in the newsletter, but I’d like to highlight just a few of them.

December saw the launch of Dublin Biomedical Engineering Research Initiative (DBERI), which helps to cement existing relationships between TCD, UCD and RCSI and provides us with a platform to build on these strengths and to take advantage of new funding opportunities as they arise. The launch occurred at our annual Winter Symposium, which provided us with an opportunity to showcase our research and educational achievements to the wider college community.

In November the M.Sc. in Bioengineering received the Engineers Ireland Education Award for demonstrating excellence in the field of engineering education at the Engineers Ireland Excellence Awards. This was the second award the MSc received in the past year. I would like to thank again Prof. Richard Reilly (Course Director) and all the TCBE PIs and students who contribute to the MSc. It couldn’t happen without your efforts. Our hope is that in the coming years we can expand the MSc to offer specializations to meet the changing demands and needs of potential students and Irish Industry.

In January we hosted the 19th Annual Conference of the Bioengineering Section of the Royal Academy of Medicine in Ireland (RAMI) in Johnstown House Hotel, Co. Meath. Nearly 200 delegates attended the conference. Prof. Richard Reilly delivered the Samuel Haughton lecture for which he received the RAMI silver medal. The RAMI Bronze medal was awarded to Caroline Curtin (Royal College of Surgeons in Ireland and TCBE) for the best overall paper. A number of PhD students from the TCBE also received prizes, including Eamon Sheehy (Best Presentation - Tissue Engineering), Alanna Gannon (Best Presentation - General Bioengineering) and Amy Lynch who received the Depuy Plate for the best young student presentation and poster. Tanya Levingstone (Royal College of Surgeons in Ireland and TCBE) won the Established Researcher award. Congratulations to all.

Finally, it was recently announced that the Advanced Materials and BioEngineering Research Centre (AMBER), an initiative put together by PIs in CRANN and the TCBE, is amongst seven centres to receive a total of €200 million of Science Foundation Ireland (SFI) funding over the next five years. The new funding will be delivered through the SFI Research Centres Programme coupled with over €100 million in cash and in-kind contributions from industry partners, making it the largest ever combined state/industry co-funding announcement of its kind in the research field in Ireland. This will present some exciting opportunities for us. I look forward to updating you all on this in the near future.

Best,
Ireland’s leading engineers, physicians and scientists are joining forces to develop 21st century health care devices and technologies in a new collaboration of the Dublin Biomedical Engineering Research Initiative (DBERI) announced this week. Stem cell based tissue engineering, regenerative therapies for orthopaedic medicine, valve repair devices for damaged hearts and imaging systems for neurology are just some of the new technologies at the frontier of medical innovation that the new initiative will lead on.

The Initiative builds on over 20 years of collaboration between Trinity College Dublin (TCD), University College Dublin (UCD) and the Royal College of Surgeons in Ireland (RCSI) in bioengineering research and education.

“As is our tradition at Trinity College, we are bringing together diverse fields of engineering and medicine to catalyse innovation in novel ways,” said Dr Patrick Prendergast, Provost of Trinity College. “The goal of this new initiative is to improve health care delivery through new tools, technologies and medicines.”

The primary objectives of the Dublin Biomedical Engineering Research Initiative (DBERI) are to foster engagement between clinical specialisations, engineering and science. It will provide a focus for collaborative research, education and commercialisation/development activities, maximising the synergies and capitalising on its breadth of expertise. It will also increase the connectivity between the medical technologies industry sector, academics and clinicians.

“This is an important step towards the integration of different disciplines that increasingly share common goals,” said Dr. Daniel Kelly, Director of the Trinity Centre for Bioengineering. “Biomedical engineering in the three institutions has already attracted a large number of outstanding academics from Schools of Medicine, Engineering, Natural Sciences and Dental Sciences who all share the objective of translating creative ideas into new clinical diagnostics, devices and therapeutics that will transform patient care.”

The new Dublin Biomedical Engineering Research Initiative will intersect broad areas of research and focus on new approaches to disease identification, simulation, clinical testing together with the development of new interventions and the discovery of new therapies.

Professor Fergal O’Brien, Head of the Bone and Tissue Engineering Research Group at RCSI, sees the Dublin Biomedical Engineering Research Initiative as a leader in designing next-generation therapies and devices.

“The next giant leap in patient care is going to happen through the joint efforts of engineering, life sciences, medicine and pharmacy specialists, applying their expertise to expand approaches for preventing, diagnosing and treating disease and injury,” said Prof. O’Brien. “Even though this formalised effort is still in its formative stage, we’re already seeing exciting results from these collaborations that will have a profound impact on patient care.”

The Dublin Biomedical Engineering Research Initiative aligns with award winning educational programmes offered by the three institutes. The M.Sc. in Bioengineering programme received two awards in 2012, the Engineers Ireland Excellence in Education Award & the GradIreland Best Postgraduate Course of the Year 2012 in Engineering. These awards recognise the scale and diversity that the course delivers in terms of the student experience, its contribution to the Irish economy and making an impact on global healthcare challenges.

“With our top-ranked engineering and medical schools and our close ties to the country’s strong life sciences and technology industries, the Dublin Biomedical Engineering Research Initiative is uniquely positioned to make a significant contribution to the advancement of technologies to improve medicine and save lives,” said Professor Cathal Kelly, CEO and Registrar of RCSI.

The levels of collaborative engagement required within the biomedical engineering field are typified by the activities within and between the DRERI partners that have existed over several decades. By generating a platform for formal engagement, the initiative will see significant gains in the collective ability to introduce innovative applications of engineering into the clinical domain, and the establishment of successful spin-out companies, such as BiancaMed that originated from research in Biomedical Engineering in UCD, giving the medical device sector significant impetus in the region.

“Putting the existing levels of collaborative activity onto a formal footing through this initiative enhances the capacity for further research and education programme delivery relating to the design and development of medical devices, diagnostics and therapies in the fields of orthopaedic, cardiovascular, rehabilitation and neural engineering.” said Professor David FitzPatrick, Director of the UCD Bioengineering Research Centre.

The Technology Transfer Offices across the three founding institutions have helped to license and spin off knowledge, technology and developments to medical device companies based in Ireland. Two patented technologies from Prof. O’Brien’s laboratory in RCSI for bone and cartilage repair are being commercialised through a spin-out campus company, SurgaColl Technologies. Patented technologies related to novel vascular stents from Dr. Kelly’s laboratory were licensed to another spin-out company, Synergy Flow.

The ability to combine complementary skills across institutions to translate research outcomes facilitates the process of commercialising the Institutions’ innovations. “DBERI has the capability to identify medical needs, conceive solutions, prototype innovative devices and then link with development partners to move healthcare products from university to patient as quickly as possible”, said Dr Gordon Elliott of the Technology Transfer Office in Trinity College.
MSC IN BIOENGINEERING – EXCELLENCE IN EDUCATION AWARD

The M.Sc. in Bioengineering, received the Engineers Ireland Education Award for demonstrating excellence in the field of engineering education at the Engineers Ireland Excellence Awards on Friday 9th November 2012. In deciding the awards, the judges consider investment in resources, innovation in education, impact of the innovation on the student community, the integration and development of campus start-ups as well as actual or potential contribution to the economy and differentiation. The ‘Best in Class 2012’ award was kindly sponsored by Shell E&P Ireland Limited. This award clearly recognises the scale and diversity of the impact the M.Sc. in Bioengineering course in terms of the student experience, its contribution to the Irish economy and making an impact on global healthcare challenges.

"This new award for our M.Sc. Bioengineering programme is very significant as it demonstrates the dedicated commitment of the academic staff and administration to ensure that our students obtain excellent education in biomedical engineering. We provide students with state-of-the-art education in biomedical engineering, innovation and creative design to allow them meet the global challenges in healthcare and to become leaders in the medical device sector so as to deliver the best medical care possible," said Professor Richard Reilly, Course Director M.Sc. Bioengineering, Professor of Neural Engineering at Trinity College, Dublin on the occasion of this award.

Dr. Ciaran Simms, Assistant Professor, School of Engineering, accepted the award at the event and said “It is a great honour for us to receive the Excellence award having developed and grown the programme over the last twelve years.

The M.Sc in Bioengineering is a central pillar of our educational programmes in the Trinity Centre for Bioengineering and contributes to other educational initiatives including the new Biomedical Engineering stream of Trinity College’s undergraduate engineering programme, the five year MAI course, and the Graduate Research Education Programme in Engineering, a structured PhD programme in Medical Devices. This award recognises what can be achieved through education collaboration on the island of Ireland”. The Engineers Ireland Engineering Education Award is testament to the dedication and expertise of the staff involved in the M.Sc. in Bioengineering.

BUSINESS & ENTREPRENEURSHIP EVENING

A Business and Entrepreneurship seminar evening was hosted jointly with the M.Sc. for Molecular Medicine at TCD. The speakers were Brian O’Neill from Enterprise Ireland, Brian Thornes from X-bolt and Stephen Nolan from EKF Diagnostics Ltd.

TCBE TRANSITION YEAR PROGRAMME

The TCBE received huge interest this year from transition year students. As part of the TCBE Outreach, a one week transition year programme was organised. Pictured left are 5 of the transition year students who completed the TCBE Transition Year programme with Dr. Ciaran Simms. The programme gave them an excellent insight into all our research themes and hands on experience in the labs. Pictured right is the EEG lab which the group participated in as part of their introduction to Neural Engineering.
TCBE WINTER SYMPOSIUM

The TCBE Winter Symposium was held in December 2012 in the Knowledge Exchange in the Trinity Biomedical Sciences Institute. This key event was the platform for the launch of the Dublin Biomedical Engineering Research Initiative (DBERI). There was also a poster display showcasing the latest ground-breaking discoveries from TCBE researchers.

TCBE MEDIA COVERAGE

On TV
Dr. Ciaran Simms featured in an RTE television program (see http://www.rte.ie/player/ie/show/10115408/) focusing on the scientific aspects of elite athletes, and on the rugby player Tommy Bowe in particular. In this program Bowe meets a nutritionist, a movement analyst, a geneticist and Dr Simms who spoke to him about the mechanics of impact during tackling, and the magnitude of the forces experienced by rugby players during a game.

In Press
The Irish Examiner featured the DBERI announcement in press on 20 December 2012 with a photograph entitled Cutting Edge featuring Dr. Daniel Kelly, Prof. Fergal O’Brien and Dr. Liam Breen pictured here.

The Irish Times featured Prof. Fergal O’Brien, PI TCBE, in an article on Building scaffolds and growing organs for the body.

GRANTS

Principal Investigator: Daniel Kelly  
Funded by: Enterprise Ireland

Award: SFI Principal Investigator Award (Approved for Funding)  €1,700,000

Project title: A tissue engineered biological joint replacement prosthesis for the treatment of degenerative joint disease

Collaborators: Prof. Fergal O’Brien (Royal College of Surgeons); Prof. Conor Buckley (TCD); Prof. Pieter Brama (UCD); Prof. Paula Murphy (TCD); Dr. Mary Murphy (NUIG); Mr Kevin Mulhall, (Consultant Orthopaedic Surgeon, Mater University Hospital).

Principal Investigator: Daniel Kelly  
Funded by: Enterprise Ireland

Award: Enterprise Ireland Commercialization Fund (2013-2104)  €172,962

Project title: A novel bioactive scaffold for articular cartilage regeneration

Collaborators: Prof. Fergal O’Brien (Royal College of Surgeons); Prof. Conor Buckley (TCD)
Prof Richard Reilly was invited to give the keynote lecture at the 6th International Joint Conference on Biomedical Engineering Systems and Technologies (BIOSTEC), Barcelona, February 2013. BIOSTEC bring together researchers and practitioners, including engineers, biologists, health professionals and informatics/computer scientists, interested in both theoretical advances and applications of information systems, artificial intelligence, signal processing, electronics and other engineering tools in knowledge areas related to biology and medicine. BIOSTEC is composed of four co-located conferences, each specialized in at least one of the aforementioned main knowledge areas.

Dr. Daniel Kelly gave a talk in the Alchemist Café entitled “Can we regenerate damaged bones and joints using our own stem cells?” in the Mercantile on 26 February 2013.

Dr. Shona D'Arcy received an award at the Telemedicine & eHealth Section of the Royal Society of Medicine 2012 conference for her poster presentation “Automatic objective monitoring of patients technique of dry powder inhalers”

Orthopaedic Research Society (ORS) Conference 2013
Tissue engineering researchers from TCBE recently attended the Orthopaedic Research Society (ORS) Conference, held in San Antonio, Texas.

From RCSI, Caroline Curtin presented "Addition of Nanohydroxyapatite to Collagen Scaolds Results in Enhanced Stiffness, Osteogenesis and Bone Repair In Vitro and In Vivo". Amos Matsiko presented "Hypoxia Enhances Stem Cell Mediated Chondrogenesis within a Chondro-Inductive Collagen-Hyaluronic Acid Scaoid"

From Trinity College, Gráinne Cunniffe presented "Porous Decellularized Hypertrophic Tissue Engineered Cartilage as a Scaold For Bone Tissue Regeneration" Lu Luo presented "Engineering zonal cartilaginous tissue using infrapatellar fat pad derived stem cells by modulating the spatial environment within the developing construct" and Darren Burke presented "Integrating Computational Mechanobiological Methods and Genetically Modified Mouse Models to Elucidate the Role of Environmental Factors in Regulating Stem Cell Fate during Fracture Repair". Darren also attended the pre-ORS conference where he presented his work "A Computational Model of Angiogenesis and Stem Cell Differentiation in an In-Vivo Bone Chamber"
The 19th Annual Conference of the Bioengineering Section of the Royal Academy of Medicine in Ireland (RAMI) took place in Johnstown House Hotel, Co. Meath on 18th and 19th January 2013. The aim of the conference is to promote Bioengineering in its many facets by bringing together the clinical, engineering and scientific communities thus providing a platform for new and advanced researchers alike. The programme for this year’s gathering featured over 100 presentations with papers being delivered on a broad spectrum of research being conducted in the Irish Higher Education sector including Biomaterials, Cardiovascular Biomechanics and Devices, Orthopaedic Biomechanics and Devices, Tissue Engineering and Neural Engineering.

This multidisciplinary research event brought together over 180 leading biomedical engineers and scientists covering a broad range of clinical engineering issues. Dr. Daniel Kelly, Director of the Trinity Centre for Bioengineering (TCBE), chaired this year’s extremely successful event. The event was preceded by a Medical Device Industry-Academia workshop that was co-chaired by Dr. Kelly and Dr. Bruce Murphy.

Professor Richard Reilly from Trinity College Dublin delivered the Samuel Haughton lecture for which he received the RAMI silver medal. In addition Professor Robert Mauck, of the University of Pennsylvania, and Professor Damien Lacroix, of the University of Sheffield presented plenary lectures. The conference was also host to the Engineers Ireland Biomedical Research Medal competition, sponsored by Boston Scientific, won by PhD student Stefaan Vergruggen (NUI Galway) for making a significant contribution to the field of biomedical engineering research.

The RAMI Bronze medal was awarded to Caroline Curtin (Royal College of Surgeons in Ireland and TCBE) for the best overall paper. A number of PhD students from the TCBE also received prizes, including Eamonn Sheehy (Best Presentation - Tissue Engineering), Alanna Gannon (Best Presentation - General Bioengineering) and Amy Lynch who received the DePuy Plate for the best young student presentation and poster. Tanya Levingstone (Royal College of Surgeons in Ireland and TCBE) won the Established Researcher award.

Prof Richard Reilly was presented with the Royal Academy of Medicine in Ireland (RAMI) silver medal from Hannan Mullett, President of the RAMI Section of Bioengineering.


Nagel, T., Kelly, D.J. The composition of engineered cartilage at the time of implantation determines the likelihood of regenerating tissue with a normal collagen architecture. Tissue Engineering Part A (in press).


Hutchinson M., Kimmich, O., Molloy, A., Whelan, R., Molloy, F., Lynch, T., Healy, D., Walsh, C., Edwards, M., Ozelius, L., Reilly, R., O’Riordan, S., The mediational endophenotype is mightier than the phenotype: temporal discrimination in dystonia”, Movement Disorders - Manuscript # MDS-12-1359, in press.


Claro T, Widaa A., McDonnell C., Foster T., O’Brien FJ., Kerrigan S. Staphylococcus aureus protein A binding to osteoblast tumour necrosis factor receptor 1results in activation of nuclear factor kappa B and release of interleukin-6 in bone infection Microbiology (2013), 159, 147–154