

Research



340

Research staff and students

80

Research proposals funded

€10.4m

Research funding income 11/12



Pictured (centre) is AngioPredict EU project coordinator Dr. Annette Byrne, Department of Physiology and Medical Physics & Centre for Systems Medicine, with members of her research team (clockwise from left) Alice O'Farrell, Liam Sheils, Phil O'Halloran, Rhys Evans and Monika Jarzabek.

Research Highlights at RCSI

86

postdoctoral researchers



First Malaria Vaccine Trial being carried out in Ireland



Motor Neuron Disease research may lead to new therapies



204 students registered for higher degrees by research



*Professor Sir Robin Murray
President of the Schizophrenia
International Research Society
presents the Society's inaugural
Basic Science Award to Professor
John Waddington (pictured right)
for outstanding achievement during
his 30-year career.*



Professor John Kelly
Director of Research

At RCSI we are strongly committed to delivering on our translational research agenda, which we support with research training programmes, infrastructures and resources that meet the needs of our researchers, create a stimulating environment, support competitive multidisciplinary research and offer professional development opportunities.

Key to our mission is the engagement of clinicians in research which we encourage and support through research and training activities that promote interdisciplinary interaction. To date, the RCSI research strategy has been proven to be very successful. Over the past ten years the population of RCSI research staff and students has grown to 340 researchers, 32 per cent of which are postgraduate students. Since 2007, we have published 2000 papers in peer-reviewed journals and our competitiveness in leading large collaborative research programmes has been evidenced by our increasing success in securing substantial European and national funding awards.

There were many research achievements this year and we include some highlights of these as follows:

International awards

The APODECIDE consortium led by Professor Jochen Prehn has been successful in securing funding (€3M) under the EU Framework 7 (FP7) Health Innovation scheme. The consortium includes academic partners from Queens University Belfast (UK), Paris Descartes University, the University Hospital of Frankfurt and small to medium enterprises from Ireland and Israel. The APODECIDE research programme will develop systems medicine tools that predict treatment responses in colorectal cancer patients to 5-FU-based

chemotherapy and anti-EGFR therapy, based on a systems analysis of apoptosis (cell death) and EGFR signalling pathways. Ultimately the goal of APODECIDE is to deliver new clinical decision making tools that enable personalised medicine approaches and 'smart' clinical trials design in the future.

The EU Commission approved funding for the establishment of the European Molecular Imaging Doctoral School (EMIDS), an Erasmus network coordinated between Professor Brian Harvey, RCSI and Universities in Belgium, France, Netherlands, Italy and Greece. EMIDS will involve RCSI staff across several departments and, over a four year period, will provide doctoral training in molecular imaging having an impact on the development of future drugs and diagnostic imaging agents.

Professor David Henshall has received an RO1 grant from the National Institutes for Neurological Disorders and Stroke, USA. The study entitled "MicroRNAs as molecular effectors of epileptic tolerance" will be carried out in collaboration with Professor Ray Stallings and Professor Roger Simon in Atlanta, USA.

An international drug discovery research partnership initiated by Professor Mauro Adamo with the Institute of Crystallography of the Italian CNR in Bari, the Department of Pharmaceutical and Toxicological Chemistry of the University of Naples "Federico II", the AIRI (the Italian Association for Industrial Research), the Gianni Benzi Pharmacological Research Foundation, and the Italian Consortium DFM scrl was successful in securing funding (€570k) from the Italian Foundation "Fondazione con il Sud" to support a multidisciplinary research programme in the area of MicroRNA therapeutics applied to the treatment of Neuroblastoma. The three year programme will bring together experts in drug design (biocomputing, molecular modelling and structural biology) and synthesis (organic and oligomer synthesis).

RCSI has been awarded major European funding for research to improve the treatment of epilepsy.

The research aims to explore how individual patients react to different epilepsy drugs on the basis of their DNA so that the most effective medication can be prescribed safely to treat them.





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RCSI is one of 15 partner institutions from eight countries to receive almost €6 million funding from the European Union FP7 programme to investigate this genetic basis of responses to antiepileptic drugs as part of the EpiPGX Consortium. Dr. Norman Delanty and Dr Gianpiero Cavalleri will lead the RCSI genetics team.

National awards

The COSYST-MCH project led by Professor Ruairi Brugha was awarded funding (€0.9M) under the Irish Aid HEA Round 3 research grants scheme. The funding award will support RCSI and DCU researchers to carry out a 3 year project to study the community linkages across Health, HIV and Nutrition among young children in Malawi and Zambia, and to design and roll out distance learning modules on community research in Africa.

Professors David Cotter and Richard Costello are the recipients of the very prestigious HRB (Health Research Board) Clinician Scientist Awards. These outstanding successes, which are jointly supported by RCSI and Beaumont Hospital, will enable Professors Cotter and Costello to increase their time commitment in research and to maximize the benefit of their engagement in translational research projects in psychosis and Chronic Obstructive Pulmonary Disease respectively.

Building on a long standing collaboration, Professor Fergal O'Brien and Professor John O'Byrne secured funding (€1.3M) under the HRB-SFI (Science Foundation Ireland) Translational Research Award (TRA) scheme. This is a very prestigious award, which in 2012 was conferred to only three Irish translational teams. The RCSI award will support a project where the clinical expertise of Professor O'Byrne will guide from preclinical studies into the clinical trial, ChondroColl, a material developed by Professor O'Brien's group, for use in the regeneration and repair of cartilage and the underlying bone.

The HRB made an Interdisciplinary Capacity Enhancement funding award (€1M) to fund The Irish Longitudinal Study on Ageing - TILDA. This new HRB award will enable applied health research and implementation science to rapidly translate policy relevant findings from the cardiovascular domain into policy and practice. Within TILDA, the award will support a large team of researchers from Trinity College Dublin, University College London, the Health Service Executive and RCSI (Professor Tom Fahey) to study the role of autonomic function in the development of cardiovascular disease in adults thereby creating new biomarkers and opportunities for intervention.



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1 The first malaria vaccine clinical trial to be carried out in Ireland got underway at RCSI's Clinical Research Centre at Beaumont Hospital. Pictured (l-r) are Professor Samuel McConkey, Principal Investigator and Head of the Department of International Health and Tropical Medicine; Ann Collins, Research Nurse; Liz Fogarty, Research Nurse; Kerrie Hennigan, Research Assistant; and Dr. Eoghan de Barra, Research Fellow.

2 The AIB Seed Capital Fund, co-managed by Enterprise Equity Venture Capital, completed an €500,000 equity investment in a new RCSI spin-out, SurgaColl Technologies Ltd, to commercialise breakthrough tissue regeneration technology developed by the Tissue Engineering Research Group at RCSI. Pictured (l-r) are Professor Fergal O'Brien, Project Lead of the Tissue Engineering Group; John O'Dea, Manager High Potential Start Ups - Industrial, Enterprise Ireland; Eric Reed, Partner, Enterprise Equity Venture Capital; and Dr. John Gleeson, Project & Business Development Manager.

New insights into vitamin D and cardiovascular disease link

Study finds hearing voices could be a marker for serious mental illness in adolescents

Research demonstrates how cannabis use during adolescence affects brain regions associated with schizophrenia

RCSI hosts inaugural BioAnalysis and Therapeutics Research Day

Honorary Awards

This year Professor John Waddington (MCT) received the inaugural Basic Science Award of the Schizophrenia International Research Society by the Society President, Professor Sir Robin Murray, FRS. This award was made in recognition of Professor Waddington's outstanding achievement during his 30-year career.

New Developments

A new 'Centre for Systems Medicine' was launched this year. The centre aims to employ mathematical and statistical models in combination with large-scale data gathering to develop novel systems biology tools to predict treatment responses in patients with conditions such as colorectal cancer, brain tumours, melanoma, stroke, neurodegenerative disorders and diabetes.

The centre also aims to develop new prognostic tools for more 'targeted' treatments for these patients, and aims to inform clinical decision making and improve patient care

The RCSI Research Staff Association (RRSA) was officially re-established with a meeting and the election of its committee members, and chair, Dr. Isabella Bray. The main aim of the RRSA is to positively influence and enhance the research staff experience by representing research staff in a range of activities including interactions with institutional management and administration; informing institutional policy; facilitation of career development activities; and providing overall support for fellow researchers. The RRSA also has representation on the Irish Research Staff Association (IRSA).

Impact and Breakthrough

The standing of RCSI research is also demonstrated by the high impact of the journals in which it was published. A selection of those published in high impact journals are as follows:

A ground-breaking new study led by Professor David Henshall was published in Nature Medicine. The study, involving a multidisciplinary team of clinicians and scientists from RCSI, Beaumont Hospital and the Cajal Institute in Madrid, shows that patients with epilepsy have much higher levels of microRNA-134 in the part of the brain that causes seizures. The study also shows that a new type of drug-like molecule called an antagomir can almost completely prevent epileptic seizures in models of epilepsy. This study identifies for the first time a completely new gene target underlying epilepsy and shows the potential of a new therapeutic approach to epilepsy.

Research led by Professor Jochen Prehn and published in the Journal of Neuroscience has discovered how Angiogenin protects motor neuron cells from degrading.

This is the first time that the mechanisms behind these protective qualities of the protein have been understood, which may lead to new therapeutics for the treatment of Motor Neuron Disease.

A study carried out by a clinicians and scientists team led by Professor Gerry McElvaney and Dr. Catherine Greene published in the New England Journal of Medicine, shows for the first time that oestrogen promotes the presence of the mucoid form of *Pseudomonas aeruginosa* in the lungs of women with Cystic Fibrosis (CF). Mucoid *Ps. aeruginosa* is more difficult to treat and causes significant lung inflammation, explaining, in part, why females with CF, have a worse outcome. This study opens the way to new understanding and potential therapeutic approaches in CF. It is also the first report describing an effect of a gender hormone on infections and, as such, has major implications for conditions extending beyond CF.

Dr. Jean McBryan from Professor Leonie Young's Endocrine Oncology Research Group published a paper in Cancer Research that shows that metastatic progression with resistance to aromatase inhibitors is driven by the steroid receptor coactivator SRC-1. Cancer Research is the most frequently cited cancer journal in the world.

Dr. Oliver Schubert, Dr. Melanie Focking, Professor David Cotter, and Professor Jochen Prehn are the authors of a review published in the journal Molecular Psychiatry that assesses the role played by clathrin-mediated endocytosis and clathrin-dependent protein trafficking in the pathophysiology of psychotic disorders. The reviewers propose that targeted pharmacological manipulation of the clathrin interactome may offer fruitful opportunities for novel treatments of schizophrenia. Molecular Psychiatry is the highest impact journal in the field of Psychiatry.

Dr. Caroline Jefferies, Claire Wynne and Rowan Higgs published an article in Nature Reviews in Immunology which presents evidence for the involvement of TRIMs in autoimmune and autoinflammatory conditions and highlights a role for these TRIM proteins as emerging targets in autoimmune and inflammatory disease.

Dr. Gianpiero Cavalleri, Christopher Whelan, Dr. Saud Alhusaini, Professor Norman Delanty and their international collaborators published the article 'Identification of common variants associated with human hippocampal and intracranial volumes' in Nature Genetics.

Research of Dr. Aine Behan, published in Neuropsychopharmacology has shown physical changes to exist in specific brain areas implicated in schizophrenia following the use of cannabis during adolescence. Senior authors in this study include RCSI Professors David Cotter, Mary Cannon and John Waddington.

The papers highlighted above are just a small selection of the many outstanding publications that demonstrate the impact of RCSI research. Great credit should also be given to the many outstanding researchers at RCSI whose publications are not included in this report but nonetheless are worthy of recognition and pride.

Centre for Systems
Medicine launched

RCSI to embark on
major study to help
personalise care in
epilepsy treatment

