



OVERVIEW

The Conway Institute of Biomolecular and Biomedical

Research is a major new research enterprise at University College Dublin, named after Professor E.J. Conway, the first Chair in Biochemistry and Pharmacology.

The research programme at the Conway Institute focuses on biological molecules; *examining how individual molecules contribute to the normal operation of cells and organs and how this can be disrupted by disease*. The knowledge gained improves our understanding of the causes and effects of disease, which leads to simpler, more reliable diagnostic tests as well as innovative, effective treatments for human and animal disorders.

Founded in 1999, the Conway

Institute received funding from the Higher Education Authority and private donors through the Programme for Research in Third Level Institutions. The total funding committed to date

amounts to €84 million. Much of this was allocated to construct and equip a state-of-the-art research facility, which became operational in September 2003.

This vital infrastructural development provides world-class research facilities for up to 400 research staff and postgraduate students.

“The research programme at the Conway Institute focuses on biological molecules; the examination of how individual molecules contribute to the normal operation of cells and organs and how this can be disrupted by disease”

The Institute has drawn together a research team from such diverse scientific backgrounds as chemistry, biochemistry, pharmacology, physiology, medicine, surgery, engineering, agriculture and veterinary medicine. By facilitating the interaction of scientists from different disciplines, with different skills and viewpoints, the Conway Institute allows them to collaboratively apply their research efforts to the resolution of important scientific problems.

The research programme is organised around three centres:

The Centre for Synthesis and Chemical Biology concentrates on creating and understanding new molecules, which will lead to the discovery of new or refined drugs and the development of innovative tools to investigate biological problems.

The Centre for Integrative Biology examines the role of individual molecules in the overall function of cells, tissues and organs.

The Centre for Molecular Medicine investigates the molecular basis of disease by unravelling the causes of disorders and explaining their effects on the body.

Through extensive interaction, the activities of these centres create a research continuum, which ensures that breakthroughs in chemical and biological science are rapidly applied to the investigation and treatment of disease. The Conway Institute operates from "molecules to medicine" and from "bench to bedside".

The research activity of the Conway Institute can also be described in terms of the biological problem or type of disease being studied. There are four major areas of focus:

Cancer
Vascular biology
Neuroscience
Infection, immunity and inflammation.

Strong links with a number of major academic teaching hospitals have been developed to underpin this activity. Scientists and physicians working in the Conway Institute and affiliated hospitals are making important contributions to our understanding of the causes and consequences of diabetes, arthritis, Alzheimer's disease, cardiovascular and lung disorders as well as breast and prostate cancer.

Crucial to the success of the Conway Institute is the development of strong external partnerships. These include:



Dublin Molecular Medicine Centre (DMMC), a partnership with Trinity College Dublin (TCD) and the Royal College of Surgeons in Ireland (RCSI).



Centre for Synthesis and Chemical Biology, which brings together expertise in chemical biology from UCD, TCD and RCSI.



THE CONWAY INSTITUTE >> RESEARCH PROGRAMME





THE CONWAY INSTITUTE >> THE OPTIMUM RESEARCH ENVIRONMENT

AN INNOVATIVE RESEARCH BUILDING

The innovative design of the Conway Institute itself contributes to promoting interaction between research groups with large, open-plan research laboratories and shared support facilities. The central provision of office, writing, meeting and social spaces is an essential feature in facilitating the interdisciplinary mission of the Institute. A new teaching facility, which incorporates laboratories and classrooms, forms an integral part of the new building providing a premier educational environment for undergraduate students in life sciences. This will ensure that students are embedded in the research milieu from an early stage and that Conway Institute graduates will be well equipped for careers in the expanding knowledge-based bioindustry and healthcare sectors.

STATE-OF-THE-ART TECHNOLOGY PLATFORMS:

- Affymetrix GeneChip oligonucleotide arrays
- Real-Time Polymerase Chain Reaction [PCR]
- Confocal microscopy and imaging
- Laser capture microdissection
- Flow cytometry and cell sorting [FACS]
- Transgenic facility
- Biological Nuclear Magnetic Resonance [NMR]
- Proteomics facility

SYNTHESIS & CHEMICAL BIOLOGY



Recent developments in molecular, cell and structural biology have made it possible to define a biological problem at the molecular level. Synthetic, structural and analytical chemistry have reached similar levels of scientific advancement. This presents exciting opportunities for the design and synthesis of novel therapeutic agents. The development of chemical tools for the study of biological processes and the discovery of new drugs depend on the design, synthesis, analysis and biological evaluation of molecules. This is the core of chemical biology.

INTEGRATIVE BIOLOGY



This centre works on whole animal, organ and cellular models of important diseases and biological processes. Such experimental systems are vital if links between genes, proteins and diseases are to be found. The centre, with investigators from physiology, pharmacology, veterinary medicine and agriculture, is well placed to lead in this cutting edge arena.

MOLECULAR MEDICINE



Since the publication of the human genome, the attention of the scientific world has turned to the study of the function of these genes and the proteins they produce. This knowledge will further the research into the development, diagnosis and treatment of diseases.

The cross-institutional collaboration between clinicians and scientists will accelerate the developments of novel therapeutic targets and focus on the delivery of patient-centred clinical research. The Conway Institute will play a full role in the Programme for Human Genomics, supplying technological platforms and basic research expertise in biomolecular sciences, which are essential if the initiative is to thrive.

CENTRE FOR SYNTHESIS & CHEMICAL BIOLOGY

The Centre for Synthesis & Chemical Biology assembles researchers in the chemical sciences from University College Dublin (UCD), Trinity College Dublin (TCD) and the Royal College of Surgeons in Ireland (RCSI).

Within the spectrum of a 'molecules to medicine' approach to biomedical research, the design, synthesis, analysis and biological evaluation of molecules is carried out by investigators in this centre. The biological testing is done in collaboration with scientists in the Conway Institute at UCD, the Dublin Molecular Medicine Centre (DMMC) at both UCD and TCD, and the Biopharmaceutical Sciences Network (BSN) at the RCSI. External collaborations, both national and international, add value to the research effort at each level of the programme elements

DUBLIN MOLECULAR MEDICINE CENTRE

The Dublin Molecular Medicine Centre is a unique partnership between University College Dublin and Trinity College Dublin, the activities of which are carried out at the Conway Institute of Biomolecular and Biomedical Research and the Institute of Molecular Medicine respectively. Through the *Programme for Human Genomics*, this partnership has grown to include complementary research at the Royal College of Surgeons in Ireland. Scientists at these premier biomedical research institutions collaborate with patient-focused clinicians working in the leading Dublin teaching hospitals.

These trans-institutional partnerships focus on improving our understanding of the origin and nature of commonly acquired human diseases by exploiting developments in genomics and proteomic technologies. This knowledge allows us to identify groups of individuals who are most susceptible to particular diseases, examine the interplay between genetic and environmental factors, detect disease onset at an earlier stage and develop sophisticated therapeutic responses. The DMMC accelerates the translation of fundamental molecular research to clinical applications resulting in improved patient healthcare.



THE CONWAY INSTITUTE >> STRATEGIC PARTNERSHIPS



CAREER OPPORTUNITIES

The Conway Institute offers a wide range of career opportunities including postgraduate studentships, postdoctoral fellowships, investigator and visiting scientist positions. A key element of recruitment is to attract investigators who are able to secure substantive fellowships from major funding agencies such as the Wellcome Trust and Science Foundation Ireland.

POSTGRADUATE EDUCATION

The Conway Institute is committed not only to the creation of new knowledge and advances in health care, but also to the education and training of future generations of research scientists, health care professionals, biotechnology entrepreneurs and science policy makers. A culture of excellence in research is being fostered at both an undergraduate and postgraduate level. In a holistic approach, the Conway Institute provides a structured educational programme with training and supervision for students.

This investment in research and education will yield the dividend of research capacity and human capital to fuel a growing biotechnology industry.

TECHNOLOGY TRANSFER AND COMMERCIALISATION

The Conway Institute places particular emphasis on fostering entrepreneurship within University College Dublin and creating strong partnerships with industry. Working closely with NovaUCD and Bioresearch Ireland, the Conway Institute ensures that researchers have access to support services for continuing professional education, practical business advice and incubation facilities to assist in the establishment and development of campus companies. This proactive policy for the translation of research has seen many of the principal investigators within the Conway Institute establishing links with the biotechnology and pharmaceutical sectors through collaborative programmes, contract research and campus companies.