

LIFE SCIENCES...

IN NORTHERN IRELAND



Collaboration, Investment and Innovation

Over the past five years Northern Ireland industry, academia and government have made significant commitment to the development of life sciences capabilities. In excess of \$160 million has been budgeted for infrastructure enhancement, collaborative research, new product development, initial evaluation of innovative product concepts and staff development initiatives, attracting government support totalling \$60 million.

In the same timeframe, Northern Ireland (NI) life science companies have committed to strategic investment expenditure in the order of \$340 million including approved government assistance of almost \$70 million.

In a country with a population of just 1.7 million people, employing around 4,000 in life sciences, this level of investment (almost \$125,000 per employee) is impressive.

This illustrates Northern Ireland's determination to maximise the opportunities deriving from a long history of technological innovation, backed by a highly educated, young workforce and an internationally recognised research base.

In 1966, Northern Ireland researcher Professor John Anderson developed the world's first portable defibrillator based on a concept by local cardiologist Professor Frank Pantridge. Professor Anderson, with

colleagues Professors Jim McLaughlin and Eric McAdams, also developed the world's highest selling disposable ECG electrode and today are bringing defibrillation into the 21st century with compact disc sized defibrillator products and ongoing work on implantable devices.

Under the direction of Professor Paddy Johnston, researchers at the Centre for Cancer Research and Cell Biology embody an entrepreneurial culture which already has led to the creation of a number of highly innovative spin out companies such as Fusion Antibodies and Almac Diagnostics. As an integral part of the 'bench to bedside to business' ethos of the centre, researchers are constantly

encouraged to evaluate the commercial potential of their work and leverage business opportunities whenever feasible.

This is just a flavour of the ground-breaking work that is taking place in Northern Ireland's life sciences sector. Our 'village' community facilitates cross-discipline collaboration, fuels innovation and paves the way for the commercial exploitation of the opportunities emerging from the convergence of core technologies.



INNOVATION AT THE INTERFACE...

ACADEMIC - BUSINESS - CLINICAL

THE UNIVERSITY OF ULSTER

The University of Ulster (UU) houses the **Northern Ireland Bio-engineering Centre (NIBEC)**, origin of the world's biggest selling disposable ECG electrode system and the world's first portable defibrillator. Its research activities include: cardiac monitoring and mapping; sensor and display technologies; diamond-like carbon coatings; pulsed wave velocity devices; implantable atrial defibrillation; biotelemetry and bioceramic/biopolymer materials.

Alongside NIBEC is the **Nanotechnology Research Institute - Nanotec NI**, a world-class centre for the design, fabrication, characterisation and commercial exploitation of nanotechnology processes, devices and systems. The synergy between the two institutes is such that they are shortly to become known as the **Nanotechnology and Integrated Bio-Engineering Centre**.

The university's close links with the Regional Medical Cardiology Centre at the Royal Victoria Hospital, Belfast are currently being crystallised with the formation of the **Centre for Advanced Cardiovascular Research**. The centre will build on collective competencies in fundamental physiology, cardiovascular modelling, material science and clinical practice to accelerate the development of leading-edge clinical cardiac care devices.

The **Biomedical Sciences Research Institute** has achieved maximum scores in recent UK research assessment exercises. Housed within the new \$27 million **Centre for Molecular Biosciences**, the institute focuses on degenerative disease, with research groups for systems biology; cancer and aging; diabetes; microbial biotechnology; diet and health; biomedical genomics, stem cell and epigenetics, and vision science.

PROFESSORS SPIN OUT SENSOR SUCCESS

Sensor Technology and Devices (ST&D) was founded by University of Ulster professors, John Anderson, Jim McLaughlin and Eric McAdams. A medical technology company, it specialises in the research, design, approval and manufacture of medical electrodes and sensors, and related electronics. ST&D products include wireless vital signs monitors, pulse wave velocity systems, medical sensors and defibrillation electrodes. Among its clients are Welch Allyn, Equimed and Heartsine.

QUEEN'S UNIVERSITY

Queen's University, Belfast's (QUB) **Centre for Cancer Research and Cell Biology** brings together 40 investigators and over 300 researchers in a model for future research in life sciences. Focusing on basic science and translation into clinical application, the centre will allow Northern Ireland to contribute in a strategically important way to future UK and international research initiatives relating to cancer, infection immunity and medicinal chemistry.

The recently opened \$110 million **Northern Ireland Clinical Cancer Centre**, provides a state-of-the-art clinical facility entirely devoted to the diagnosis and treatment of cancer. The centre represents the first comprehensive cancer centre on the island of Ireland, promoting international, high-quality research programmes and linking the work of QUB with the health service and other funders of cancer research.

The **McClay Research Centre for Pharmaceutical Sciences** is part of QUB's School of Pharmacy and is based within the campus of a major teaching hospital. Employing 100 researchers in state-of-the-art facilities, the centre focuses on: drug delivery and biomaterials (controlled drug delivery systems, mucoadhesion and rheology, bioactive medical devices and biomaterials), primary and secondary care (novel approaches to improve safety and effectiveness of medicines, clinical pharmacy and drug analysis), biomolecular science (peptide drug discovery, protease inhibitors, pharmacogenomics) and experimental therapeutics (gene therapy and functional gene characterisation, radiation biology).

The **Medical Polymers Research Institute** conducts fundamental and applied research on polymeric biomaterials, passive and active (drug delivery) medical devices and medical and pharmaceutical polymeric packaging materials, integrating innovative research from design, through processing to testing and evaluation. It is involved in developing novel bioactive biomaterials for medical devices to eradicate the problems of device-related infections, investigating the degradation resistance of irradiated polypropylene packaging, and optimising artificial joint replacements.

SPIN-OUT COMPANY IN FIGHT AGAINST CANCER

Northern Ireland's well-educated workforce and strong links between universities and business, make it an ideal location for life sciences companies, says the CEO of Fusion Antibodies, a leading biotechnology discovery company.

The university spin-out company has developed a proprietary platform of **Fusion Protein Expression Technology** to enable the rapid production of soluble recombinant proteins and antibodies. It is developing products with specificity in the fields of oncology and infectious disease. Clients include GSK, Alltech, Novartis, the Center for Disease Control and the National Cancer Institute.



FROM RESEARCH...

...TO REVENUE



Innovative Drug Delivery

WARNER CHILCOTT

Warner Chilcott is an international pharmaceutical group headquartered in Rockaway, New Jersey, with facilities in Puerto Rico and Larne, Northern Ireland. The company is focused on the core therapeutic areas of women's healthcare and dermatology and develops, manufactures, supplies and markets branded prescription pharmaceutical products.

Warner Chilcott works closely with Invest Northern Ireland and has received funding for a number of research and development programmes. The Larne operation is the group's research and development centre. It was partially funded through Invest NI's Centres of Excellence programme.

Claire Gilligan, VP Operations Warner Chilcott UK, says: "Northern Ireland has many attributes for a successful business: a young population; good local universities from which to draw new graduates; assistance from Invest NI for relocation; tax credits for research and development and a good quality of life.

Current communications technology ensures that there are no barriers between our Northern Ireland site and our New Jersey headquarters."

Cardiac Devices/Sensors

HEARTSINE TECHNOLOGIES

Belfast company, Heartsine Technologies, has developed innovative technology for use in automated external defibrillators - devices that can detect and treat sudden cardiac arrest.

The company was formed in 1997 as an R&D initiative in the field of cardiac defibrillation involving the University of Ulster (UU) and the Royal Victoria Hospital (RVH). Heartsine is currently working with the UU and the RVH to commercialize a licensed implantable defibrillation product for the treatment of atrial fibrillation, the world's most common abnormal heart rhythm.

It has also developed a public access device (PAD) which has US Food and Drug Administration approval. The PAD is designed specifically for the public access sector e.g. airports, dental surgeries, schools. The device, for treating cardiac arrest, is simple and safe to use: it analyses the patient's heart rhythm and, if needed, delivers the appropriate life-saving shock.

Invest NI provided financial assistance for research and development in the early stages of Heartsine's activities. Heartsine Technologies Inc is the company's parent, based in the US.

Integrated Pharmaceutical Services

ALMAC

Almac, with its headquarters in county Armagh, Northern Ireland, was established in 2001 by its current Chairman Sir Allen McClay and has grown rapidly into a \$600 million company which employs almost 2,000 staff worldwide.

The company now comprises five closely integrated divisions, Almac Sciences, Almac Clinical Services, Almac Clinical Technologies, Almac Pharma Services and Almac Diagnostics and is a world leader in the provision of integrated research, development and manufacturing services to the pharma and biotech sectors.

Invest NI has provided support to Almac Sciences, Almac Clinical Services, Almac Pharma Services and Almac Diagnostics through a range of funding programmes extending to capital projects, research and development, training and staff skills development initiatives.

Advanced Packaging Solutions

PERFECSEAL

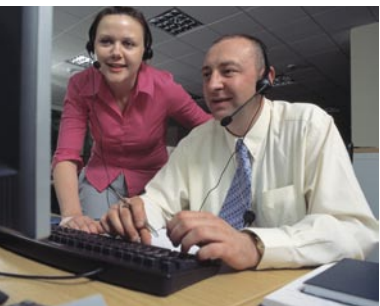
Londonderry company, Perfecseal, is the healthcare packaging division of BEMIS, one of North America's largest flexible packaging companies. Perfecseal is leading the way in the development of sterile barrier technologies and systems. The company's product range includes high-barrier materials such as pouches, breather bags and lidding. Perfecseal also designs and manufactures customized thermoformed trays.

The company works closely with two university-led specialist polymer development centers in Northern Ireland. Keith McCracken, Perfecseal's Director of European Operations, says: "New medical device technologies and combination products demand new ways of thinking about package functionality and manufacturing processes."

Perfecseal's sales growth has been phenomenal, with double digit growth in each of the last five years. The company employs 250 people, and, assisted by Invest Northern Ireland, is building a state-of-the-art manufacturing and research facility. Mr. McCracken says: "We are on target to be the global industry leader and preferred risk free supplier." He also highlights the wider enabling role played by Invest NI. "Their support has helped us to unlock market intelligence, develop high-calibre people, and to secure significant capital investment enabling new capabilities."

A PARTNERSHIP...

...FOR PROFIT



INVEST NI

Invest NI provides tailored financial and non-financial assistance to businesses. The agency is also helping to enhance the infrastructure necessary for the life sciences sector to fully and effectively exploit the opportunities presented by a strong research base and highly educated, young population.

Initial financial support for companies newly investing in Northern Ireland can include combinations of capital and revenue grants, loans and investment in share capital. However, this is merely the first step in a new company's relationship with Invest NI.

Invest NI client companies also have ongoing access to financial support for R&D and staff development as well as a range of advice and development programmes to help companies build strategic and operational capability.

Invest NI's goal is the development of a sustainable, knowledge-based economy for Northern Ireland and with this in mind it seeks to forge long-term partnerships with client companies.

TAX INCENTIVES

Companies in the UK benefit from tax incentives that include depreciation allowances of 25 per cent per annum for machinery, and 4 per cent per annum for industrial buildings.

In many cases companies may also benefit from a system of R&D tax credits offering a deduction from taxable profits of 150 per cent of qualifying expenditure for SME's (small and medium sized enterprises) or 125

per cent for larger companies. Of particular note to life science companies is the fact that "not in profit" SME's can choose instead to take a cash payment of up to 24p per £1 for qualifying expenditure.

INFRASTRUCTURE

High quality science parks and incubator facilities in Northern Ireland include:

- the Northern Ireland Science Park (www.nisp.co.uk) Belfast, a commercial and research driven centre for knowledge-based industries;
- the Technology and Engineering Innovation Centre (TEIC) at University of Ulster Jordanstown (www.uusrp.com/jtown.htm) specialising in advanced engineering, medical devices and software; and
- the Science Research Park in Coleraine, (www.innovations.ulster.ac.uk), focusing on life, health and environmental technologies.

TAILORED SUPPORT FOR BUSINESS

Some examples of Invest NI support and the level of investment in recent years are shown in the adjacent graphic.

In addition to support for strategic company development projects, Invest NI can also provide support for R&D infrastructure creation and enhancement, pre-commercial and near market product/process R&D and staff development in order to help leverage commercially exploitable opportunity from both the industrial and academic communities.

(Note:- R&D grant support may impact on a company's eligibility for the tax credits mentioned above.)

NI Life Sciences Sector
Total Funding Committed:
Support allocated:

Past Five Years
\$US 500 million
\$US 130 million

Sector Growth
Expenditure Committed
\$US 340 million
Support provided
\$US 70 million

STRATEGIC
COMMERCIAL
INVESTMENT

STAFF
TRAINING

**Technology Transfer
Continuum**
Expenditure Committed
\$US 160 million
Support provided
\$US 60 million

PRODUCT &
PROCESS
DEVELOPMENT

PRE-COMMERCIAL
RESEARCH

CENTRES OF EXCELLENCE

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