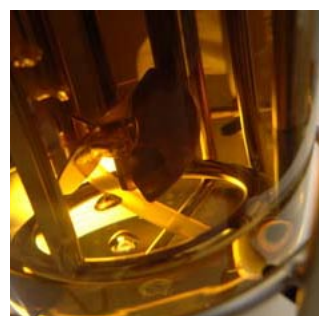


The Scottish Translational Medicine Research Collaboration  
STRATEGIC OVERVIEW AND BENEFITS TO HEALTHCARE IN SCOTLAND



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## 1 • WHAT IS TRANSLATIONAL MEDICINE?

Translational medicine can be broadly defined as 'bench to bedside' research where theories emerging from experiments in the laboratory in preclinical experiments are tested on individuals in early clinical trials. Translational medicine also goes from bedside to bench: information obtained from preliminary human experiments is used to refine our understanding of the biological systems and principles underpinning different human diseases. This enables further development and enhancement of therapeutics for treating and preventing the disease.

In therapeutic terms, translational medicine will support the development and application of current and proprietary technologies for the selection of lead compounds most likely to succeed in the clinic. It will serve to accelerate drug discovery and lead to new therapies for patients. It is hypothesised that successful translational medicine will reduce "late" failure rates in phase 3 clinical studies. Well designed phase 2 proof of concept translational medicine studies will support cost-effective determination of efficacy and safety through the use of biomarkers and experimental studies in humans.

Translational Medicine encompasses:

1. Basic science studies which define the biological effects of therapeutics in humans
2. Investigations in humans which define the biology of disease and provide the scientific foundation for development of new or improved therapies for human disease
3. Non-human or non-clinical studies conducted with the intent to advance therapies to the clinic or to develop principles for application of therapeutics to human disease
4. Any clinical trial of a therapy that was initiated based on #1–3 with any endpoint including toxicity and/or efficacy.

In addition, in the regulatory arena:

5. Translational research may be defined as appropriate product development for clinical use in various stages of investigational clinical trial. For example, identity, purity and potency of a drug product must be studied during the early stages of the clinical trial. However, these tests must be in place before implementing phase 3 trials as required by the regulators.

(see [www.translational-medicine.com/content/2/1/14](http://www.translational-medicine.com/content/2/1/14))

The aim of this initiative is to develop a world-leading network of clinical and scientific excellence throughout Scotland called the Translational Medicine Research Collaboration. The TMRC is a unique collaboration involving Scotland and Wyeth, a top ten global pharmaceutical company. Wyeth will be responsible for all the costs of such studies sponsored by them. The Scottish parties in the TMRC will form a new company with Scottish Enterprise, through which the relationship with Wyeth will be managed.

The TMRC will see more than £50million injected into clinical research in Scotland over the next five years, placing Scotland as a world leader in translational medicine.

The conceptual development of the programme involves the establishment of a core Research Laboratory linking with the four major clinical academic centres at the Universities of Aberdeen, Dundee, Edinburgh and Glasgow and the NHS in Scotland, initially working with NHS Grampian, NHS Greater Glasgow, NHS Lothian and NHS Tayside. The collaboration therefore covers over 70% of the Scottish population. Specialist patient-based studies will be performed at the four centres of excellence, linking seamlessly with the Research Laboratory which will be the focus of a number of key activities associated with this initiative, including:

- Establishing state of the art laboratory methodology and technology to be a leading international centre for translational medicine and development of biomarkers.
- The development and coordination of clinical trials carried out in the clinical research centres aimed at obtaining samples from clearly defined disease populations.
- Linking with the Scottish Clinical Research Network to manage streamlined ethical approvals, data collation and statistical analysis of results.
- The coordination of research activities to be carried out on the samples collected.

Life sciences is recognised as a key sector in Scotland's economy, as exemplified by the recent launch of the Scottish Life Sciences Strategy in February 2005. This strategy emphasises the requirement to achieve critical mass to compete in the global marketplace, and the need for each stakeholder in the sector including industry, NHS Scotland and academia to work "smarter" to identify and play to our strengths.

NHS Scotland and the University Medical Schools in Scotland are committed to positioning Scotland as a 'single research site'. This will facilitate Scotland's international competitiveness and will allow us to be rapidly responsive to initiatives such as UK Clinical Research Collaboration (UKCRC) and European Union Framework programmes. A similar conclusion has been reached by other sectors of the economy and is echoed in the stated need for a 'fully connected national strategy' (Scottish Life Sciences Strategy 2005).

The NHS and universities are in the process of working together to create a "fully connected" network to deliver clinical research. Here, Scotland's size is a clear strength because it does achieve critical mass in this key area. The key deliverables of this network will comprise:

- Newly built or refurbished state-of-the-art, joint university/NHS clinical research facilities sited in the four major academic centres (Aberdeen, Dundee, Edinburgh, and Glasgow).
- Harmonised management and operating procedures across the four sites so that, while they can function in the local setting, national programmes (large scale clinical trials, epidemiological studies) can be mounted readily and seamlessly.
- National education and training programmes for clinical researchers to meet the requirements of research governance and EU legislation.
- A 'virtual private informatics network' for secure, confidential data transmission and administration between sites.
- The mounting of national disease registers (stroke, diabetes, renal disease etc) on the virtual network to provide a stable platform for their development and exploitation.
- An integrated approach to the establishment, development and use of expensive imaging techniques which are the core of 21st century medicine.

The clinical research facilities will form a 'backbone' support structure accessible to local clusters of academic biomedical research institutes and the biotechnology industry.

Despite recent talk of spiralling R&D costs and productivity concerns, the pharmaceutical industry is poised to develop a wave of new and innovative medicines that have been discovered and developed following the complete decoding of the human genome. This presents both an opportunity and a significant challenge to R&D organisations. As more innovative new drugs acting at non-precedented targets come through R&D pipelines, it becomes increasingly important to get an earlier and better understanding of whether a drug will be effective in humans. However, preclinical studies are frequently poor indicators of success in humans.

Translational Medicine is rapidly emerging in many pharmaceutical organisations as a tool to bridge this gap between preclinical and clinical studies. Translational Medicine is a growing discipline that attempts to improve our ability to understand the likely behaviour of medicines in humans and direct R&D decision-making and financial investments with greater confidence.

Wyeth has long embraced the concepts of translational medicine. Wyeth scientists were early adopters of transcriptional profiling, both for biomarker discovery as well as for identification and validation of novel drug targets. The company has worked closely with the FDA in developing guidelines for the submission of genomic data in support of drug registration. In 2004, Wyeth was the first company to submit genomic data to the FDA in the Voluntary Genomic Data Submission program.

Wyeth utilizes Translational Medicine to specifically answer key questions such as:

- Which subjects are most likely to respond to a drug? Are there clinical subgroups that will respond differentially to treatment?
- What is the optimal dosing regimen of Wyeth's drugs?
- What are the earliest and most sensitive markers of altered pathophysiology?
- What biomarkers exist to indicate efficacy and adverse effects?

## 5 • WHAT WILL THE RESEARCH LABORATORY DO?

The Research Laboratory will be hosted by the University of Dundee but jointly owned and governed by the Scottish partners in collaboration with Wyeth.

The scientists in the Laboratory will be responsible for the coordination of the laboratory-based analyses of all TMRC clinical research projects carried out in the academic centres. These activities will be identified at a strategic level by the TMRC Governance Board (consisting of the Scottish partners and Wyeth) and on an operational basis by the TMRC management team of the Laboratory.

The other major role of the Laboratory is to develop and format the technologies emerging through the research activities in the Centres of Excellence in a manner that allows them to be applied, according to good laboratory practice (GLP), to the clinical samples that are accrued. Such tests may also be applied to the analysis of samples from clinical trials that are sponsored specifically for the development of Wyeth compounds. There will therefore be a requirement within the Laboratory for state-of-the-art research facilities in proteomics, analytical biochemistry, bioinformatics, etc. The Laboratory may in its own right also be responsible for certain research and development projects. This aspect of the Laboratory is expected to grow organically over time. The collaborating universities involved will be able to carry out research and development projects coordinated by the TMRC partners on specific themes identified either by the management team or proposed by Wyeth. The focus of this initiative is to develop new diagnostic tests for human disease that can be applied to drug development. The TMRC is not envisaged as the engine for the discovery of new chemical entities or new drug targets; however, it is feasible that, as a consequence of identifying new diagnostic tests, novel pathways will be uncovered that could potentially become drug targets. It is not envisaged, however, that this is a directive of the TMRC and such projects would be more serendipitous than planned.

The Research Laboratory will comprise:

### 1. *A Basic Research Laboratory*

The following activities will be developed:

State of the art laboratory infrastructure to allow biomarker discovery, bioinformatics, assay development, and core services. Examples of infrastructure that will be made available to all partners include expression profiling, transcriptional profiling, proteomics and metabolomics, physiology and systems biology, reagent acquisition. At full capacity up to 110 full-time equivalents will work within the research laboratory.

### 2. *A Clinical Laboratory*

The following activities will take place:

Exploratory biomarker studies including, optimising biomarker assays, analytical method validation, and clinical sample handling, bio-banking and processing and analyses of clinical samples. The clinical laboratory will employ up to thirty people when the Laboratory is at full capacity.

### 3. *A Clinical Research Group*

This group will provide the interface between the TMRC and the Scottish Clinical Research Network. They will be responsible for coordinating issues such as study design, data management, the identification of collaborators for disease translational medicine or biomarker studies or linkage with existing tissue banks. They will commission studies from the expertise at the Centres of Excellence at each of the universities and make maximum use of the wealth of disease cohorts already established, or in development throughout Scotland.

There will be four Centres of Excellence in Translational Medicine located at the Universities of Aberdeen, Dundee, Edinburgh and Glasgow which will contribute to:

*1. Leadership and Governance:*

Integration and strong links will be developed with academic and university faculties of all Scottish partners, so that the TMRC and Research Laboratory are viewed as a national resource. The leadership and governance team will be responsible for promoting innovative and novel scientific developments. The leadership team will be responsible for developing unique opportunities in translational medicine education between the Scottish partners.

*2. Designing and Executing Translational Medicine Studies*

Teams of clinical and scientific researchers will work at each University to perform cutting-edge clinical and scientific studies, initially in the areas of cardiovascular disease, neurosciences, women's health, inflammation, cancer, bone disease and diabetes. These studies will be focussed on the development of biomarkers. Studies will be designed to either discover or validate biomarkers in support of the diseases and conditions of interest. These will involve either methodology development or a focus on the use of known biomarkers in evaluation of new compounds in the proper context of disease, so that effectiveness and safety can be evaluated.

## Clinical Benefits Summary

### 1. Benefits for Scottish patients

- Will enhance our understanding of disease and allow diseases to be subdivided according to molecular pathology.
- Will provide new diagnostic tests of disease.
- Will be at the cutting edge of personalised medicine.

### 2. Benefits for Centres of Excellence and Clinical Research Network

- This programme will help in establishing, accelerating and consolidating the network of Clinical Research Facilities across Scotland.
- Will engage clinicians in a national network of clinical excellence.
- Will be the first initiative to engage with the clinical research network and show the benefit of a system that has consolidated, rationalised and harmonised ethical approvals and clinical research across Scotland.
- Will inject more than £50m into clinical research in Scotland over the next five years.
- Will place the clinical centres as world centres of excellence in translational and personalised medicine.

### 3. Technology

- Will create new state of the art technologies for the diagnosis of human disease, which will be assembled for researchers and scientists throughout Scotland.
- Will develop new diagnostic tests.
- Will create new technology platforms in Scotland which will underpin the academic and biotechnology base, e.g. metabolomics, serum tests.
- Will provide an opportunity for beta testing of new equipment.

### 4. Benefits for Teaching/Research/Academia

- Will link in exceptionally well with other major initiatives such as Generation Scotland.
- Will inject money into the University system throughout Scotland
- Will put Scotland at the forefront of applied medicine research into the development of new treatments for disease.
- Will create new undergraduate and postgraduate teaching courses in translational medicine.
- Will result in high impact publications.
- Will attract world-class academics with expertise in drug development and use.
- Will provide an enviable research platform that will strengthen the position of Scottish universities to apply for major grant awards in drug development from Research Councils, the Department of Health, large medical and philanthropic charities and foundations, the European Union and elsewhere.
- Will create an academic base of experts in drug development and use, which in its own right will attract more pharma to Scotland
- Will create a highly tuned workforce for biotech and clinical research.

### 5. Biotechnology and Commercialisation

- Will result in novel intellectual property for Scotland.
- Will develop novel diagnostic tests for licensing to Scottish biotech companies or elsewhere.
- Will result in the establishment of at least two new biotech companies.
- Will create 50 new jobs in the first instance rising to at least 110 new jobs over five years and numerous indirect jobs.
- Will help create a fertile and vibrant environment for the establishment of new Biotech companies and provide a network of expertise for the translation of their programmes into the clinical arena.
- Will provide a Scottish network for the realisation of the concept of "bench to bedside" in the exploitation of our research base.
- Will be the catalyst for a whole new industry in Scotland.

### A • Scotland's Biotechnology Landscape

The Scottish partners involved in the TMRC have a collective world class reputation in the fields of life sciences and medical research. Scotland is home to a significant proportion of the most frequently cited scientists. Scotland and Wyeth together will make a real difference to patients' lives.

#### Scotland is proud of achievements such as:

- **Breakthroughs** like anaesthesia, CT scans, ultra-sound, MRIs, the discovery of the p53 gene, Dolly the Sheep and signal transduction all emerged from Scotland.
- Scotland has been home to some of the **greatest scientists** such as Professor Lane (who discovered the p53 cancer suppressor gene), Professor I Wilmot (inventor of Dolly the Sheep), and Professor Sir Philip Cohen (whose work with signal transduction has made him one of the most respected and most cited cancer specialists in the world).
- The **University of Dundee** has collaborated with six of the world's leading pharma companies in one of the largest-ever industrial research deals worth £15 million over five years. The Division of Signal Transduction Therapy has recently been awarded the prestigious Queen's Anniversary Prize.
- The **city of Edinburgh** has one of the largest concentrations of clinical scientists and researchers in the UK.
- The **University of Dundee** has been voted for the past three years as the best scientific workplace in Europe and in the top 10 worldwide in an independent survey of scientists by The Scientist magazine.
- The **University of Glasgow** has recently invested £45M in research infrastructure. Three new Centres focus on areas of international research excellence, which will make most impact on the health of Scotland – cardiovascular disease, cancer, and infection, inflammation and immunity.
- The **University of Aberdeen** has a history of major achievements which includes alumni and former staff being awarded four Nobel prizes. It was given the Queen's Anniversary Prize which recognised the achievements of the Department of Biomedical Physics and Bioengineering in developing new techniques for medical imaging. In 2005, the University celebrated the silver anniversary of Aberdeen physicists and clinicians being the first in the world to scan the body of a patient using MRI. Millions of patients across the world have benefited from imaging technology since that pioneering breakthrough.
- **Aberdeen** has been ranked as the UK's most competitive city after London and among the top three UK cities in terms of knowledge-based businesses.
- **Grampian** is home to a world-class research base with a particular focus on life sciences and an established culture of collaboration and commercialisation. The University of Aberdeen, at the centre of the region, enjoys an international reputation in a wide range of key areas such as biomedicine and environmental microbiology.
- The **University of Aberdeen** is also at the forefront of commercialisation with an impressive list of spin-out companies and potential licensing opportunities.

### **Scotland is a premier location for biotechnology R&D:**

- Scotland has more than 500 organisations and over 25,000 employees dedicated to biotechnology R&D.
- Scotland houses more than 20% of the UK's biotech companies and is one of the most successful biotech bases in Europe.
- The biotechnology industry in Scotland has grown at an average of 28% over the last four years compared with a 15% growth rate in the rest of Europe.
- Scotland produces 30% of the UK's microbiology PhDs and 31% of the UK's genetics postgraduates.

### **B • Track record of Scottish Enterprise in supporting life sciences in Scotland**

- The Scottish government provides a highly supportive and attractive regulatory environment for biotechnology innovation and research.
- Scotland has numerous government-supported incubators and science parks.
- The government has supported the development of a "bio-campus" outside Edinburgh.
- Innovative companies such as PPL Therapeutics, Cyclacel, Axis Shield, Haptogen Ltd and Pro Strakan are a few of the firms that have received R&D funding from the government.
- A strong bio manufacturing base, including seven of the UK's 15 accredited sites, is located in Scotland.
- A Life Sciences Intermediary Technology Institute has recently been established.

## C • Track record of Scotland wide collaboration

The establishment of the TMRC has emerged from a long history of successful research and collaboration between the four Universities' medical schools, the NHS and distinguished funding bodies on a variety of research projects.

The following are brief synopses of the most recent collaborations across the five disease areas that will be the subject of research by the new Collaboration:

### GENERATION SCOTLAND

Launched in February 2006, Generation Scotland, is an ambitious and ground-breaking project exploring the ways genetic and lifestyle factors cause cancer, heart disease and mental illness. The Scottish Executive and the Scottish Funding Council are funding the project with initial grants of £4.4m and £1.8m respectively.

Leading doctors and scientists from the medical schools at the Universities of Aberdeen, Dundee, Edinburgh and Glasgow are driving forward the multi-million pound project, which is following the health of 50,000 Scots family members over the next generation. The project is being conducted in full and close collaboration with the NHS in Scotland.

Health and genetic data collected from Scottish families will build a rich store of material to explore not only the inherited nature of common diseases, but also how lifestyle, diet and environment influence the development of common conditions like heart disease, dementia, cancer and diabetes, amongst others. The findings will help identify those at high risk of developing genetic conditions, and allow early treatments with new drugs designed to combat such diseases. The genetic information will also help adapt prescription drugs to individual needs.

### HEART DISEASE

#### *Improving recovery following heart attack*

Researchers at the University of Aberdeen are carrying out a major study which could lead to improved diagnosis and more tailored treatment for heart attack patients. Chest, Heart, Stroke Scotland and The British Heart Foundation are funding the pioneering research which is using Magnetic Resonance Imaging (MRI) and ultrasound to investigate whether cardiac muscle is alive or dead following a heart attack. Currently, it is difficult to determine if the muscle is dead or alive but not contracting.

The research will increase understanding of what happens to the heart muscle following a heart attack and will lead to improved treatment methods for patients.

#### *The Institute for Cardiovascular Research (TICR)*

State-of-the-art laboratories at the University of Dundee host major research projects funded by the Medical Research Council, British Heart Foundation and the Scottish Executive.

Projects underway includes a study of heart and blood vessel behaviour in Primary 6 children in which researchers advise the children on how they can improve their cardiovascular health through changes in lifestyle and diet. Another TICR-led project involves screening people with no symptoms or signs of heart disease, detecting early signs by a scan of the heart, and treating these patients actively in an attempt to prevent future heart attacks, stroke and leg amputation.

## DIABETES

*Wellcome Trust Functional Genomics Programme grant: The United Kingdom Type 2 Diabetes Case Control Collection*

Type 2 Diabetes is the commonest form of diabetes that typically affects middle aged and elderly people. It is rapidly becoming more common with more than 180 million people believed to be affected world-wide. This type of diabetes is a very important condition as it is a major cause of strokes, leg amputation, blindness and kidney failure. Scientists still do not understand what causes Type 2 diabetes but know it is a mix of environmental factors such as diet and also inherited genetic factors.

The United Kingdom Case Control Study for Type 2 Diabetes is based at the University of Dundee. The aim is to collect DNA and clinical details from 7,500 patients with Type 2 diabetes and 7,500 people without diabetes. This has been established in Tayside because there is already established an outstanding computer-based long-term follow up of patients. The DNA collected will form a resource for use by UK and international scientists working on Type 2 diabetes and will be distributed through a Steering Committee with representatives of all the major UK centres and the patients' organisation Diabetes UK. This large collection will enable scientists to define the genes involved in both the susceptibility to both developing diabetes and the development of long term complications. This knowledge will highlight the critical pathways that are altered when patients get diabetes, will give new opportunities to understand the cause of Type 2 diabetes and therefore will allow new strategies to treat and prevent this important condition to be developed.

*Edinburgh health study identifies undiagnosed diabetics*

A major, fifteen-year, University of Edinburgh study involving 1600 middle-aged and elderly people with poor leg circulation discovered that more than half of those recruited had undiagnosed diabetes and that these patients had a similar risk of death from heart attack and stroke to those with known diabetes.

The research also showed that a simple fasting blood sugar test was enough to identify people with high risk of dying from heart disease and stroke. The study found that people who have raised fasting blood sugar levels have an increased risk of death from a variety of causes, including heart disease and stroke.

## OSTEOPOROSIS

Researchers at the University of Aberdeen are investigating the cause of a flu-like side-effect caused by drugs used to treat osteoporosis. Studies have already led to the discovery of the mechanism behind the side-effect and a potential method for preventing the flu-like illness by using a common anti-lipid drug, statin.

With the assistance of an International Pharmaceutical Company a clinical trial is underway in Aberdeen testing whether patients prescribed a statin at the same time as receiving an injection of the osteoporosis drug, bisphosphonate, will have a reduction in the adverse effect profile of the drug. Results from the study are expected to be available late in 2006.

## CANCER

### *Breast Cancer*

Researchers at the University of Aberdeen are conducting a study of young women under the age of 40 attempting to understand why these women develop breast cancer. The studies focus on the possibility that the natural body systems that protect the cell's own genetic material against damage aren't functioning properly.

Aberdeen researchers are trying to understand how certain nutrients can interact with genes in cells and how these effects might be important in a normal cell changing into a cancer cell.

Patients in Aberdeen were one of the first cohorts involved in a study to test a new anti-cancer drug which has now become one of the standard drugs used in the treatment of patients with breast cancer.

### *New Imaging Techniques in Cancer*

Patients have also participated in Aberdeen trials to understand the role of new imaging techniques such as Positron Emission Topography and magnetic resonance imaging. These techniques are being examined to understand how they can be used both to diagnose patients with cancer and also how they can be helpful in understanding how patients are responding to treatment. Aberdeen is currently the only location in Scotland with PET.

### *Minimising the effects of chemotherapy*

Scientists in Edinburgh and Germany are collaborating to produce light-activated platinum drugs which can kill cancer cells but minimise the unwanted side-effects of chemotherapy. Chemists at the University of Edinburgh, working with researchers at Greifswald, have developed platinum compounds which target and destroy cancer cells but leave surrounding, healthy tissue unharmed. The breakthrough, reported in *Chemistry & Biology* journal, builds on previous work carried out at Edinburgh and Ninewells Hospital, Dundee.

Although light-activated cancer treatments are common, it is the first time non-toxic platinum light-sensitive compounds have been used to kill tumour cells. This 'Photo-Activated Chemotherapy' (PACT) therapy, developed at Edinburgh, has a key advantage over existing light-sensitive therapies as it does not need oxygen - often limited at tumour sites - to become active. And it is hoped that these new platinum compounds will produce fewer side-effects than existing photo-activated drugs, which can linger in the body after treatment. Some patients become so sensitive to daylight that they are unable to go outside for fear of being burned.

The study also suggests PACT will be more effective than existing Platinum-based therapies. Platinum anti-cancer drugs are among the world's best-selling cancer treatments but, though effective at killing certain types of cancer cells, they are often linked to hair loss, nausea and damage to the nervous system. PACT, however, targets only malignant cells. The compounds are placed on tumour cells in a 'dormant' state and then activated by lasers directed only at cancer cells, so that toxic damage to neighbouring healthy tissue can be significantly reduced.

### *Personalised' cancer treatment*

In a collaborative study with US Company Orion Genomics, University of Glasgow researchers are developing innovative tests with the potential to enable early diagnosis of cancer and identify patients who may particularly benefit from new cancer treatments. These developments could mean much speedier and more effective treatment.

By using cutting edge technology, the collaborative study - working together with clinical trial groups and with support from Cancer Research UK - will analyse specific markers in cell DNA (methylation) to gather information for the detection and treatment of cancers of the lung, breast and ovaries. Signs of abnormal methylation often indicate cancerous cells and the study will compare these cells with normal cells to identify how methylation can provide novel information about the pathology of tumours.

This research has the potential to substantially change the way physicians first diagnose and later treat cancer patients. By analysing methylation of tumour cells it may be possible for doctors to choose the most appropriate form of treatment, thus helping get more effective drugs into patients quicker and reducing the risk of time wasted on ineffective treatments. The methylation technologies may prove to be extremely powerful in helping improve the outcome for cancer patients, particularly in clinical trials of novel agents.

#### *Beatson Oncology Centre - NTRAC status*

NTRAC is the National Translational Cancer Research Network, a network of 14 UK centres of cancer research, with a role to integrate the expertise of the bench researcher with the front-line clinician, and to translate novel anti-cancer therapeutics into clinical trials on patients. This accreditation, which is for the NHS, allows researchers at Glasgow to conduct larger scale studies around the world for the treatment of cancer.

#### *Cancer Research UK funding in Dundee*

Researchers at the Cancer Research UK Molecular Pharmacology Unit at the University of Dundee are working on the factors involved in the uptake, metabolism and detoxification of chemicals. Such studies are important in understanding the causes of cancer and its prevention, as well as determining the activity of anticancer drugs.

Research underway includes an investigation of an important group of enzymes called cytochrome P540s and how they respond to anticancer treatments. The work will help doctors in the future to select the best drug - and dose - and maximise the effectiveness of treatment while minimising the side-effects for cancer patients.

The researchers also aim to produce new and more tailored anticancer drugs, with fewer side effects. A better understanding of the way anticancer drugs are processed will also help improve existing treatments.

Another research team is examining enzymes in a vital pathway called the MAP kinase pathway. These key enzymes help cells to respond to changes in their environment and are often faulty in cancer, including breast, lung, colon and pancreatic cancer. A new research programme aims to unravel the exact role of these enzymes in tumour development and identify those that could be targeted by new treatments.

A further four research grants have been awarded to scientists based in the School of Life Sciences at the University of Dundee to:

- study the controls that are in place when cells multiply. Every day, millions of cells in our body divide in two, replacing the millions of cells that die or are worn out. Before a cell can divide, it needs to make an identical copy of all its genes so there is a complete set of DNA for both cells. This copying process has to be perfectly choreographed otherwise mistakes are made that can corrupt the cell's genetic instructions and trigger cancer. The project aims to identify new molecules that are important in controlling this process and find out how they respond to DNA damage. The team will also examine how these molecules behave in cancer cells in response to anti-cancer drugs, so treatments can be made more effective.

- investigate the role of the NF-kappaB family of molecules in cancer. One member of this family, called RelA, has already been found to have conflicting roles in cancer. In the early stages of tumour development this molecule can help prevent cancer and enhance the effectiveness of treatment. But in later stages it helps cancer cells to spread and prevents treatments from working properly. The team wants to understand the double nature of RelA and its contradictory roles in cancer. In the future they hope to investigate how drugs could be used to switch RelA back on so that it helps protect against cancer.
- research the structure, folding and function of our cells' genetic material or DNA. This team is studying a special structure called the four-way (Holliday) junction in DNA, which is the central structure formed during the repair of damaged DNA. The team operate at the interface, where biology meets chemistry and physics, and are using extremely sensitive methods to probe the structure and dynamics of junctions in single DNA molecules.

## ALZHEIMER'S AND DEMENTIA

### *New drug treatment for memory loss in old age*

University of Edinburgh researchers have shown that memory loss may be improved or helped by a new drug treatment. In pilot studies, funded by the Wellcome Trust biomedical research charity, the Edinburgh team showed that two groups— one of elderly men and one of patients with type 2 diabetes — showed improvements in specific aspects of memory after only a few weeks of treatment with the drug carbenoxolone.

Although mild impairment of brain function and memory is a common feature of ageing, previous research has shown that raised levels of glucocorticoids — hormones which are a key part of the body's response to stress— can contribute to the brain's decline as a person ages. The area of the brain, known as the hippocampus, which deals with learning processes and long-term memory storage, is especially sensitive to raised glucocorticoid levels. In previous work, the University of Edinburgh team of experts in endocrinology, psychology and geriatric medicine, had shown that an enzyme amplifies glucocorticoid effects in the hippocampus and that mice lacking the enzyme were protected from loss of memory with age.

The University of Edinburgh team has now tested the drug, which inhibits the enzyme, in small randomised trials on a group of ten healthy men aged 55 to 75 and also on 12 patients with type 2 diabetes (also known as maturity-onset diabetes). After four weeks on the drug, the healthy elderly men showed improved verbal fluency and after six weeks, the 12 patients with diabetes showed improved verbal memory.

## PATIENT TRIALS

### *Scottish Collaboration of Triallists (ScoT)*

The University of Aberdeen is leading a Scotland-wide network of health professionals and research experts involved in conducting key health trials.

The Universities of Aberdeen and its partners the Universities of Dundee, Edinburgh and Glasgow are sharing a £1.2m Strategic Research Development Grant from the Scottish Higher Education Funding Council to create a Scottish Collaboration of Triallists (SCoT).

The four-year funding will support excellence and build capacity for multi-centre randomised controlled trials (RCTs) of healthcare interventions led from Scotland.

The first component of the SCoT project is the creation of a collaboration of experienced triallists from clinical trials units at the four Scottish universities.

They will deliver a range of work plans to improve expertise, efficiency and capacity to mount landmark trials which address important health issues. These work plans will focus on harnessing new technologies to increase quality and efficiency of trials; improving recruitment and retention in trials, and providing Scottish training in these types of trials.

The second component of SCoT will enhance the existing clinical trials facility at the University of Aberdeen - the Centre for Healthcare Randomised Trials or CHaRT - to meet the demand for trials infrastructure from groups of clinicians who wish to evaluate an aspect of the health care.

#### *SAINT (Stroke Acute Ischaemic NXY-059 Treatment)*

A University of Glasgow-led international clinical trial has resulted in the design of a new drug, NXY-059, that could greatly reduce the number of patients left disabled following a stroke. Clinical trials of the drug have shown it is effective in reducing the amount of brain injury that develops during the early hours after a stroke.

The SAINT (Stroke Acute Ischaemic NXY-059 Treatment) trial, involved 154 hospitals around the globe. 1,700 patients were examined upon arrival at hospital within 6 hours of developing stroke symptoms. Patients who were given this new drug were more likely to have made a full recovery from stroke after 3 months. Their odds of avoiding disability were about 20% better if they were given NXY-059

The results have demonstrated that firstly, that it is possible to treat stroke later than 3 hours after symptoms have started; secondly, it is possible to protect brain tissue using drugs that don't carry a risk of unwanted bleeding, so called 'neuroprotective drugs'; third, that the treatment can be given alongside clot-busting treatment and even appears to reduce the risk of bleeding that clot-busting treatments cause; and fourth, that this is a treatment that could be easily and safely administered without the need for specialist staff and equipment – it could be used in any district hospital.

The effect is relatively modest for individual patients, but since treatment could be given to so many people it could have a profound effect on the number of patients who are left disabled by stroke. The trial has opened up new horizons for the treatment of one of the most important conditions affecting our society.

#### *Blood Pressure Trial*

A University of Glasgow researcher is mapping the genetic location that explains why certain blood pressure-lowering drugs are not effective for some patients. The findings enable scientists to move closer to developing targeted therapies for patients with high blood pressure who might otherwise be started on medications that won't help.

High blood pressure (hypertension) is a major risk factor for heart disease, stroke and kidney disease. Most patients require two or more medications to achieve optimal blood pressure control which reduces the risk of developing complications. However, only a quarter of hypertensive patients achieve optimal blood pressure control despite there being more than a hundred anti-hypertensive drugs.

The trial studied 2,142 severely hypertensive sibling pairs as part of the Medical Research Council's British Genetics of Hypertension (BRIGHT) study, and identified a region on human chromosome 2 which may contain genes that determine whether a patient responds or fails to respond to a specific group of hypertension medications.

Identification of the causative gene or gene sequence in this region will help target the right drug to the right patient and will have a considerable impact on public health in addition to greatly expanding our understanding of the causation of hypertension.

## RHEUMATOID ARTHRITIS

A discovery by a University of Glasgow researcher of how the Leishmania parasite blocks the action of one of the molecules that signals between immune cells, cytokines, has been adopted as a therapeutic strategy.

Work on different cytokines by the Glasgow researchers led to the development by Danish company Genmab of antibodies to cytokines which showed promising effects in test-tube, and wanted to explore possible effects on cells from rheumatoid patients. The researchers coordinated the Glasgow arm of a phase I/II clinical trial, with 30 RA patients in several different countries. The results were enormously encouraging: 63 per cent felt 20 per cent better, 38 per cent felt 50 per cent better, and 25 per cent felt 70 per cent better.

This trial demonstrates the clear benefits of clinicians and laboratory scientists working together in a bench to bedside model – one which will be developed further in the new £17.5M Glasgow Biomedical Research Centre. On the ground floor will be structural biologists; on the first floor researchers from the Wellcome Centre for Molecular Parasitology; and above them the immunologists, a mix of basic and clinical scientists. The research centre will house 300 scientists in 25 internationally recognised research groups.

The main aim of the new institute is to create and increase extensive multidisciplinary research in a culture of seeking scientific solutions to problems of diseases of major morbidity and mortality and to apply this knowledge rapidly to the clinics. The link from basic to clinical science is a unique feature of the planned institute, as around 20% of the scientists are medically qualified with active clinical practice.

## D • Scotland's Health Informatics platform

### HEALTH INFORMATICS IN DUNDEE

The University of Dundee is home to The Health Informatics Centre (HIC), a joint initiative between the University of Dundee, NHS Tayside and NHS Scotland Information Services Division, housed in a purpose-built centre at Ninewells Teaching Hospital and offering powerful new tools for analysing the health of the nation and developing new areas of research and treatment.

The focus of the work at HIC is using information to improve health, bringing together anonymised data from a range of health projects and sources to create a major resource for the health services. HIC lets researchers analyse the data from hundreds of thousands of individual patients, allowing them to track trends and patterns which had previously gone undetected. These can offer key insights into how we can improve patient care.

HIC holds a vast array of data covering the whole spectrum of healthcare, from dental research to the large scale effectiveness of prescribed drugs. All of the data held at HIC is available to researchers only in a purely anonymous form, meaning that a person's health data can be accessed, but with nothing to link it to that individual. The value for researchers lies purely in the data, not in the identity of the person.

HIC provides three major benefits:

1. A single location where researchers can combine their resources and expertise to develop new programmes of research that will improve health and healthcare delivery.
2. A single location for record-linkage, encryption, management and data storage, improving the efficiency of quality assurance and enhancing public understanding and trust.
3. Greatly improved access for other researchers to allow the development of interdisciplinary research programmes.

### HEALTH INFORMATICS IN ABERDEEN

The University of Aberdeen holds the largest anonymised database of GP records in Scotland within its Primary Care Clinical Informatics Unit. These comprise information from GPs throughout Scotland about prescribing and illnesses.

The University's Department of General Practice and Primary Care (along with their corresponding departments in the other three medical schools) was a founder member, remains an active participant, in the national Scottish School of Primary Care.

This organisation has increased collaboration within the academic community, and has enabled primary care to be full partners in initiatives such as the Generation Scotland, Family Health Studies and UK Biobank. Primary care's involvement in these endeavours has been led by Dr Blair Smith from Aberdeen. The Department of General Practice and Primary Care at Aberdeen also has an active clinical research unit conducting clinical trials and population-based clinical research. This has been used previously to identify healthy control subjects for a study of the genetics of schizophrenia.

The University has a large number of clinical databases which provide opportunities for Translational Research. These include a large number of studies into bone disease and bone health and the Aberdeen Maternity and Neo-Natal Data Bank.

## HEALTH INFORMATICS IN EDINBURGH

The University of Edinburgh has exceptional strength in the discipline of informatics, with the largest concentration of top-rated informatics researchers in Europe. Furthermore, the University co-hosts the National e-Science Centre in partnership with the University of Glasgow.

Health informatics is a key theme and important contributions include participation in the successful bid for a National Translational Cancer Research Award. A new Chair in e-Health is about to be appointed and will lead development of a joint e-health strategy with the University's close partner, Lothian Health Board.

## HEALTH INFORMATICS IN GLASGOW

Glasgow University brings particular expertise in health informatics to the table – the Robertson Centre for Biostatistics is the facility of choice for analysing the results of clinical trials on an international scale, and for international clients. The Robertson Centre for Biostatistics in Glasgow carries out research in bio statistical methodology and participates in research initiatives addressing major medical and biological issues.

The Centre acts as an advisory centre for the biomedical research community in Glasgow and beyond and actively seeks joint research initiatives with medical and biological researchers in academia, the pharmaceutical industry, the health service and with other research organisations.

Undertaking projects ranging from small university research projects to major international multi-centre clinical trials, the Centre has excellent relations with both the pharmaceutical industry and academic clinical research groups. Areas of particular interest include clinical trials, statistical issues in epidemiology, and health economics.

The University also houses a unique health informatics alliance between Computing Science and Biology through the establishment of the Bioinformatics Research Centre (BRC) and the Sir Henry Wellcome Functional Genomics Facility (SHWFGF).

The understanding of the function of our genes requires close interdisciplinary links between biology, medicine and bioinformatics. By establishing the BRC and SHWFGF, the University has strengthened its long term commitment to cutting edge research in this area. The facilities have a track record of successful collaborative projects that explore the molecular causes of disease in order to facilitate the development of new drugs. This alliance aims to close the loop between the wet-lab and computer analysis by actively promoting collaborative projects between life scientists and bioinformaticians.

The physical proximity of the biologists to the computer scientists helps facilitate an ongoing and dynamic chain of exchange and communication. The BRC already has a rapidly expanding strong and active research team, with backgrounds ranging from molecular biology to theoretical computer science.

The Life Science element of this exciting initiative has been created through a £4.5M investment with major contributions from The Wellcome Trust and the University of Glasgow to establish The Sir Henry Wellcome Functional Genomics Facility (SHWFGF). The SHWFGF combines state-of-the-art technology and expertise in genomics, proteomics, tissue microanalysis and bioinformatics, the key tools for modern life science research.

The aim of the SHWFGF is to promote biological and biomedical research by providing a cutting edge technology platform, which thanks to our highly skilled staff can be tailored to meet the needs of both basic and clinical researchers.

This integration of post genomic disciplines into one comprehensive facility makes it quite unique. It builds on the strengths and expertise that already exist here and at the Beatson Institute for Cancer Research and Strathclyde University.

The Facility is not only a technology platform, but also an incubator that will enable cross-fertilisation and innovation through collaboration. This synergy is strengthened by the valuable input from the Bioinformatics Research Centre.

It is a unique facility enabling researchers in Scotland and elsewhere to pursue both small and large scale projects in functional genomics. These projects, in turn, will allow the amassing and analysis of vital information to assist in diagnosis, detection and prevention of disease.

## E • Key University Biographies

### UNIVERSITY OF ABERDEEN

The University of Aberdeen is an acknowledged centre of excellence for Life Sciences and Medicine.

Translational research is an area of particular strength for the University because of its wide range of internationally recognised health research, underpinned by many of its leading scientists and clinicians based on one of the largest teaching hospital sites in Europe.

Five hundred years ago the University boasted the first Chair of Medicine in the English speaking world. The tradition of innovation in medicine and medical sciences has continued. Aberdeen led the world with MRI clinical scanning. Today it remains at the forefront with its PET (Positron Emission Tomography) imaging technology and expertise. Patients are already reaping the benefits of PET in a clinical setting.

Over the last five years, the University has made major strategic investments in its estates, its people, and its infrastructure to consolidate its position as one of the world's key centres for R&D in life sciences and medical research.

With its ambitious Sixth Century Fundraising Campaign, the University is one of the most progressive fundraising higher education institutions in the UK. Over the last two years, Aberdeen has recruited more than 50 senior academic leaders from institutions all over the world.

It is an extremely dynamic time for our College of Life Sciences and Medicine, which comprises the Schools of Medical Sciences, Medicine, Biological Sciences and Psychology. The College is internationally recognised in a broad range of fields which include: bone research, community based clinical subjects, physiology, infection and immunology, biological sciences and plant and soil science. All achieved 5 for excellence in the last Research Assessment Exercise.

Leading research at the College is supported by first-class facilities such as the state-of-the-art £20 million Institute of Medical Sciences – created to maximise translational research opportunities and home to internationally renowned scientists, investigating a host of diseases including diabetes, neurodegenerative diseases, bone disease, fungal and bacterial diseases, eye diseases, inflammation and immunity, drug metabolism and multiple sclerosis.

Leading population-based research is conducted by the 5 rated Institute of Applied Health Sciences, which strives to improve health and healthcare delivery through excellence in applied health sciences research. Its researchers will shortly move to a new £5.7 million purpose-built Institute, which received major funding from the Wolfson Trust.

Some of our other funders include the Wellcome Trust which recently awarded Aberdeen scientists £1.4 million to continue their research into finding new ways of killing harmful bacteria. The Melinda and Bill Gates Foundation, the Department of International Development and the United States Agency for International Development have also helped fund IMMPACT - our £20 million high profile global research project whose ultimate goal is to improve maternal health and survival in developing countries.

The University enjoys extensive collaborations with other research institutions and industry. Two of our most recent links-ups are multi-million pound deals with South Korea which followed efforts by Scottish Development International to build relationships between Scotland and South Korea's life sciences communities.

The partnerships are the first projects awarded funding under the International Collaborative Research Programme for Drug Development. For more details about the University of Aberdeen see: [www.abdn.ac.uk](http://www.abdn.ac.uk) and: [http://www.talentscotland.com/view\\_item.aspx?item\\_id=3949&list\\_id=search1-search\\_page&list\\_index=1&is\\_search\\_result=true](http://www.talentscotland.com/view_item.aspx?item_id=3949&list_id=search1-search_page&list_index=1&is_search_result=true)

**Professor C Duncan Rice**  
**Principal and Vice-Chancellor • University of Aberdeen**

Professor C Duncan Rice has been Principal and Vice-Chancellor of the University of Aberdeen since September 1996. He was previously Dean of the Faculty (1985-91), and Vice-Chancellor (1991-96) at New York University, playing a key role in one of the most successful US higher education fund-raising campaigns, which raised over \$1 billion in 10 years.

Professor Rice was born in Aberdeen, and took a first in history at the University of Aberdeen in 1964. He taught briefly at Aberdeen and completed an Edinburgh doctorate before spending much of his professional life at Yale and New York University.

Professor Rice has published widely as a professional historian. He is the recipient of many academic awards and honours, including Honorary Degrees from New York University and Robert Gordon University, an Honorary Fellowship from the UHI Millennium Institute, and fellowships at Harvard and Yale, as well as being a Fellow of the Royal Society of Edinburgh. He serves on the Heritage Lottery Fund Committee for Scotland, and is Vice-Chairman of Scottish Enterprise Grampian. He has previously served on the Boards of Scottish Opera/Ballet, BT Scotland, and The National Trust for Scotland. He was Chairman of the Circumpolar Universities Association from 1997-1999, and is Chairman of the UK Socrates-Erasmus Trust, and a member of the Universities and Colleges Employers Association Board.

Professor Rice is married to Susan Rice, the Chief Executive of Lloyds TSB Scotland. They have three children and live in Old Aberdeen. His interests include hillwalking, contemporary Scottish literature, and opera.

**Professor Stephen Logan**  
**Senior Vice Principal • University of Aberdeen**

Professor Stephen Logan is the Senior Vice-Principal of the University of Aberdeen and is responsible for the development, integration, implementation and review of strategic planning in relation to academic, research, financial, human resource and estate matters.

He is a neurophysiologist whose research interests are in the way the brain controls blood pressure, memory and appetite. He has published more than 100 scientific articles and has served on Research Council, Wellcome Trust and Health Department Advisory Panels

Professor Logan has key interests in strategic issues around creating and maintaining a world-class research base and the requirements for exploitation of intellectual property for wealth creation. He is a director of two University spin-out companies TauRx pte and Wista pte.

He has held appointments as Chairman of Grampian University Hospitals NHS Trust, and as a member of NHS Grampian and the Scottish Higher Education Funding Council.

**Professor Michael Greaves**

Mike Greaves graduated in Medicine, with Honours, from Sheffield University in 1972 and developed an interest in haematology shortly thereafter. He trained in internal medicine within the United Sheffield Hospitals before taking up a temporary Lectureship to work on the area of Bone Resorption in Malignancy. Following this he spent two years in Australia, firstly at the Austin Hospital in Melbourne and then in the Westmead Hospital in Sydney undergoing specialist training in haematology and carrying out research into haemostasis. He returned to Sheffield as Lecturer in 1981, later becoming Senior Lecturer and Reader.

He was appointed Professor of Haematology in Aberdeen in 1996, Head of Department of Medicine & Therapeutics in 1999, Deputy Dean of the Faculty of Medicine and Medical Sciences in 2002 and Head of the School of Medicine in 2003.

Professor Greaves has published extensively on haematological topics, particularly in relation to haemostasis, thrombosis and myeloma. Current research activity is also in these areas, with an emphasis on the pathogenesis and management of thrombotic disease. His clinical work is in the area of general haematology, haemostasis and thrombosis.

Professor Greaves is: Past-President of The British Society for Haematology, of the British Society of Haemostasis and Thrombosis and the Scottish Haematology Society. He has also been Chairman of the British Committee for Standards in Haematology, Chairman of the National Quality Assurance Advisory Panel (Haematology), Chairman of the British Journal of Haematology Research Trust, and Anticoagulation Sub-Committee of the International Society for Thrombosis and Haemostasis.

He is co-Editor-in-Chief elect of the Journal of Haemostasis and Thrombosis. He was previously editor of the British Journal of Haematology.

### **Professor Nuala Booth**

Professor Nuala Booth's research is directed at a better understanding of fibrin and its stabilization, which is relevant to thrombosis and atherosclerosis. Her research focusses on the plasmin system, which is central to the degradation of blood clots and extracellular matrix and to the activation of growth factors. Her studies include characterization of the major proteins of this pathway, the plasminogen activators, tPA and uPA, and the inhibitors, PAI-1, PAI-2 and 2-antiplasmin. This now extends to TAFIa, a carboxypeptidase activated by thrombin, which affects local generation of plasmin, and thrombospondin, which appears to affect fibrinolysis by a number of different mechanisms. Her work includes structure-function relationships in these proteins, their cellular roles and their importance in thrombus lysis and in the protection of the vessel wall from atherosclerosis. Localization of these related proteins by transglutaminases is a particular interest; fibrin is stabilized by cross-linking, not only of the fibrin chains but also of the inhibitors of fibrinolysis.

Professor Booth is Vice-Chairman of the Scientific and Standardization Committee of the International Society of Thrombosis and Haemostasis and will take over the chair in July 2006. She has served as President, British Society for Haemostasis and Thrombosis and as a Chairman, International Society for Fibrinolysis and Proteolysis. She is an experienced reviewer of grants and papers and has served on grant committees for British Heart Foundation and other bodies.

### **Professor Andy Rees**

Professor Rees has research interests in the pathogenesis and treatment of glomerulonephritis, especially in the context of severe multisystem autoimmune disease; the molecular aspects of the autoimmune response to the glomerular basement membrane in Goodpasture's Syndrome; the control of inflammation within the glomerulus. Professor Rees has been President of the Renal Association of Great Britain and Chairman of Kidney Research UK; Chair of the Royal College of Physicians (Lond) Specialist Committee on Renal Medicine; Advisory board of the European Renal Association, and the Management Board of the European Renal Research Initiative. He was elected a Fellow of the Academy of Medical Sciences in 2000.

## **Professor David Reid**

Professor David M Reid holds a personal chair of Rheumatology at the University of Aberdeen. He graduated in 1975 from the University of Aberdeen. After initial medical post-graduate training in Aberdeen in 1979 he moved to Edinburgh as a Lecturer in Rheumatology. He returned to Aberdeen to take up a post as a Consultant Rheumatologist in 1986. He moved back into the academic field in 1996 as a Senior Lecturer and was promoted to Reader in 1997 and Professor in 1999. Since December 2003 he has been Head of the Department of Medicine & Therapeutics at the University of Aberdeen and also heads the 5\* Bone and Musculoskeletal Research Theme at the University. He has over 200 original papers and reviews, largely on his current research interests which include the utility of bone mass assessment, assessment of risk of fracture, secondary osteoporosis and the assessment of long-term disease activity, drug adverse effects in rheumatic diseases and clinical trials. His main research interests are in bone mass assessment, corticosteroid induced osteoporosis, cost effectiveness of screening for osteoporosis, clinical outcome assessment in rheumatoid arthritis and osteoporosis, clinical trials in osteoporosis and arthritis.

## **Professor Steven Heys**

Professor Steven D Heys is Professor of Surgical Oncology and Honorary Consultant Surgeon in the University of Aberdeen and NHS Grampian, with a special interest in the treatment of breast cancer. He also leads the Cancer Research Programme at the University of Aberdeen within the theme of Cell Biology and also has a key interest in medical education currently co-ordinating Phase III of the medical curriculum. He has over 1180 original papers and reviews and 25 book chapters, largely on his current research interests, which include breast cancer, carcinogenesis (particular with respect to nutrient-gene interactions), chemotherapy resistance and nutrition and metabolism in patients undergoing surgery. He is a council member of the Association of Breast Surgery at the British Association of Surgical Oncology (BASO), representing Scotland. In addition, he represents the BASO at the National Institute of Clinical Excellence (NICE) with respect to guidelines regarding certain chemotherapeutic agents and novel surgical procedures.

## **Dr Alison Murray**

Dr Alison D Murray a Clinical Senior Lecturer in Radiology. She leads the brain imaging research team in the Department of Radiology, located in the Lilian Sutton Building, which also houses the 1.5T research magnetic resonance imaging (MRI) scanner.

Her research is in structural and functional brain imaging correlates of cognitive ageing and dementia and current work includes MRI in the Aberdeen 1936 Birth Cohort, and MRI and regional cerebral blood flow in a Phase II clinical trial in Alzheimer's disease. She is also involved in brain imaging research in Parkinson's disease, occupational divers and autistic spectrum disorder, utilising quantitative assessment of brain volumes, disease burden and function.

Dr Murray has extensive clinical experience of brain imaging in dementia, being responsible for over 500 nuclear medicine brain regional cerebral blood flow studies per annum, receptor studies in movement disorder and, with colleagues in Nuclear Medicine, development of a national clinical positron emission service across Scotland.

She is at the forefront of improving access to state-of-the art brain imaging research resources across Scotland.

The University of Dundee has a long and illustrious history as a provider of professional vocational education, as a Queen's College Dundee since 1882 and then as a fully independent University from 1967 with HM The Queen Mother as its first Chancellor:

The University now graduates more people into the professions than any other University in Scotland and its graduates command a higher salary than any other university's, north of Oxbridge. Dundee has established a particularly strong international reputation in the field of life sciences and medical research. It is home to a medical research complex larger than the National Institute for Medical Research in London and laboratory sciences in both its medical school and School of Life Sciences were rated 5\* in the latest Research Assessment Exercise.

There are more than 1500 researchers working in the School of Life Sciences and the School of Medicine, Dentistry and Nursing with centres of excellence in key areas such as cancer, diabetes, cardiovascular disease, Alzheimers and tropical and parasitic diseases. The University generates more research income per capita than any other University in Scotland and is third highest in the UK. The University is one of the leading partners in defining and developing economic regeneration in Tayside. 17 spin-out companies have been launched by the University and 7 have been launched since 2001. There are currently 73 licenses in operation, 285 patents granted and 255 further patents pending.

22 of the most frequently cited scientists (including the two most frequently cited) in the world are working in Dundee. An international survey of scientists has for the past two years voted Dundee as the top scientific workplace in Europe for academics. An independent University of Oxford study ranked the University's School of Medicine as providing the best training for doctors in the UK. The University is the lead in a consortium of more than 80 international medical schools who have created the International Virtual Medical School (IVIMEDS) enabling doctors to access the latest surgical techniques in their own country.

The £20m Centre for Inter-Disciplinary Research (CIR) housing 250 scientists and support staff has recently been completed. At the heart of this new centre is Europe's first drug discovery unit, which was opened in January 2006 by the UK Chancellor, the Rt. Hon. Gordon Brown MP, who hailed Dundee as "a world-class research centre". The Drug Discovery Unit will enable scientists to mimic pharmaceutical conditions with medicinal computational chemistry and high throughput screening facilities in order to develop drug candidates for tropical and parasitic diseases. The CIR will also enable the School of Life Sciences to dramatically expand its teams working on diabetes and cancer and the centre is integrated with the adjacent world famous Wellcome Trust BioCentre, home to more than 500 scientists from 53 countries.

The development of a new Clinical Research Centre is also scheduled to be completed by late 2006 and will attract international scientists researching disease prevention, diagnosis and early therapy for cancer, cardiovascular and thoracic diseases, nutrition, diabetes, metabolic diseases and neuroscience. The CRC will house patient rooms, investigation centres and day rooms integrated with advanced diagnostic, analytical and imaging facilities.

### **Sir Alan Langlands** **Principal and Vice Chancellor • University of Dundee**

Alan Langlands is the Principal and Vice Chancellor of the University of Dundee. The University is a world ranking research institute in medicine and life sciences and provides a broad range of undergraduate and postgraduate teaching programmes. It plays an important role in the economic, social and cultural development of Scotland. Alan is also the Chair of UK Biobank, a major genetic epidemiology study funded by the Wellcome Trust, the Medical Research Council, the Department of Health and the Scottish Executive.

Alan was the Chief Executive of the National Health Service in England from 1994-2000. He has an international reputation in the development of healthcare policy and as a strategic manager of health services he has advised in many countries including Russia, the USA, Canada and China. He received a Knighthood in the Queen's Birthday Honours list (1998) for his services to the NHS and is a Fellow of the Royal Society of Edinburgh.

Alan is a science graduate of the University of Glasgow and was conferred Doctor of the University in October 2001. He is an Honorary Professor at the University of Warwick Business School and a member of the advisory board of the Johns Hopkins bioethics institute in Baltimore. He has been awarded Honorary Fellowships by the Royal College of Physicians, the Royal College of General Practitioners, the Royal College of Surgeons of Edinburgh, the Royal College of Physicians and Surgeons (Glasgow), the Faculty of Public Health Medicine and the Institute of Actuaries. He chairs the Universities Scotland Funding Policy Group.

### **Professor Michael A.J. Ferguson FRS FRSE**

Michael Ferguson was born in Bishop Auckland, Co. Durham, on February 6th 1957 and educated at St. Peter's School, York (1968-1975) and University of Manchester Institute of Science and Technology (1976-1979), where he obtained a BSc in Biochemistry in 1979.

In 1982 he obtained a PhD in Biochemistry at London University under the supervision of Tony Allen and David Snary. He was a Postdoctoral Fellow at the Rockefeller University, New York, with George Cross, FRS (1982-1985) and at Oxford University with Raymond Dwek, FRS (1985-1988).

He took up a lectureship at the University of Dundee in 1988, was promoted to Reader in 1991 and to a Personal Chair in Molecular Parasitology in 1994. He received the 1991 Colworth Medal of the British Biochemical Society, the 1996 Makdougall Brisbane Prize of The Royal Society of Edinburgh and the 1999 International Glycoconjugate Organisation Award. He was elected a Fellow of the Royal Society of Edinburgh (1994) and of the Royal Society of London (2000) and made a member of the European Molecular Biology Organisation in 1999.

Professor Ferguson has published over 200 peer-reviewed research papers and given numerous invited lectures at scientific meetings around the world. His research takes a multi-disciplinary approach to understanding the biochemistry of protozoan parasites that cause tropical diseases, like African Sleeping Sickness, Chagas' disease, leishmaniasis and malaria; and the design and synthesis of potential drug-leads against these diseases. He is also Director of a proteomics facility that provides services to the biomedical community at the University of Dundee and beyond. He and his colleagues are currently involved in establishing research programmes to translate basic research into therapeutic benefits. This includes a new Drug Discovery for Tropical Diseases initiative and establishing pilot programmes in translational medicine.

### **Professor Andrew Morris**

Andrew Morris is the Professor of Medicine of Diabetic Medicine at the University of Dundee, a member of the Diabetes Network in Tayside and Lead Clinician for Diabetes in Scotland. He leads a translational research team that focuses on the epidemiological and molecular aetiological basis of diabetes complications and has published over 120 original papers. Over the course of his career, he has attracted over £14.0 million peer reviewed grant funding, and was awarded the RD Lawrence lecture by Diabetes UK in 2003 as recognition of his contributions to diabetes research in the United Kingdom, the Scottish Science Award in 2005 and the Scottish Executive Edinburgh Lecture 2006.

Professor Morris is Principal Investigator of two population-based programme grants: The Wellcome Trust United Kingdom Case Control Study for Type 2 Diabetes and Generation Scotland. These studies are recruiting over 60,000 people in Scotland for translational medicine studies.

Professor Morris also had an interest in the design of health care systems and how they can be optimised to provide quality, safe and efficient care for people with long term conditions. He is chair of the Scottish Diabetes Group and a Fellow of the Royal Society of Edinburgh.

### **Professor Frank Sullivan**

Frank Sullivan is Professor of Research and Development in General Practice and Primary Care in the University of Dundee, Clinical Director of the East of Scotland Primary Care R&D network, and a General Practitioner in Dundee.

Professor Sullivan's main research interests are in Informatics in Primary Care, with a focus on chronic disease management.

### **Professor Roland Wolf**

Professor Roland Wolf, FRSE FMedSci, FRSA was educated at University of Surrey where he graduated in 1972 with a BSc Chemistry and in 1975 with a PhD in Biochemistry. He is currently the Director of the University of Dundee Biomedical Research Centre and Honorary Director of the Cancer Research UK Molecular Pharmacology Unit.

His main research interests are understanding the pathways which determine the sensitivity of cells to drugs, environmental agents and chemical toxins, particularly molecular and genetic studies on how chemical agents interact with cells, how this influences their therapeutic and toxicological properties and how genetic polymorphisms in the genes involved relate to disease susceptibility, adverse drug pharmacology and toxicology. Specific current projects focus on preclinical drug development, pharmacogenetics, cancer therapy and chemoprevention.

Professor Wolf has published over 400 papers in peer-reviewed scientific journals and is on the Board of Governors of the Association for International Cancer Research and of the Beatson Institute for Cancer Research. In 2001 founded a company, CXR Biosciences, currently comprising 35 staff. In addition to drug discovery, the company has a major focus on developing new models to accelerate the drug development process and reduce attrition when drugs enter man.

He is a Fellow of the Royal Society of Edinburgh, of the Academy of Medical Sciences and of the Royal Society for the encouragement of Arts, Manufactures & Commerce. Recipient of the ISSX European Scientific Achievement Award 2005.

See: <http://www.dundee.ac.uk/biomedres>  
<http://www.cxrbiosciences.com>

**[www.dundee.ac.uk](http://www.dundee.ac.uk)**

**Professor Timothy O'Shea, BSC, PhD, FRSE**  
**Principal • University of Edinburgh**

Professor Timothy O'Shea became Principal of the University of Edinburgh in October 2002. Born in Hamburg in 1949, Professor O'Shea was brought up in London and went to school in Essex. A Computer Scientist, he was Master of Birkbeck College at the University of London from 1998 and Pro-Vice-Chancellor of the University of London since 2001. A graduate of the Universities of Sussex and Leeds, he has worked in the United States and for the Open University where he founded the Computer Assisted Learning Research Group and worked on a range of educational technology research and development projects. He was a Research Fellow at the University of Edinburgh, Department of Artificial Intelligence, from 1974 to 1978. His career has been characterised by a commitment to issues of access and research.

Professor O'Shea sits on the Boards of Scottish Enterprise, the Intermediary Technology Institute Scotland Ltd and the British Council. He is a member of the Governing Body of the Roslin Institute and is Convener of the Research and Commercialisation Committee of Universities Scotland. In 2004 he was elected Fellow of The Royal Society of Edinburgh

**Professor Robert Millar**

Professor Millar is Director of the MRC Human Reproductive Sciences Unit which comprises over 100 researchers and attracts about \$10 million annual funding. He is Professor in the Division of Reproductive and Developmental Sciences at Edinburgh University. He is founder and Chief Scientific Officer of Ardana Biosciences. Ardana was founded in 2000, attracted about £50m investment, has 1 drug in the market, 1 in process of registration and 1 in Phase II/III. Professor Millar has interacted and consulted extensively with Pharma and Biotech (Astra Zeneca, Johnson and Johnson, Ipsen, Schering, Pfizer, Debio Pharm, Zymogenetics, Neurocrine, Zentaris) and is a member of the board of MRC Technology.

Prior to holding his present appointments, he has held a personal Chair and made a Fellow at the University of Cape Town, and served as Dean of Research in the Medical Faculty. He serves on the board of many international journals and has published over 300 papers. Professor Millar's research focuses on the molecular functioning of the GnRH receptor with an emphasis on ligand receptor interactions, mechanisms of ligand-mediated receptor activation and coupling to intracellular signalling pathways, and receptor trafficking.

Professor Millar pioneered the discovery of the GnRH prohormone and novel GnRHs. His group was involved in the first cloning of the GnRH receptor and subsequent discovery of GnRH receptor subtypes. Together with collaborators his laboratory have made major contributions in delineating GnRH binding sites.

**Professor David Newby**

Professor Newby is Professor of Cardiology at the University of Edinburgh, the Director of the Wellcome Trust Clinical Research Facility (WTCRF) and a Consultant Cardiologist at the Royal Infirmary of Edinburgh. His principal research interests are in vascular biology, acute coronary syndromes and heart failure. He currently sits on the Editorial Board of the Journal of the American College of Cardiology, Arteriosclerosis Thrombosis and Vascular Biology and Heart. He is a member of the Project Grant Committee of the British Heart Foundation, and the Biomedical and Therapeutics Research Committee of the Chief Scientist's Office at the Scottish Executive. Professor Newby is also currently a major contributor in the development of the Scottish Intercollegiate Guideline Network (SIGN) guidelines for the management of acute coronary syndromes.

## **Professor David Porteous**

Professor Porteous was appointed Professor of Human Molecular Genetics & Medicine, University of Edinburgh, in September 1999. Professor Porteous is also Head of the Medical Genetics Section, Chairman of the Molecular Medicine Centre, University of Edinburgh and Director of the Genetics Core at the Wellcome Trust Clinical Research Facility Western General Hospital Campus.

An Edinburgh first degree and PhD graduate in Genetics, Professor Porteous spent three years as a post-doctoral researcher in Oxford, before returning to Edinburgh to take up an MRC Recombinant DNA Training Fellowship with Professor Ed Southern. In 1983 he moved to the MRC Human Genetics Unit where he was closely involved in transforming the Unit into one of the leading centres in human molecular genetics.

A major focus of his work is the application of knowledge emerging from the Human Genome Project to the identification of risk factors, disease processes and new treatments for common disorders prevalent in the Scottish population. This has evolved into a major collaborative initiative between the Scottish Medical Schools, the NHS in Scotland and allied research institutes called Generation Scotland (for further details see [www.generationscotland.org](http://www.generationscotland.org)).

His own laboratory (see <http://www.genetics.med.ed.ac.uk/>) focuses on a) gene therapy for the inherited lung disorder of cystic fibrosis and b) the genetics of psychiatric illness.

His work on gene therapy for cystic fibrosis includes developing the first transgenic model of the disease to show a lung defect that parallels the human disease, the first UK clinical trial of non-viral gene therapy for cystic fibrosis and the first clinical trial in Scotland, all supported by MRC Programme Grant support and by the CFTrust. In 2000, his group joined with Imperial College London and Oxford University to form the UK Cystic Fibrosis Gene Therapy Consortium, backed to the tune of £15million over 7 years by the CFTrust to develop and apply the next generation of gene therapy.

His other major area of research interest is in psychiatric genetics. To date, his group has identified six genes of major effect in determining the risk of developing schizophrenia or bipolar affective disorder. Of particular note is the identification of the DISC1 gene as a risk factor in schizophrenia, which is now recognised as one of the best validated findings in the field. This work is supported by MRC Programme Grant funding, other charities and industry.

Professor Porteous has published over 160 peer reviewed papers. He is a Fellow of the Royal Society of Edinburgh, the Academy of Medical Sciences and the Royal College of Physicians of Edinburgh. He provides expert advice on genetics to the MRC, the Wellcome Trust, the Department of Health and the UK Government. He has been involved in the work of a range of Advisory Committees including the House of Commons Select Committee on Science & Technology Report on 'Human Genetics: the science and its consequences', the Protocol Development Committee for the UK Biobank, the Council of Scientists for the Human Frontiers Science Program and the British Medical Association Genetics Steering Group.

## **Professor Eve C Johnstone**

Professor Eve C Johnstone CBE MD FRCP FRCPsych DPM FMedSci FRSE is Professor of Psychiatry and Head of the Division of Psychiatry, the Edinburgh University. She was previously Honorary Consultant Psychiatrist and member of the Scientific Staff of the Medical Research Council at the Clinical Research Centre in Northwick Park. She has conducted a research programme in schizophrenia for 30 years and carried out the first CT scan study of schizophrenic patients, now 30 years ago, to demonstrate loss of brain tissue. She has continued to work on structural and functional imaging in schizophrenia, but her main focus is the use of these and other methods to study very large cohorts of patients with schizophrenia and related illnesses. She has received extensive Government and charitable support for this work, including three MRC Programme Grants. Current principal work is the Edinburgh High Risk of Schizophrenia Study, which from 1994 has studied 163 individuals at enhanced risk of schizophrenia for familial reasons together with controls. Currently, she also studies a cohort of approximately 600 young people from all over Scotland in relation to the Edinburgh study of cognitive impairment and schizophrenia. Serial scans and genetic material are available on a sub-sample of 240 of these individuals and their wider families. She is the author of over 200 refereed papers, eight books, and numerous other works. She enjoyed direct MRC support until 1989 and since then has acquired more than £10M in grant support. She does extensive committee work, mainly for the MRC and Government bodies and was a member of the MRC Council from 1997-2002 being the Chairman of the MRC Neurosciences Board of the MRC from 1999-2002.

[www.ed.ac.uk](http://www.ed.ac.uk)

Delivering significant, measurable improvement in health and quality of life is the fundamental objective of Glasgow University's rich resource of biomedical scientists - one of the largest integrated biomedical and life science departments in Europe. Biomedical science in the post-genomic era presents new, far-reaching opportunities to harness and translate knowledge for the benefit of society, and the University is driving forward this agenda with an investment of £45M in new research infrastructure. The understanding of the function of our genes requires close interdisciplinary links between biology, medicine and bioinformatics, and the Faculties of Biomedical & Life Sciences, Medicine, Veterinary Medicine, and Information & Mathematical Sciences are working closely together in a focused plan of development.

The new £17.5M Glasgow Biomedical Research Centre brings together 20 leading biomedical research groups in three cognate areas – structural biology, molecular parasitology and immunobiology – and links them to clinical researchers. The aim is to create and increase extensive multidisciplinary research, seeking solutions to problems of major diseases and applying this knowledge rapidly in the clinic. The adjacent £12M British Heart Foundation Glasgow Cardiovascular Research Centre focuses our research into the genetics of cardiovascular disease, contributing to the development of new methods of detection and prevention of diseases of the heart and blood vessels.

The Centre is the Glasgow base for the ambitious £4.4M Generation Scotland programme, a collaboration between all four medical schools and NHS Scotland, which will explore how genetic and lifestyle factors cause cancer, heart disease and mental illness – keeping Scotland at the forefront of healthcare genetics.

Researchers at the AVMA-accredited Veterinary School, housed in the Institute of Comparative Medicine, have linked with engineers and computing scientists to break the boundaries of translational research with applications for improved animal and human disease diagnosis and prevention. Internationally-acclaimed work on FIV, a strong example of our excellence in virology and oncology, has established links between viruses and tumours, resulting in the development of life-saving vaccines for animals and humans, and new diagnostics.

A £4.5M investment, with major contributions from The Wellcome Trust, has established The Sir Henry Wellcome Functional Genomics Facility. This Facility combines state-of-the-art technology and expertise in genomics, proteomics, tissue microanalysis and bioinformatics, the key tools for modern life science research. Another three major research centres apply mathematical and information sciences to biomedicine: The Roberston Centre for Biostatistics develops new biostatistical methodology and analyses international clinical trials. The Bioinformatics Research Centre focuses on systems biology, structural bioinformatics & functional genomics, and the Centre for Mathematics Applied to the Life Sciences uses mathematical modelling to support all aspects of medicine and biology.

These facilities now have a track record of successful collaborative projects exploring the molecular causes of disease in order to develop new treatments. Formal links with hospitals facilitate streamlined clinical trials, ensuring faster delivery from laboratory bench to patient bedside.

A further planned state-of-the-art development at the Cancer Research UK Beatson Institute will transform Scotland's cancer research environment. The Institute will provide world-class facilities for 240 researchers tackling cancer; from research into the fundamental biology of cancer cells to the development of new targeted treatments.

"Medicine in Glasgow" is a wider strategic collaboration between the University, the City of Glasgow and the local Health Board. It is a new partnership which, through joint working, integrates separate responsibilities in the field of health care, education delivery and research. Through a shared vision of excellence, based on leading edge medical research and top quality teaching, the new collaboration offers continuous improvement in health care for the West of Scotland and beyond.

**Sir Muir Russell**  
**Principal and Vice Chancellor • University of Glasgow**

Sir Muir Russell became Principal of the University of Glasgow in October 2003. Prior to his appointment he was Permanent Secretary to the Scottish Executive since its establishment in July 1999, following devolution. He was elected as a fellow of the Royal Society of Edinburgh in 2000 and holds honorary degrees from the University of Strathclyde and the University of Glasgow. He was appointed a Deputy Lieutenant of the City of Glasgow in 2004 and became an Honorary Fellow of the Royal College of Physicians and Surgeons of Glasgow in 2005.

**Professor John Coggins**

Professor John Coggins is the Vice-Principal for the Faculties of Biomedical and Life Sciences, Clinical Medicine and Veterinary Medicine, University of Glasgow. He is also Professor of Molecular Enzymology and former Dean of the Institute of Biomedicine & Life Sciences (IBLS). His major research interests are the structure and mechanism of biosynthetic enzymes and the rational design and development of novel anti-microbial and anti-parasitic agents. He is Vice President of the Royal Society of Edinburgh.

**WHMSB – Reproductive Health • Professor Ian Greer**

Professor Ian Greer is the Regius Professor and Head of the Department of Obstetrics and Gynaecology, University of Glasgow, Honorary Consultant Obstetrician at Glasgow Royal Maternity Hospital and Honorary Consultant Gynaecologist at Glasgow Royal Infirmary, Glasgow.

Professor Greer is a member of several professional societies including the International Society for the Study of Hypertension in Pregnancy, the British Society for Haemostasis and Thrombosis and the Society for Gynaecological Investigation. He has been an active member of the Royal College of Obstetricians and Gynaecologists throughout his career. Positions for this society include member of the Scottish Executive Committee (1989-1995), nominated Academic Advisor of the Clinical Terms Project - Speciality Assurance Team (1992-1994), member of the Thromboembolism Working Group (1993-1994), and Chairman of the Subspeciality Committee (1995-1998).

He is a reviewer for several journals including The Lancet, British Medical Journal and Thrombosis and Haemostasis. He has contributed to the publication of many guidelines for obstetricians and gynecologists including the Thromboembolic Risk Factors Consensus Group Guidelines in 1992 and 1998, and the Royal College of Obstetricians and Gynaecologists Working Party on Prophylaxis against Thromboembolism in Gynaecology and Obstetrics in 1995.

His main research interests include the mechanism and management of hemostatic and thrombotic problems, including congenital and acquired thrombophilias in obstetrics and gynecology, guideline development for clinical practice, pathophysiology of vascular damage, and placental vascular development of pre-eclampsia and intrauterine growth retardation.

**Oncology • Professor Jeff Evans**

Professor Jeff Evans is Professor of Translational Cancer Research at the University of Glasgow. He was formerly Senior Lecturer in Medical Oncology at the University of Glasgow and is also Honorary Consultant in Medical Oncology at the Beatson Oncology Centre, Glasgow.

His initial medical training was at St Bartholomew's Hospital Medical School, University of London, and he trained in Medical Oncology at Charing Cross and St. George's Hospitals, London.

His research interests are in the development of novel anti-cancer agents including molecular targeted therapies, anti-invasive therapies, and gene therapy. He co-ordinates the early-phase clinical trials in Glasgow, and also chairs the Steering Committee of the Analytical Services Unit in Glasgow. He is a member of the editorial board of the British Journal of Cancer, and a former member of the Executive Committee of the British Association for Cancer Research.

### **Inflammation • Professor Neil Thomson**

Professor Thomson heads the Respiratory medicine section within the Division of Immunology, Infection & Inflammation and leads the clinical experimental research programme. The main research interests of the group are the pathogenesis and treatment of asthma and COPD. Research expertise of the group range from basic molecular and cellular biology to clinical experimental research and community based clinical trials.

### **Cardiovascular and Metabolic • Professor John Connell**

John Connell graduated in medicine from the University of Glasgow in 1977 with commendation. Initial clinical and experimental training was in Glasgow with appointment as a Clinical Scientist to the Blood Pressure Unit in 1983 and he was awarded an MD for research studies in 1986. He was awarded an MRC Travelling Fellowship to spend eighteen months in Melbourne working in the Howard Florey Institute for Experimental Physiology and Medicine. He returned to Glasgow as Consultant Physician and senior Clinical Scientist in the MRC Blood Pressure Unit in 1988; in 1994 he was appointed to a personal Chair and in 1995 he became Professor of Endocrinology in the University of Glasgow and Honorary Consultant Physician. He is deputy Director of the BHF Glasgow Cardiovascular Research Centre. His main research interest is in the endocrine and metabolic regulation of cardiovascular function. He has published over 200 peer reviewed papers in the last 20 years.

Research interests:

He has had programme grant funding from the MRC for the last twelve years to support studies into the role of corticosteroids in cardiovascular disease, with the most recent renewal (for 5 years) being in 2005. During this period his group has carried out extensive research into the regulation of aldosterone synthesis, and the genetic factors that alter this, in relation to cardiovascular disease. These studies are characterised by a combination of population-based measurements of corticosteroid phenotypes in relation to cardiovascular disorders; detailed investigation of the regulation of steroid synthesis in small groups of carefully characterised patients and normal subjects and cellular and molecular studies into the key steps that control aldosterone and cortisol production in the adrenal cortex. The group has extensive collaborations with other investigators in the UK (Keavney, Newcastle; Seckl, Edinburgh; Stewart, Birmingham); Europe (Ploin, Paris; Bernhardt, Dusseldorf) and the US (Rainey, Atlanta).

He has been closely involved in studies of the genetic basis of essential hypertension in the UK and Europe for the last 10 years, and chairs the multi-centre consortium of investigators that has established, over the last decade, the MRC Bright Study. This programme, funded by the MRC is the largest single investigation into the genetics of hypertension worldwide and is currently completing recruitment of a large case/control population.

He had additional interests in the metabolic regulation of vascular function and in the interaction between insulin and vascular endothelium. This work was funded by BHF and MRC Project Grants and Training Fellowships. These studies involve close collaboration with colleagues in molecular biochemistry (Gould, Salt) and metabolic medicine (Sattar) in Glasgow. His group have published extensively on the endothelial consequences of insulin resistance, using a combination of clinical physiological investigations in patients, and molecular studies in isolated vascular endothelial cells.

[www.gla.ac.uk](http://www.gla.ac.uk)

## F • Collaboration partner's biographies

### WYETH PHARMACEUTICALS RESEARCH & DEVELOPMENT

Wyeth Pharmaceuticals is a division of Wyeth (NYSE:WYE), headquartered in Madison, New Jersey. The Company is one of the world's largest research-based pharmaceutical and health care products enterprises. Wyeth is a leader in the discovery, development and manufacture of prescription and other health care products. Wyeth's Research & Development (R&D) vision is to be the most productive global R&D organization combining innovative science and technology with the talents of our people to create breakthrough therapies for a healthier world.

The pharmaceutical research programs at Wyeth R&D are focused on creating first-in-therapy, first-in-class and best-in-class drugs that address significant global medical needs in a wide range of areas across the following major therapeutic areas:

- Neuroscience
- Oncology and Hemophilia
- Vaccines and Infectious Diseases
- Inflammatory Diseases
- Women's Health and Musculoskeletal Diseases
- Cardiovascular and Metabolic Diseases
- Transplantation

Wyeth's strong therapeutic resources are bolstered by the Company's ability to create medicines across three development platforms – small molecules, proteins and vaccines – an advantage that provides many scientific and commercial synergies and increases the Company's opportunity to discover breakthrough treatments.

Wyeth has a history of discovering and developing novel and innovative therapeutics including treatments for depression, menopause, bacterial infection and rheumatoid arthritis. Wyeth's scientific excellence is manifest through its leadership position in a number of disease areas including Alzheimer's disease, rheumatoid arthritis, oncology, musculoskeletal biology and metabolic diseases. In addition to disease area expertise, Wyeth is also a leader in a number of enabling technologies including combinatorial chemistry and structural biology, high throughput screening, and protein optimization technology. Combined with process excellence and organizational change our scientific excellence has fuelled Wyeth's drug discovery success, and since 2001 Wyeth has placed 62 new molecular entities into development in 62 months including a high percentage of first-in-therapy and first-in-class therapies, a truly industry leading productivity rate.

Wyeth was also one of the forerunners in the establishment of dedicated Translational Medicine efforts to bridge the gap between basic pre-clinical drug discovery and clinical drug development. Wyeth has significant expertise in the field of translational medicine using pharmacogenomics, imaging and other technologies to identify markers of efficacy, patient populations most likely to respond to therapy and those likely to exhibit toxicological side effects.

For more information, please visit [www.wyeth.com](http://www.wyeth.com)

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**Giora Z. Feuerstein MSc, M.D., FAHA**  
**Senior Director • Translational Medicine**

Giora Feuerstein joined Wyeth in 2005 as the Senior Director, Translational Medicine.

Before joining Wyeth, Dr Feuerstein has maintained Directorship position in Discovery of cardiovascular, stroke and metabolic disease programs for 16 years in other Pharmaceutical Houses. At SmithKline Beecham (1980-1998), Dr Feuerstein served as the Director of the Department of Cardiovascular Pharmacology where he led the Carvedilol (COREG) program which became the first beta-blocker launched for treatment of chronic Heart Failure. In addition, Dr Feuerstein was associated with the discovery and development of eprosartan, enrasartan, losartan and several other compounds for diverse cardiovascular indications including stroke and anti-arrhythmic drugs.

In 1998, Dr Feuerstein joined DuPont Pharmaceuticals as the head of the Cardiovascular Disease Department leading thrombosis, cardiovascular and metabolic syndrome programs. Razaxaban, a lead FXa inhibitor was advanced to phase II development prior to acquisition of the DPC by BMS. In 2003 Dr Feuerstein joined Merck Co, Inc, West Point as the Executive Director, Cardiovascular diseases where he established a new department leading efforts in hypertension (renin inhibitors), metabolic syndrome and cardiac arrhythmias. In addition, Dr Feuerstein was appointed as member of strategic forums in cardiovascular drug development and chaired licensing and business development committees.

Prior to joining the Pharmaceutical industry, Dr Feuerstein held academic position in the USUHS, Bethesda, MD (1981-1988) where he was the Director of the Neurobiology Research laboratories heading research in central and peripheral regulation of the cardiovascular system with focus on adrenergic and peptidergic systems. In addition, Dr Feuerstein developed research lines in stroke, gene expression and pharmacological strategies. Dr Feuerstein held the rank of Professor (Research).

Dr Feuerstein received his MSc degree in Pharmacology from the Hebrew University, Jerusalem, Israel in 1970 and his MD degree from the Hadassah Medical School, Jerusalem, Israel. Following lectureship position in the department of Pharmacology, Hadassah Medical School (1976-1979) Dr Feuerstein obtained the Fulbright scholarship for further training at the National Institute of Health (NIH) Bethesda, MD (1979-1981) in the Laboratory of Clinical Sciences (Chief, I Kopin) focusing on sympathetic nervous system control of the cardiovascular system.

Dr Feuerstein holds adjunct position in academic organization (Med College of Georgia, Augusta GA) and Jefferson Medical College, Philadelphia, PA). He also serves on editorial boards of the J Pharmacology Experiment Therapeutics; Biochemical Pharmacology, J Cerebral Blood Flow Metabolism, Circulation Research, Stroke. Dr Feuerstein is the recipient of several national and international awards including Award of Excellence in Cardiovascular Research, AHA, 1987; Prix Galien Award for Drug Discovery (endothelin antagonist) 1994, Conrad R Lam Award for Cardiovascular Research, Henry Ford Foundation, 2001.

Dr Feuerstein has authored and coauthored over 650 publications of which over 400 in peer review journals. He also is co-inventor on 12 patents and edited 8 books.

**Matt Bell, Ph.D.**  
**Senior Director • Discovery Research Strategy • Wyeth Research**

Dr Matt Bell combines a rare background in science, drug discovery, and pharmaceutical business. He graduated with a First Class degree in Natural Sciences from Cambridge University, England and completed his post-graduate studies in the Drug Discovery laboratories of Parke Davis Neuroscience (a division of Warner Lambert, now Pfizer). He then worked for Cambridge Pharma Consultancy, the strategic consulting division of IMS Health. At Cambridge, Dr Bell led successful strategic engagements for senior R&D clients including Pfizer, Eli Lilly, Wyeth and GlaxoSmithKline.

In his current role Dr Bell is Senior Director of Discovery Research Strategy at Wyeth Research and member of the Discovery Executive Committee. In this role he works closely with senior R&D colleagues to develop and implement strategies for sustainable Discovery Research success. He leads a business team that has had a critical impact on Discovery success by championing and developing novel approaches to productivity, external collaboration, performance improvement, and value creation throughout the Discovery Research process. In addition, he is a thought leader in improving organizational decision-making in R&D.

### **J. Lynn Rutkowski, Ph.D.**

#### **Head • Biomarker Development • Translational Medicine**

Lynn Rutkowski joined Wyeth Research in July 2003 as Director of Neuroscience in Experimental Medicine under John Ryan. With the launch of the Translational Medicine initiative in Oct 2004, she became head of Biomarker Development under Thorir Bjornsson. Biomarker Development is comprised of three functional groups: Translational Science, which designs and executes research to address the gap between drug discovery and clinical development; the Clinical Biomarker Laboratory, which develops exploratory biomarker assays for early clinical drug trials; and Biomarker and Bioanalytical Operations, which manages contract services and the clinical database,

Prior to joining Wyeth, Dr Rutkowski was Senior Director and Head of Product Development at Neuronyx, a development-stage biopharmaceutical company located in Malvern, Pennsylvania. While at Neuronyx, she developed a unique population of human adult bone marrow-derived stem cells in addition to GMP processes for cell isolation, expansion, storage and delivery. This stem cell population has demonstrated efficacy in animal models of myocardial infarction, spinal cord injury and stroke and is under development for cardiovascular disease.

Dr Rutkowski had a successful academic career spanning over 15 years prior to moving to industry. Dr Rutkowski received her PhD in Pharmacology and Toxicology from the University of Maryland, Baltimore, in 1984. After post-doctoral training in Neuropathology and Neurotoxicology at the Johns Hopkins University in Baltimore, she became an Instructor in Neurology at the same institution. Her research focused on understanding the regenerative properties of Schwann cells. From there, she moved to the Department of Neurology as Assistant Professor, expanding her research into the mechanisms of tumorigenesis in the peripheral nervous system. In 1995, she moved to the University of Pennsylvania and became an Associate Professor in Neurology focusing on the transcriptional mechanism controlling the growth, differentiation and transformation of myelin-forming cells.

During her academic career, Dr Rutkowski was awarded grants from multiple funding agencies including the National Institutes of Health, National Multiple Sclerosis Society and United Cerebral Palsy Foundation. In addition, she mentored over 20 graduate students and postdoctoral fellows, served on editorial boards and grants review committees and organized scientific meetings.

### **Frank Walsh Ph.D., DSc (Hon), FmedSci**

#### **Executive Vice President • Discovery Research**

Frank Walsh joined Wyeth Research in July 2002 as Senior Vice President and Head of Discovery Research. In January 2005, he was promoted to Executive Vice President. Dr Walsh is a member of RADEX and Chairs the Discovery Review Board and the Discovery Executive Committee. He is also a member of the management team of the BioPharma Business Unit.

Prior to joining Wyeth, Dr Walsh was at GlaxoSmithKline where he was Senior Vice President and Head of the Neurology CEDD (Centre of Excellence for Drug Discovery) from 2000. From 1997-2000 he was Vice President and Head of Neuroscience Research at SmithKline Beecham. Dr Walsh had a distinguished academic career spanning almost 20 years prior to moving to industry. He was latterly the Research Dean at the United Medical and Dental Schools of Guys and St. Thomas's Hospitals, London, UK, and also held the Sir William Dunn Professorship in Experimental Pathology.

Dr Walsh received his B.Sc. in Biochemistry from the University of Strathclyde, Glasgow, Scotland, in 1974, and his Ph.D. in Biochemistry from the University College, London, in 1977. Thereafter, he was a Postdoctoral Fellow at the National Institutes of Health. Dr Walsh is the author of over 200 scientific publications in peer-reviewed journals. He is the Chief Editor of the Journal of Molecular and Cellular Neuroscience and the editor of a number of journals. Previously he was an editor of the Journal of Cell Biology and the Journal of Neurochemistry.

Dr Walsh holds a number of academic appointments including a visiting professorship at University College Dublin, and GKT Medical School at Kings College, London. He is a member of the Research Committee of the Muscular Dystrophy Campaign in the U.K.; and the Advisory Boards of the Robert Packard Center for ALS Research at Johns Hopkins University; the Center for Advanced Biotechnology and Medicine at Rutgers, NJ; and the MRC Centre for Developmental Neurobiology, King's College London. Dr Walsh is also a member of the CEO's Committee of the New York Academy of Science.

In October, 2004, he was awarded an Honorary Degree in the Chemistry and Technology of Drugs from the University of Perugia in Italy; and in 2003 was elected to the Academy of Medical Sciences, London.

### **Orest Hurko, M.D.**

#### **Assistant Vice President • Clinical Discovery • Translational Research**

Orest Hurko joined Wyeth Research in January 2003 as Assistant Vice President, to form a new division of Discovery Medicine. In 2004 he became Assistant Vice President for Clinical Discovery in Translational Research. Dr Hurko is a member of the Discovery Executive Committee, the Development Council, the Translational Medicine Review Board and the Neuroscience Leadership Team

Prior to joining Wyeth, he was at GlaxoSmithKline where he founded the Investigational Medicine Unit in the Neurology CEDD and was a member of the Joint Development Council of the Shionogi-GSK Joint Venture. Dr Hurko had a distinguished academic career spanning 25 years prior to moving to industry. His primary faculty appointment at the Johns Hopkins University School of Medicine was in Neurology, where he was Director of the Neurological and Neurosurgical Consultation Service. Dr Hurko was also Consultant Neurologist in the Moore Genetics Clinic and Director of the Greenberg Center for Skeletal Dysplasias. He served the Author-Editor for Neurologic, Psychiatric and Muscular Disorders, Online Mendelian Inheritance in Man.

Dr Hurko received a B.A. in Biochemical Sciences in 1969 from Harvard College and an M.D. in 1974 from the Harvard Medical School, after a two-year research program in neuroendocrinology at M.I.T. He then completed medical internship at St. Luke's Hospital Medical Center, Columbia University, in New York. In 1975, Dr Hurko was appointed to the NIH in Bethesda, Maryland, as Staff Associate in the Laboratory of Biochemical Genetics, NHLBI Postdoctoral training in Neurology was at the John Hopkins Hospital, Baltimore, Maryland, where he became Chief Resident in 1980. He became the Mosely Travelling Fellow of the Harvard Medical School in 1981. In 1983, Dr Hurko received primary appointment as Fellow in Neurology with advancement to Associate Professor in Neurology, Medicine, Pediatrics and Neurological Surgery.

Dr Hurko serves on a number of National Medical Advisory Boards, is Board Certified in Neurology, a Diplomate of American Board of Medical Examiners, and a Fellow of the American Neurological Association. Dr Hurko has authored over 150 publications in the peer-reviewed literature including the first molecular definition of a pathogenic mitochondrial DNA deletion, identification of the molecular basis of the myoneurogastrointestinal syndrome, FACs sorting of human muscle progenitors, segregation model of Tourette syndrome, and treatment of neurological complications of skeletal dysplasias.

<http://wyeth.com/>

Scottish Enterprise is Scotland's main economic development agency, funded by the Scottish Executive. Its mission is to help the people and businesses of Scotland succeed. In doing so, it aims to build a world-class economy.

Its key priorities are to provide a range of high-quality services to:

- help new businesses get underway;
- support and develop existing businesses;
- help people gain the knowledge and skills they will need for tomorrow's jobs; and
- help Scottish businesses develop a strong presence in the global economy - building on Scotland's reputation as a great place to live, work and do business.

As well as companies and individuals, it also works with universities, colleges, local authorities and other public sector bodies to achieve these goals.

Rated among the world's top economic development agencies, Scottish Enterprise is the main economic development agency for Scotland, covering 93 per cent of the population from Grampian to the Border.

Scottish Enterprise consists of Scottish Enterprise and 12 Local Enterprise Companies. Working in partnership with the private and public sectors, it aims to secure the long-term future of the Scottish economy by making Scotland's industries more competitive. It:

- helps business start-ups and existing companies to grow;
- promotes and encourage exporting;
- attracts inward investment ; and
- develops skills.

### *Smart, Successful Scotland*

The Scottish Executive has set out its strategic vision to guide the strategy and operations of Scottish Enterprise. The vision is for a Smart, Successful Scotland, a Scotland where creating, learning and connecting faster is the basis for sustained productivity growth, competitiveness and prosperity. The role of the Enterprise Networks will be central to delivering this vision. The action needed to achieve a Smarter Scotland translates into three key organising themes for the activities of the Enterprise Networks.

- Growing businesses  
Scotland: a fast learning, high earning nation
- Global connections  
Scotland: a globally connected nation
- Learning and skills  
Every Scot ready for tomorrow's jobs

To find out more please visit: [www.scottish-enterprise.com](http://www.scottish-enterprise.com)

### **Jack Perry**

#### **Chief Executive • Scottish Enterprise**

Jack Perry became Chief Executive of Scottish Enterprise in February 2004.

As Chief Executive of Scotland's largest economic development agency employing circa 2,600 (this figure is made up of 1,500 Scottish Enterprise Network and 1,100 Careers Scotland staff), he is responsible for an annual budget of circa £450m.

Prior to this, until December 2003, he was the managing partner of Ernst & Young in Glasgow. In addition he was Regional Industry Leader for Scotland and Northern Ireland for Ernst & Young's Technology & Communications practice.

A dual national, Jack was born in Scotland to American parents. Educated at both Glasgow and Strathclyde Universities, he is a graduate scientist. He is also a Chartered Accountant and a United States Certified Public Accountant. He has worked in both the United States and the United Kingdom in a career covering most professional disciplines and industries.

In September 2001 Jack took office as Chairman of CBI Scotland, having been a member of the CBI Scotland Council since 1996. He also chaired the group of 12 CBI Regional Chairmen and was a member of the President's Committee, the ultimate policy making body of the CBI. Jack demitted office at the CBI at the end of his two-year term in September 2003.

His other responsibilities include Chairmanship of the Board of Directors of Craigholme School. Jack is also a visiting tutor to the Leadership Trust. He is a former member of the Ministerial Task Force on Economic Forums, the Advisory Board of the Prince and Princess of Wales Hospice, and the Glasgow Area Committee of the Institute of Chartered Accountants.

Jack is married with three children. He lives in Glasgow and his leisure interests include golf, skiing, reading and current affairs.

### **Dr Janet Brown**

Janet joined Scottish Enterprise in January 2000 after having spent 18 years working in the US. She is presently Managing Director of Industries. She has extensive experience in business management, her previous position being Director of Operations for Networking Memories in the semiconductor sector of Motorola located in Austin, Texas. Janet joined Motorola in 1993 in Microprocessors and Memory Technologies Group in the position of Director of Group Reliability and Quality Assurance.

Prior to moving to Motorola, Janet was employed by AT&T Bell Laboratories. Her background includes research and development, materials and process engineering, and technical management. While she was at AT&T she was assigned to the US semiconductor consortium, SEMATECH as the senior AT&T executive, where she was the Director of Process Architecture and Characterization.

Janet holds a Ph.D. in Physical Metallurgy and Science of Materials from the University of Birmingham in England.

She is a member of IEEE, I.O.P., and has published over 60 technical papers and reports in the field of semiconductor materials.