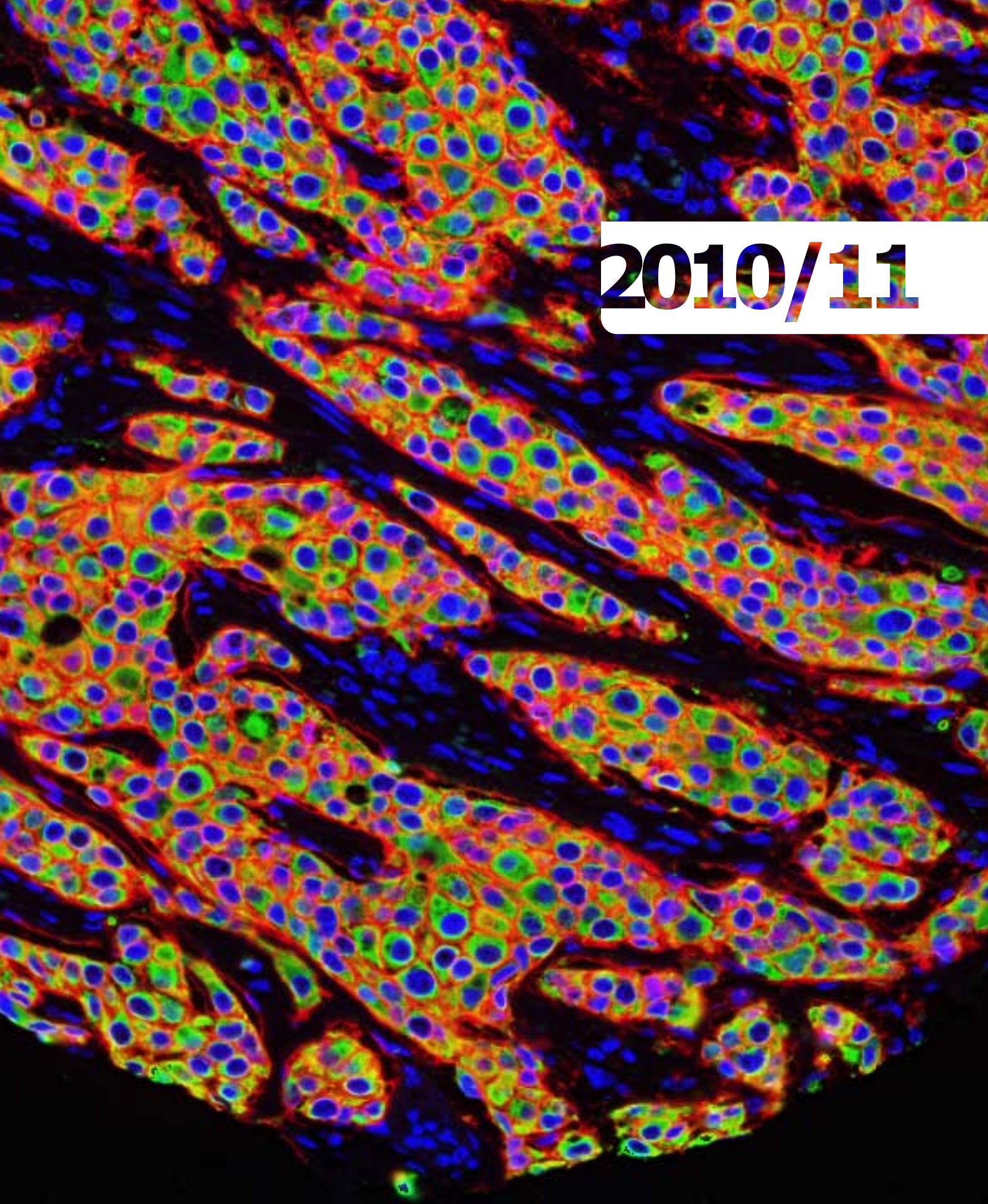


2010/11

Annual Review
Funding a Healthier Future

medical research scotland

Foreword

BUCKINGHAM PALACE

I was delighted to be able to accept the Trustees' invitation that I continue as Patron of Medical Research Scotland for a further three years.

As Patron, it is clear to me that Professor Harrison and his fellow Trustees are determined to ensure that Medical Research Scotland continues to make a meaningful difference to the careers of young people in biomedical science in Scotland. In that regard, I have been interested to learn of the introduction of several significant changes to the charity's funding strategy. While remaining focused on its charitable objects and ensuring best use of its funds, these changes demonstrate that Medical Research Scotland is responsive to the changing academic and economic environment in which it operates.

It will be some time until these changes will reap tangible benefits, but I look forward to learning more about their progress in the year ahead.

HRH The Princess Royal

Chairman's Report

My fellow Members and I were delighted to learn in March this year that HRH The Princess Royal has agreed to continue her Royal Patronage of the charity for a further three years. We are very grateful for her continued interest in our work.

Last year I reported that the Members' comprehensive strategic review of our activities would result in changes and the most significant of these is to our funding strategy. In future, we will be offering support for four-year PhD studentships involving collaborations between healthcare-related companies and universities and incorporating training on developing science research careers in an increasingly difficult and competitive market. As a result, we will make the last of our traditional three-year Research Project Grant awards in the summer of 2011. Work is now under way to ensure that all the necessary changes are made to our conditions of award and other documents to enable the first PhD studentships to start in the autumn of 2012. We believe these innovative new awards will allow the Trust to enhance the contribution it has always made to the careers of young biomedical scientists in Scotland.

I am pleased to report that the streamlining of our project grant application processes was well received by all concerned and reduced significantly the time taken for applicants to receive a decision. The reports from the undergraduate beneficiaries of our first Vacation Scholarships showed them to be popular, successful and, in most cases, meeting their principal objective. We therefore decided to invite applications for the summer of 2011 and made 19 offers of award at our February meeting.

We are always very grateful for the legacies and donations we receive and I am particularly pleased to record that this year, we have received a substantial legacy from the late Miss Annie McCabe, specified to be allocated for research into cancer and into rheumatoid arthritis. Further, we have also received donations made electronically, via our website links.

At an event in Edinburgh in August 2010, we said our formal farewells to Professor Michael Steel and Mr Fred Dalgarno, who had demitted office as Members during the year and also to Dr Joan Macnab, our Scientific Adviser, who would retire on 31 December. In thanking them all for their expert contributions over the years we recognised, in particular, the dedicated and very valuable support that Joan has given both to young researchers and to the work of the Trust since her appointment in November 1996.

The occasion was also an opportunity to offer a formal welcome to our new Members: Mr Brian Duffin and Mr Bruce Mann who had joined us earlier in the year and Professors Cathy Abbott and Andrew Baker and Mr Scott Johnstone, recently appointed following advertisement and interview. All bring their professional experience in various business, commercial and scientific fields. Dr Alex Graham took over as the Trust's Scientific Adviser in January 2011 and, as she has settled into the role, she is proving to be an able successor. Professor Steve Wigmore resigned his Membership during the year, owing to pressure of other work.

Making further improvements to ensure our good governance, we have introduced a system of 'light touch' appraisal for Members whose initial terms of appointment are nearing completion. As a result, I am pleased to say that Dr Marie Boyd and I were both reappointed for a further period. Our Members all act in a voluntary capacity, so it is fitting that I acknowledge this with thanks for their time and contributions.

Professor David J. Harrison
Chairman

2010-11 Reviewed

Aiming to support young people establishing careers in medical research in Scotland, we fund research which should ultimately lead to improvements in the understanding, diagnosis or treatment of all diseases and the advancement of medical technology.

During the past year

- streamlining of the grant application and review processes, significantly reducing the time to decision, was well received by all concerned;
- the successful introduction of Undergraduate Vacation Scholarships at the end of 2009-10 was followed by a further round and agreement that the Trust will offer up to 20 such awards annually;
- the recommendations arising from a comprehensive strategic review of all the Trust's activities included agreement for a major restructuring of its funding streams, resulting in the phasing out of the 'traditional' Research Project Grants and the introduction of new fully-funded 4-year PhD Studentships incorporating a joint university/company training scheme.

New directions in the year ahead

In addition to completing a review of the Trust's Secretarial Services and maintaining vigilance on the value of the Trust's funds and income arising from them, during 2011-12 the Trust will:

- ensure maximum publicity for the changed direction of its funding strategy so that sufficient suitably high-quality applications are received for its innovative PhD Studentship awards to enable up to 10 to be made;
- encourage more young people to consider a career in biomedical research by holding a second Researcher Showcase for senior school pupils and also offering up to 20 Undergraduate Vacation Scholarship awards;
- make the last of its Research Project Grant awards and work to ensure that the recipients of these and earlier awards are supported appropriately throughout the tenure of their grants;
- consider the opportunities its changed funding strategy affords to augment the funds available to it through partnership funding or other means;
- continue to introduce changes to the Trust's structures and operational procedures in the interests of good governance and administrative efficiency, including to ensure the most efficient use of its resources.

"..ALLOWED ME TO CARRY OUT EXPERIMENTS THAT I WOULD NEVER HAVE HAD A CHANCE TO DO...."

Improving health & supporting career development

Medical Research Scotland helps to improve the nation's health by funding research that will lead to improvements in the understanding and treatment of disease. Changes to the Trust's funding strategy mean that, in future it will be supporting young people at an earlier career stage, while also helping to strengthen Scotland's internationally-renowned biomedical research base.

Making a difference to career establishment

For almost 60 years, while seeking to improve health care through high-quality research, Medical Research Scotland has always done so by supporting individuals as they become independent researchers, obtaining grants from large mainstream funders and building research teams of their own. The following demonstrate that the Trust continues to do this.

Dr Omar Albagha, now a Lecturer in the Rheumatic Diseases Unit, Edinburgh University (Identification of susceptibility gene(s) for osteoporosis in men on chromosome 10q21 [2007-09]), identified a new candidate gene for regulation of bone mineral density in men which provides new insights into the understanding of osteoporosis.

"… the award helped me in building my research career and develop the skills required to complete two separate but related projects … now have a tenured position."

This later work on Paget's disease has resulted in two papers published in the high-impact journal, Nature Genetics.[1]

Dr Trevor Bushell, now Glaxo-Jack Research Lecturer at Strathclyde University (Determining the role of proteinase-activated receptor 2 in upregulation in CNS neurones [2007-09]), found that activation of the receptor can protect neurones against toxic insults and also identified mechanisms which may be involved.

"I have obtained a Wellcome Trust project grant which is funding the continuation of the grant…."

The work funded by our grant has resulted in two publications.[2]

Dr Christopher Loughrey, now Senior Lecturer in the Institute of Cardiovascular and Medical Sciences and Associate Academic in the School of Veterinary Medicine at Glasgow University (Investigating the role of intracellular calcium in left ventricular diastolic dysfunction [2006-08]):

"[the award] was pivotal to establishing my research laboratory and group. We are now international experts in the use of PV catheter technology, which stems from the award granted to us…".

This led also to subsequent grants from Heart Research UK and the British Heart Foundation.

Dr Andrew Roe, Lecturer in Infection, Immunity & Inflammation at Glasgow University (Identification of proteins targeted by salicylic aldehyde inhibitors in *Escherichia coli* O157 [2008-10]), provided the first insights into the likely binding proteins of these compounds and showed that three are involved in the normal expression and regulation of virulence factors in *E. coli* O157 and *Yersinia pseudotuberculosis*.

A paper will be published in the Journal of Biological Chemistry in autumn 2011[3] and Dr Roe has recently obtained a 5-year grant from the Wellcome Trust.

1
Albagha, O.M.E, et al. Genome-wide association identifies three new susceptibility loci for Paget's disease of bone. Nature Genetics. 2011, 43(7):685-689. Epub 2011 May 29.
www.nature.com/ng/journal/v43/n7/abs/ng.845.html

Albagha, O.M.E., et al. Genome-wide association study identifies variants at CSF1, OPTN and TNFRSF11A as genetic risk factors for Paget's disease of bone. Nature Genetics. 2010, 42(6):520-4. Epub 2010 May 2.
www.nature.com/ng/journal/v42/n6/abs/ng.562.html

2
Greenwood, S.M. and Bushell, T.J. (2010) Astrocytic activation and an inhibition of MAP kinases are required for proteinase-activated receptor-2-mediated protection from neurotoxicity. Journal of Neurochemistry 113, 1471-1480

Gan, J., Greenwood, S.M., Cobb, S. R. and Bushell, T.J. (2011) Activation of Proteinase-activated Receptor-2 Modulates Neuronal Excitability and Inhibits Synaptic Transmission in the Hippocampus. British Journal of Pharmacology [DOI: 10.1111/j.1476-5381.2011.01293.x.] (in press)

3
Currently available at:
www.jbc.org/content/early/2011/07/01/jbc.M111.233858.full.pdf+html

Encouraging the next generation

The **Vacation Research Scholarships** introduced late last year have proved to be popular. They provide promising undergraduates with hands-on experience of research during the summer vacation and aim to encourage them to consider a career in research. Comprising a stipend for the student and a modest contribution to the host laboratory, the 11 awarded cost £17,470 in the 2010-11 financial year.

The success of these new awards can be judged by the following quotations from supervisors and students and also by the fact that at least one of the 2010 Vacation Scholars presented a poster on his research at a national specialty conference early in 2011. In the increasingly competitive research career environment, success is measured by publications and conference presentations, so such achievements are noteworthy.

"… allowed me to carry out experiments that I would never have had a chance to do … as an Undergraduate…. reinforced my desire to stay in science … determined to find a PhD …re-affirmed my commitment to a career in biomedical research."
3rd-year student Biomedical Sciences

"… greatly increased my interest in laboratory-based medical research and I would like to pursue a career in medical research… either through a postgraduate research degree or employment with a medical research institute."
3rd-year student Pharmacology

"I enjoyed learning new skills … and also the social aspects of this project. Though working individually, I collaborated with the PhD and Post-Doc students to solve any problems I encountered… it has been a fantastic learning experience."
2nd-year student Chemistry

"I noticed an almost unshakeable dedication to every aspect of the research process among the staff that mirrored the healthcare environment, a facet of medical research I found both attractive and contagious."
2nd-year student Medicine

"… gives the students such a wonderful chance to experience the ups and downs of research, even in such a short period."
supervisor

"… really enjoyed his time in the lab made possible by Medical Research Scotland … he should have no problem picking up a PhD post assisted by his experience."
supervisor

"… as a result the student has decided to seek PhD positions and pursue a career in research."
supervisor

"….A FANTASTIC LEARNING EXPERIENCE"

Supporting the next stage

The first step for graduates wanting a career in biomedical research is a PhD degree. Mindful that of the 30% of PhD graduates (in all sciences) who secure postdoctoral research posts, only 12% eventually achieve permanent academic appointments (The Scientific Century: Securing our Future Prosperity, Royal Society of London, 2010: http://royalsociety.org/The-scientific-century/), the Trust is withdrawing from offering the 'traditional' three-year project grants for postdoctoral researchers and diverting the ~£1m available to it annually to introduce an innovative PhD Studentship award scheme.

The Members believe that this change will increase the value of the support that the Trust has always given to young people starting a career in biomedical science, by offering an enhanced 4-year PhD research and training programme that will provide better preparation for a career which, increasingly, is likely to be outwith academia and in a difficult and competitive market.

By embracing Scotland's vibrant life sciences commercial sector within the PhD Studentships, these new awards will enhance the long-term career prospects of the graduates involved, by ensuring that business-focused skills training is provided to augment the research and generic skills training provided by the universities. Reversing the customary direction of academic/industry collaboration, the research projects will largely be market-driven, because companies wishing to be part of these new awards must find academic collaborators. In this way, Medical Research Scotland will also be continuing to strengthen Scotland's internationally-renowned biomedical research base.

Applications for the new awards were sought during the spring/summer of 2011, with the first graduates anticipated to start their PhD projects in autumn 2012.

".. GIVES THE STUDENTS ....A CHANCE TO EXPERIENCE THE UPS AND DOWNS OF RESEARCH, EVEN IN SUCH A SHORT PERIOD"

Project Grants Awarded 2010-11

The Members awarded over £1m as **Research Project Grants** for work into better understanding of hospital-acquired infections, diphtheria, schizophrenia and several neurological disorders, as well as work towards developing new cancer treatments.

Bacterial virulence & HAI: £141,512 over two years to **Dr Sarah J. Coulthurst** (Division of Molecular Microbiology, Dundee University) for an investigation into the role of a new protein secretion system in the virulence of the opportunistic pathogen, *Serratia marcescens*.

A bacterium called Serratia marcescens *is the source of many hospital-acquired infections (HAI). This project seeks to improve detailed understanding of the steps in the infection process, with the results contributing to the search to find new ways to combat HAI.*

Unravelling schizophrenia: £149,861 over three years to **Dr Bing Lang** (School of Medical Sciences, Aberdeen University) and colleagues in Aberdeen and the Western General Hospital, Edinburgh, for a project aimed at uncovering novel biomarkers for schizophrenia.

Schizophrenia and bipolar disorder affect 1 in 50 people. No effective medication is available and current antipsychotic drugs often have unpleasant side-effects. This project aims to explain aspects of abnormal brain development in schizophrenia and identify new biomarkers which may be useful in future drug development.

Tailoring colon cancer chemotherapy: £148,730 over three years to **Dr Dana Faratian** (Division of Pathology & Breakthrough Research Unit, Edinburgh University), for a project involving the grouping of colorectal cancers by phosphoprotein profiling to refine prediction of responses to new and existing therapies.

Reducing the 1 in 3 death rate for colon cancer depends on finding better ways to predict a patient's response to chemotherapy. This project aims to identify key differences between cancer types, to enable suitable tests for pathologists in hospital laboratories to use when a diagnosis is made.

Targeting brain tumour treatment: £74,192 over 18 months to **Dr Annette Sorenson** (Institute of Pharmacy & Biomedical Sciences, Strathclyde University) and colleagues in the CRUK Beatson Laboratories and Glasgow University, to investigate several novel combination therapies for the treatment of medulloblastoma and other somatostatin receptor expressing tumours.

Medulloblastoma is the most common type of brain tumour affecting children. Current treatments for it and other similar cancers have serious side-effects resulting from 'collateral' damage to the surrounding healthy tissues. This project will study a number of possible options for improved and more effective treatment.

Understanding resistant diphtheria: £120,229 over 24 months to **Dr Paul Hoskisson** (Microbiology, Institute of Pharmacy & Biomedical Sciences, Strathclyde University) to study non-toxigenic *Corynebacterium diphtheriae* - a pathogen of emerging importance in Scotland.

Diphtheria is a debilitating disease caused by the bacterium Corynebacterium diphtheriae. *Relatively rare in the UK thanks to vaccination, but recent increases in cases of serious, persistent infection have highlighted a need for this project, which aims to improve understanding of the detailed disease mechanisms.*

Insulin control in bone tissue: £147,067 over 24 months to **Dr Vicky MacRae** (Roslin Institute & Royal (Dick) Vet School, Edinburgh University) and Edinburgh colleagues to investigate the regulation of insulin signalling in bone by PC-1.

Insulin is crucial to efficient glucose metabolism and insulin resistance underlies diabetes and cardiovascular disease. Plasma cell membrane glycoprotein-1 regulates glucose metabolism in muscle and adipose tissue. This project will clarify its role in insulin control, particularly in bone, recently found able to regulate glucose metabolism.

Disrupted antenatal neural development: £148,872 over 36 months to **Dr Richard Mort** (Medical & Developmental Genetics, MRC Human Genetics Unit, Edinburgh) and colleagues in Edinburgh and Heriot-Watt Universities, to take an integrated, multidisciplinary approach to model normal neural crest cell development and the abnormalities that contribute to human birth defects.

1 in 3,000 babies born in the UK are diagnosed with neurofibromatosis type 1. This disease increases the risk of developing nervous system cancers and >95% of these children also have patchy skin or hair colouration. This project will investigate how abnormal development of neural crest cell contributes to disease.

Immune response in MS: £141,848 over 30 months to **Dr Hui-Rong Jiang** (Institute of Pharmacy & Biomedical Sciences, Strathclyde University), to investigate IL-33 activity in the development of neurological autoimmune diseases.

Multiple sclerosis is an incurable, chronic, autoimmune disease causing irreversible nerve damage, for which treatments are largely ineffective. Cell-signalling proteins, cytokines, are important in disease progression, but the details are not understood. This project focuses on cytokine IL-33 and how it affects the immune response in MS.

"... HELPED ME IN BUILDING MY RESEARCH CAREER AND DEVELOP THE SKILLS REQUIRED"

Finance

Legacies & Donations Received

The following legacies and donations were received with gratitude by the Members. Unless otherwise indicated, all will be applied in support of general medical research.

	£
From the estate of the late Miss Annie McCabe (for cancer and rheumatoid arthritis research)	241,753
From the estate of an anonymous donor (for pain management research) [final payment]	196
From the estate of the late Mr Richard Ellis [final tax rebate]	6
From Mr David Wilson (for arthritis research) [including Gift Aid]	5,000
From Mr & Mrs S Henderson (for neurological diseases research)	220
From Mr Robert N. Wyllie	40
From J.M.H. Anderson	700
Total	**247, 915**

Financial Summary

The Trust can only spend income, so relies on that received from its investments, augmented by legacies, donations and royalties. Income generated on the investment portfolio and related cash deposits was £836,671 during the year, compared with £1,032,676 in 2009-10. As at 31st March 2011, the value of the Trust's investment portfolio (including capital cash) was £27,993,712, compared with £26,921,777 at 31st March 2010 and royalties were £59,653 compared with £68,895. The Trust's investments are divided into Restricted and Unrestricted Funds: the former supporting research into named diseases; the latter being available to support any area of the Trust's work. Work continues on developing plans to broaden the Trust's income base.

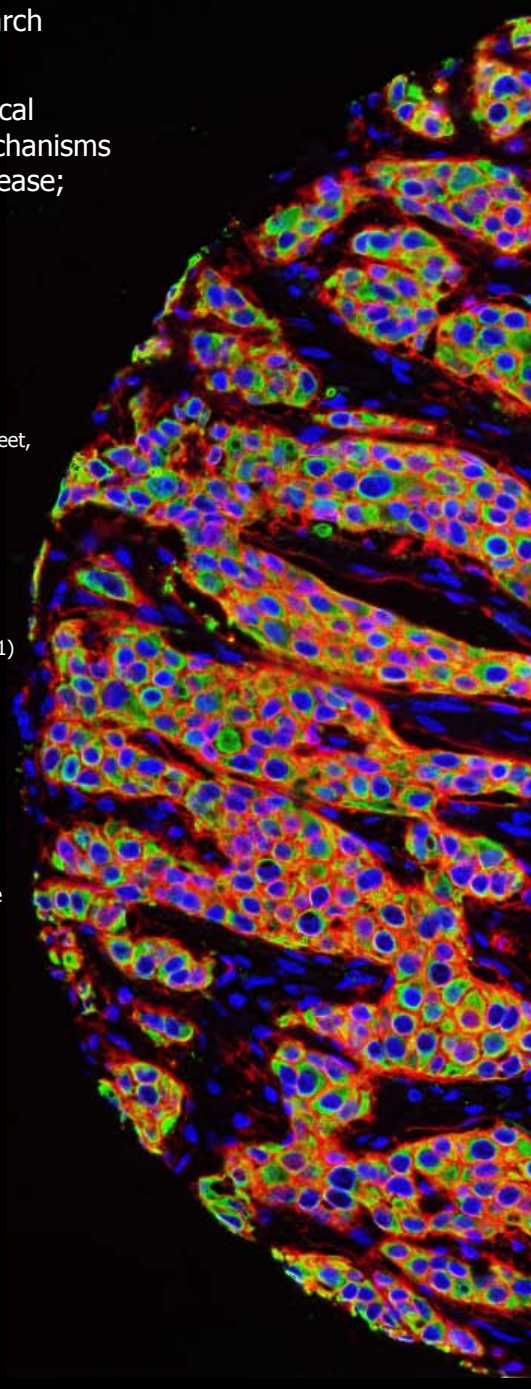
Income & Expenditure Summarised

	2011 £	2010 £
INCOME		
Legacies & donations	247,915	2,751
Royalties	59,653	68,895
Investment income	836,671	1,032,676
Miscellaneous income	-	75
Total incoming resources	1,144,239	1,104,397
EXPENDITURE		
Costs of generating voluntary income	8,410	16,650
Investment management cost	81,187	71,848
Grants payable	1,145,761	714,411
Support costs of grant-making	159,420	187,467
Governance costs	45,962	44,689
Total resources expended	1,440,740	1,035,065
FUND BALANCES at 31ST March	**29,731,322**	**28,927,286**

The financial information above is extracted from the full Report & Financial Statements for the year to 31st March 2011, which were approved on 26th August, 2011 with an unqualified audit report from Scott-Moncrieff, Exchange Place 3, Semple Street, Edinburgh EH3 8BL. The full financial statements are available on the website at: www.medicalresearchscotland.org.uk/reports.htm and also on application to the Trust Secretaries.

As Scotland's largest independent comprehensive charity funder of medical research, Medical Research Scotland is committed to:

- supporting people in the early stages of their careers in medical research in Scotland
- supporting only the highest-quality clinical and laboratory-based medical research, which is aimed at improving understanding of the basic mechanisms of disease processes; or the diagnosis, treatment or prevention of disease; or the advancement of medical technology.



medical research scotland

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Cover image: HER2 biomarker expression in invasive breast cancer measured by AQUA quantitative immunofluorescence; kindly supplied by Dr Dana Faratian, Pathology, University of Edinburgh; **Page 02:** University of Edinburgh/Chris Close.

Produced by: Fiona Selkirk

Design by: Pod Creative Design Ltd: www.pod-creative.com

Medical Research Scotland is the operational name of the Scottish Hospital Endowments Research Trust (SHERT), which is recognised as a charity in Scotland with Charity No. SC014959.