As Patron, I am gratified to note that Medical Research Scotland is adapting to meet the continuing need to attract young people into medical research. It was a pleasure to be able to attend the Researcher Showcase Open Day in Glasgow recently, to meet and talk both to young researchers supported by the charity and to the senior pupils who attended from several local schools. The range of science supported is impressive, and the focus on sharing enthusiasm and knowledge with the next generation particularly encouraging.

Last summer Medical Research Scotland said farewell to Professor Moira Brown who achieved so much as Chairman, for which we are all most grateful, and I am pleased to welcome Professor David Harrison in her place. I am confident Medical Research Scotland will continue its innovative work under his guidance.

Her Royal Highness
The Princess Royal, Patron
The charity is immensely grateful to Professor Moira Brown who retired as Chair, having brought Medical Research Scotland to independence and reinvigorated its mission to support young people in biomedical research. In August 2009, the Members said their farewells at a dinner in the Raeburn Room, Old College, The University of Edinburgh. During this year, we also said farewell to Members Dr Denise Coia, Mr Alan Stewart, Dr Karen Horsburgh and Professor Michael Steel who demitted office. Mr Brian Duffin and Mr Bruce Mann joined the Board and bring a wealth of experience of finance, governance and investment expertise. Members of Medical Research Scotland act in a voluntary capacity and so it is fitting to acknowledge with thanks their contributions. We are currently appointing new Members by a process of advertisement and interview, a first for the charity, but reflecting our desire to ensure transparency and good governance.

The Members have reviewed aspects of its structure and work, to reflect both the changing economic and research environments and also both the costs of running the charity and the benefits accrued from charitable spend. Some of the changes adopted are now in place and we anticipate there will be more to follow.

Our annual Research Open Day moved from Edinburgh to Glasgow, where grantees and some Members presented careers in science to almost 70 school students and their teachers. We were particularly honoured by the attendance and active participation of our Royal Patron, HRH The Princess Royal in the event.

Summer 2010 saw the first group of 11 Medical Research Scotland Research Scholars take up Undergraduate Vacation Bursaries. This new scheme enables science students from across Scotland to gain up to 8 weeks' experience working on a real research project in a high-quality academic laboratory.

In recent years, we have been able to award up to 6 Research Project Awards per annum to support a staff salary for up to 3 years. Reflecting a number of comments about the application process and to shorten the time it takes to make a decision, we have moved from a two-stage to a one-stage process. In addition we invite applicants to respond to comments from external referees. We think these changes allow for a more efficient processing of awards, while also providing much more feedback to candidates, whether their application succeeds or not.

Medical Research Scotland depends largely on investment income and this has been a volatile period. We are grateful for the donations we receive each year. Members are reviewing both costs and investment strategy, in order to maximise our usefulness in continuing to support new generations of young people entering biomedical research.

Professor David J. Harrison
Chairman
... allow for a more efficient processing of awards, while also providing much more feedback ...
We maintain our commitment to supporting high quality research carried out by young people in the early stages of their careers in medical research in Scotland, by funding work which aims to improve understanding basic disease mechanisms, or lead to better diagnosis, treatment and prevention of disease.

In August, we awarded the first Support Grant to one of the four clinician researchers appointed by the Scottish Government Health Department as Scottish Senior Clinical Fellows 2008 and, being reassured about the quality of those appointed, agreed that we should invite the 2009 Fellows to apply for Support Grants. The Fellowships are designed to help to maintain Scotland’s international reputation in clinical medicine and dentistry by providing a research-focused entry point to a permanent clinical academic career in the field and we were happy to continue with this partnership for another year.

The annual Research Open Day was held in Glasgow in March 2010 in the form of a “Meet the Researcher Showcase”. Senior pupils and teachers from schools in the West of Scotland were invited to take part to learn more about medical research in practice, by talking to 11 of our current grantholders who had prepared posters outlining the research we are funding. The event, which was attended by our Patron, HRH The Princess Royal, was well received by our guests and it has been agreed that similar should be held in Aberdeen, Dundee and Edinburgh in the years ahead.

The incoming Chairman’s review of administrative and operational procedures has already resulted in a streamlining of the application review processes, with a resultant reduction in the timescale between application and funding decision, and the introduction of short Vacation Scholarships for undergraduates. Both of these will be fully operational from the spring/summer of 2010.

In line with our operational procedures, competitive tenders were sought for the provision of both our independent Audit and Investment Management services. These resulted in a change of Auditors and the re-appointment of our incumbent Investment Managers, each for terms of three years.

In the year ahead in addition to continuing to review the professional services provided to it and maintaining vigilance on the value of the trust funds and income arising from them, particularly in light of the continued instabilities in the global financial markets, the Trust will:

- Work to raise awareness of the funding opportunities it offers, particularly seeking to encourage more young people to consider careers in biomedical research and to receive high quality applications for funding, from those who wish to work in Scotland;
- Ensure that it has the necessary breadth of expertise among its membership and appropriate administrative support to pursue its core charitable mission without undue bureaucracy;
- Review its partnership funding for the Scottish Senior Clinical Fellowship Scheme;
- Consider other ways in which it can maximise its contribution to improving Scotland’s research base and thus its international reputation.

… Meet the Researcher Showcase for senior pupils from West of Scotland schools …
improving the
nation’s health

“... other ways in which it can maximise its contribution to improving Scotland’s research base ...”
Improving understanding of what causes malignant melanoma
Melanoma is a cancer of the cells (melanocytes) that provide pigment to the skin, hair and eyes. Accounting for >80% of skin cancer deaths, its incidence is increasing and its most aggressive form is resistant to chemotherapy. Using zebrafish as models, Dr Hironori Ishizaki & Dr Elizabeth Patton of the Edinburgh Cancer Centre at Edinburgh University are focused on improving understanding of how melanocytes develop, migrate and survive and also the genetic and cellular events that cause them to form moles and progress to become invasive cancer. They are also studying how several new chemical compounds affect developing cancers.

Reducing the disease burden of E. coli O157
Infection with the bacterium E. coli O157 can result in serious disease, particularly in the very young and the elderly and Scotland has Europe’s highest E. coli O157 infection rate. Working to identify the proteins involved in the processes used by the bacterium to enable it to infect an individual by attaching itself to the gut wall, are Glasgow University researchers, Dr Andrew Roe of the Division of Infection & Immunity and colleague Dr Richard Burchmore (of the Functional Genomics Facility). The results should provide pointers to the development of compounds which could be used to block the attachment of E. coli O157 to the gut wall.

New insights into atherosclerosis
Immune responses are known to play a key part in the development of atherosclerosis (‘hardening of the arteries’), which is a leading cause of death from heart attack, but the details are not well understood. Now new techniques, enabling the tracking of specific blood cells in vivo, are being combined with state-of-art microscopy by Dr Pasquale Maffia & Professor James Brewer, working at the Institute of Infection, Inflammation & Immunity, Glasgow University. They are creating, for the first time, real-time images of immune responses within intact atherosclerotic tissues. Tracking the movements, locations and interactions of the cells involved will provide the detail needed to improve existing treatments for atherosclerosis.

Are ‘volume dials’ in the spinal cord involved in Motor Neuron Disease?
Every year more than 130 people in Scotland are diagnosed with Motor Neuron Disease (MND), a neurodegenerative and fatal disease for which there is neither cure nor effective treatment. MND damages and kills the nerve cells in the spinal cord which send signals to muscles (motor neurons), controlling movement. Motor neuron loss leads to paralysis and death within 3-4 years of diagnosis. Trying to find pointers to improved treatment, Dr Gareth Miles of the School of Biology at St Andrews University is investigating the potential of other spinal cord nerve cells (interneurons) and their direct connections (synapses) with motor neurons which act like ‘volume dials’, controlling the strength of the signals that motor neurons send to muscles.
grants awarded
09 / 10

... for work on ovarian cancer, reproductive failure, respiratory disease, obesity, bone destruction, heart disease ...
During the year, the Members made a total of eight awards, totalling over £1.1m in value for work on aspects of ovarian and other forms of cancer, reproductive failure, respiratory disease, obesity, bone destruction, heart disease and liver transplantation.

**Cancer Gene Therapy:** £135,287 over two years to Dr Christine M. Dufes (Strathclyde Institute of Pharmacy & Biomedical Sciences) & Professor Kevin Ryan (Beatson Institute for Cancer Research, Glasgow) for the evaluation of systemic p73 gene therapy of cancer, using a novel transferrin-targeted dendrimer.

The potential for using gene therapy in cancer treatment is currently limited by the inability to treat the modified genes to deep-seated tumours efficiently and without healthy tissues being damaged in the process. Iron is essential for tumour cell growth and tumour cells have many iron-carry receptor sites on their surface. This project aims to improve the efficiency of these ‘seek and destroy’ anti-cancer therapies by using an iron-targeted delivery system to carry a specific tumour-suppressor gene directly to the tumour.

**Appetite Control in Obesity:** £149,947 over two years to Dr Nancy Sabater (Centre for Integrative Physiology, University of Edinburgh) to study hypothalamic mechanisms in obesity.

25% of UK adults are obese and, as obesity can lead to diabetes, heart disease and stroke, it is becoming a major health burden. Appetite is largely controlled by a balance between brain signals of hunger and ‘fullness’; obesity often results from a defect in the ‘fullness’ signalling. Mutations in a gene only found in neurones in one part of the hypothalamus are associated with obesity. This project aims to clarify the role of these nerve cells in appetite control.

**Inflammation in Respiratory Disease:** £142,239 over two years to Dr John A. Marwick & Professor Adriano Giorgio Rossi (MRC Centre for Inflammation Research, University of Edinburgh) to study the impact of oxidative stress and glucocorticoids on neutrophil function and macrophage clearance.

Neutrophils and macrophages are white blood cells important in controlling inflammation, the natural, but potentially damaging defence response. Neutrophils kill foreign invaders such as bacteria and die shortly thereafter; macrophages remove dying cells, including neutrophils. Anti-inflammatory drugs (steroids) reduce the rate of neutrophil death and conditions like asthma can impair neutrophil removal. A better understanding of the factors affecting neutrophils may help to identify potential ways to improve steroid efficacy or provide targets for new anti-inflammatory drugs.

**Protecting Liver Transplants:** £117,817.00 over two years to Mr Stephen J. McNally, Professor Stephen J. Wigmore & Dr Luke Dewey (Centre for Inflammation Research, University of Edinburgh) to study the effect of heme-oxygenase-1 on the role of monocytes in hepatic ischaemia-reperfusion injury and transplantation.

Liver transplantation and liver cancer removal have high complication rates, mainly because of the damage that occurs to the liver when its blood supply is restored after surgery. Using models of both procedures, this project aims to identify cells causing the damage and then clarify whether a specific protein might protect the liver when used pre-operatively. Also, in transplants, also whether the donor organ or the recipient should be treated.

**MRI in Heart Disease:** £160,000 over three years to Dr Colin Berry (BiH Glasgow Cardiovascular Research Centre, Glasgow University) for a project aiming to use cardiac magnetic resonance imaging to provide new pathological insights and functional significance in acute myocardial infarction (Scottish Senior Clinical Fellowship Support Grant).

Heart attack, the leading cause of premature ill health and death worldwide, is difficult to predict and the nature and severity of damage to the heart is difficult to detect. Magnetic Resonance Imaging (MRI), is a safe, non-invasive and ‘gold standard’ way to measure heart function, providing images of the beating heart. This project is developing new computer models of heart attack and combining them with MRI scans, aiming to improve prevention or treatment of heart attack.

**Ovarian Cancer Treatment:** £146,832 over three years to Dr V. Anne Smith (School of Biology, St Andrews University) with colleagues Dr S. Langdon & Dr Dania Farahian (Institute of Molecular Medicine & Genetics, Edinburgh University), to take a systems biology approach to the development of predictive patient selection for ovarian cancer therapy.

65% of women with ovarian cancer die within 5 years, in spite of often responding well to initial treatment. There are currently no indicators to help decision-making on the most suitable therapy. This project will create datasets from treatment-sensitive and -resistant ovarian cancers and use a powerful statistical technique (systems biology) for data analysis. This will visualise how a range of variables, including biological measurements and treatment response, relate to each other in ‘biomarker pathways’, which enable improved decision-making on treatment suitability.

**Reproductive Potential:** £114,696 over two years to Dr Andrew J. Childs (MRC Human Reproductive Sciences Unit, Edinburgh), Professor R.A. Anderson (Reproductive & Developmental Sciences, Edinburgh University) & Professor P.T. Saunders (MRC Human Reproductive Sciences Unit, Edinburgh), to study the regulation of germ cell development in the human fetal ovary as a means to establish reproductive potential. Women are born with a finite number of eggs, which decline in number until exhausted at menopause, normally around the age of 50. In 1% of women, however, menopause occurs before 40, which can be a devastating diagnosis for some women. This project will investigate how specific growth factors affect the growth, number and maturation of developing eggs in the fetal ovary, how their disruption could eventually result in early menopause and point towards improved treatment.

**Bone Destruction:** £148,940 over three years to Dr Carl S. Goodyear (Centre for Integrative Physiology, University of Edinburgh), to take a systems biology approach to the development of predictive patient selection for ovarian cancer therapy.

Bone destruction is associated with many diseases, including rheumatoid arthritis, periodontal disease and osteoporosis and is thought to be result from an imbalance in the normal bone remodelling processes, with increases in the activity and number of bone-eating cells (osteoclasts), over their bone-making (osteoblasts) counterparts. This study will investigate a new therapeutic intervention that will stop the increase in osteoclast numbers and activity, while clarifying the detail of their regulation in such diseases.

www.medicalresearchscotland.org.uk
Income generated on the investment portfolio and related cash deposits was £1,032,676 during the year.
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.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>From the estate of the late Mr Richard Ellis</td>
<td>1,194*</td>
</tr>
<tr>
<td>From the Stuart &amp; Margaret Miller Charitable Trust</td>
<td>2,000</td>
</tr>
<tr>
<td>From the Nairn Charitable Trust</td>
<td>750</td>
</tr>
<tr>
<td>*Less amount accrued in accounts to 31/3/09</td>
<td>(1,193)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2,751</strong></td>
</tr>
</tbody>
</table>

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 £1,032,676 during the year, compared with £1,105,862 in 2008-09. As at 31st March 2010, the value of the Trust’s investment portfolio (including capital cash) was £26,921,777, compared with £19,439,437 at 31st March 2009 and royalties were £68,895 compared with £37,740. Work continues on developing plans to broaden the Trust’s income base. The Trust’s investments are divided into Restricted and Unrestricted Funds: the former supporting research into specific diseases; the latter being available to support any area of the Trust’s work.

Income & Expenditure Summarised

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INCOME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legacies &amp; donations</td>
<td>2,751</td>
<td>517</td>
</tr>
<tr>
<td>Royalties</td>
<td>68,895</td>
<td>37,740</td>
</tr>
<tr>
<td>Investment income</td>
<td>1,032,676</td>
<td>1,105,862</td>
</tr>
<tr>
<td>Miscellaneous income</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total incoming resources</strong></td>
<td><strong>1,104,397</strong></td>
<td><strong>1,144,119</strong></td>
</tr>
<tr>
<td><strong>EXPENDITURE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs of generating voluntary income</td>
<td>16,650</td>
<td>7,596</td>
</tr>
<tr>
<td>Investment management cost</td>
<td>71,848</td>
<td>66,765</td>
</tr>
<tr>
<td>Grants payable</td>
<td>714,411</td>
<td>639,054</td>
</tr>
<tr>
<td>Support costs of grant-making</td>
<td>187,467</td>
<td>190,100</td>
</tr>
<tr>
<td>Governance costs</td>
<td>44,689</td>
<td>45,831</td>
</tr>
<tr>
<td><strong>Total resources expended</strong></td>
<td><strong>1,035,065</strong></td>
<td><strong>949,346</strong></td>
</tr>
<tr>
<td><strong>FUND BALANCES at 31st March</strong></td>
<td><strong>28,927,286</strong></td>
<td><strong>21,371,564</strong></td>
</tr>
</tbody>
</table>

The financial information above is extracted from the full Report & Financial Statements for the year to 31st March 2010, which were approved on 27th August 2010 with an unqualified audit report from Scott-Moncrieff, Exchange Place 3, Semple Street, Edinburgh EH3 8BL. The full financial statements are available on application to the Trust Secretaries and also on the website at: www.medicalresearchscotland.org.uk/reports.htm
As Scotland’s largest independent 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.

PATRON - HRH The Princess Royal

MEMBERS
The following served as Members of the Trust during the year:
*Professor S Moira Brown, OBE, PhD, FRCPath, FRSE (Chairman) (retired 14 November 2009)
*Professor David J Harrison, BSc, MBChB, MD, FRCPath, FRCPE, FRCSEd (as Chairman from 15 November 2009)
Dr Marie Boyd, BSc, PhD
Dr Denise Coia, MBChB, FRCPsych (resigned 25 January 2010)
Professor William Cushley, BSc, PhD
*Mr Frederick Dalgarno, LLB, DipIM, CA (retired 26 February 2010)
*Mr Brian Duffin, MA, FFA, CCMI (appointed 27 November 2009)
Professor David J Harrison, BSc, MBChB, MD, FRCPath, FRCPE, FRCSEd
Dr Karen Horsburgh, BSc, PhD (resigned 25 March 2010)
*Mr Bruce M Mann, MCIBS, BSc(fin) (appointed 10 November 2009)
Professor Allan M. Mowat, BSc, MBChB, PhD, FRCPath
*Mrs John Naylor, OBE, MA, CCMI
*Ms Fiona Nicolson, MA, LLB, DipLP
Professor Michael Steel, BSc, MBChB, PhD, DSc, FRCPE, FRCSE, FRCPath (retired 26 February 2010)
*Mr Alan A Stewart (retired 31 August 2009)
Professor Stephen J Wigmore, BSc, MBBS, MD, FRCSEd, FRCS
* Denotes membership of the Audit & Investment Sub-Committee

SECRETARIES:
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SCIENTIFIC ADVISER:
Dr Joan C.M. Macnab, PhD, FRCPath

AUDITORS:
Scott-Moncrieff, Exchange Place 3, Semple Street, Edinburgh EH3 8BL

INVESTMENT MANAGER:
Martin Currie Investment Management Ltd,
Saltire Court, 20 Castle Terrace, Edinburgh EH1 2ES