



MRC

Medical
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THE MEDICAL RESEARCH COUNCIL

Economic Impact Reporting Framework

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Introduction

The Economic Impact Reporting Framework (EIRF) was implemented across all research councils in 2005 and forms part of the performance framework managed by the Department for Business, Innovation and Skills (BIS).

The framework has been revised for 2010: it follows the original framework as it was initially designed but separates metrics into groups so that those regarded as applicable to all research councils are collected consistently.

The EIRF 2010 is an interim document. The reporting on the economic and social dimensions of research councils' outputs is under revision and changes are expected for 2011. BIS is currently consulting with all stakeholders on the preferred options. This year the EIRF also includes elements of the Economic Impact Baseline report¹ which we have published in previous years, which aims to convey the progress made by the MRC to maximise the impact of MRC research on the economy.

The MRC's EIRF should be read in conjunction with its Annual Report and Annual Review² which provide a comprehensive summary of achievements over the period.

The EIRF contains data on selected aspects of the MRC's performance relevant to the Government's objectives for the UK science base, and is presented with reference to the Government's 10 year Framework for Science.

The EIRF shows, where possible, data for 2006/07, 2007/08 and 2008/09 alongside those for 2009/10.

1 This years Economic Impact Baseline report is called *Impact of MRC Research* <http://www.mrc.ac.uk/Utilities/Documentrecord/index.htm?d=MRC007392>

2 The MRC Annual Report and Annual Review can be found at: <http://www.mrc.ac.uk/Newspublications/Publications/index.htm>

Section 1:

Overall Economic Impacts

There is compelling evidence that investment in medical research leads to significant improvements in both health and economic prosperity³. The UK has a world-leading medical research sector, and research funded by the MRC is a vital part of this success. Maximising the impact of this research is a key element of the MRC strategic plan⁴ and in 2009/10 the MRC can demonstrate substantial and positive impact from its research portfolio. The many highlights this year include:

Humanised Antibody Technology: an MRC discovery which has revolutionised medicine

MRC research provided key discoveries that established monoclonal antibodies as a new therapeutic intervention. The pipeline of therapeutic antibody drugs is now the fastest growing in the pharmaceutical industry, with a \$40 billion global market in 2009/10, projected to reach \$60bn by 2014⁵.

MRC research has played a key role in the development of 10 per cent of monoclonal antibody drugs currently approved for use. The first therapy to reach blockbuster status was Humira®, with \$1bn in sales in 2005. By August 2009, Humira was being used in 80 countries in the treatment of 370,000 patients, and it is now estimated to be the world's top earning pharmaceutical product, with sales predicted to reach \$10bn by 2016⁶.

In particular, antibody drugs have revolutionised the treatment of inflammatory conditions such as rheumatoid arthritis (RA). RA is a disease of the joints which can result in eventual destruction of the joint interior and the surrounding bone, leading to disability. RA is a serious unmet clinical need: it is estimated that 1 per cent of the world's population suffer from RA⁷, approximately 400,000 people in the UK, and that the cost to the UK economy is between £3.80bn and £4.75bn each year⁸.

In 2009/10, NICE recommended Cimzia®, an anti-TNF antibody manufactured by UCB Pharma, as an option for the treatment of adults with severe active RA⁹. The NICE recommendation was made on the condition that a Patient Access Scheme is implemented for the drug. UCB will offer the drug free for the first 12 weeks of treatment. Clinical trials have shown that most patients respond to treatment within this time.

Information provided through MRC e-Val is tracking the progress and impact of six antibodies which owe their development to MRC research (including Humira and Cimzia) approved for use in eight conditions between 2006 and 2009, and others that are at earlier stages of development.

3 Health Economics Research Group, Office of Health Economics, RAND Europe (2008) Medical Research: *What's it worth? Estimating the economic benefits from medical research in the UK*, London: UK Evaluation Forum. <http://www.wellcome.ac.uk/About-us/Publications/Reports/Biomedical-science/WTX052113.htm>

4 Medical Research Council (2009) *Research Changes Lives: MRC Strategic Plan 2009-2014*, London: MRC. <http://www.mrc.ac.uk/About/Strategy/StrategicPlan2009-2014/index.htm>

5 Datamonitor (2010) *Monoclonal Antibodies: 2009 update*

6 EP Vantage (2010) Humira set to steal Avastin's crown. *EvaluatePharma* <http://www.evaluatepharma.com/Universal/View.aspx?type=Story&id=211976&isEPVantage=yes>

7 The National Audit Office (2009) *Services for people with rheumatoid arthritis: report by the comptroller and auditor general*. HC 823 Session 2008-2009.

8 Pugner KM, Scott DI, Holmes JW et al (2000) The costs of rheumatoid arthritis: an international long-term view. *Seminars in Arthritis & Rheumatism*, 29(5):305-320.

9 NICE (2010) *Certolizumab pegol for the treatment of rheumatoid arthritis* (Technology Appraisal 186). <http://www.nice.org.uk/nicemedia/live/12808/47544/47544.pdf>

Test cuts bowel cancer death rate by nearly half

In 2010, trials were completed that demonstrated that bowel cancer can be prevented with a simple, once-in-a-lifetime, five-minute screening test. Among 40,000 people screened, the test cut the incidence of the cancer by a third and the death rate by 43 per cent over a decade. Bowel cancer is the second biggest cancer killer in the UK, after lung cancer, claiming 16,000 lives a year. The Government announced in October 2010 that the test will be incorporated into the existing bowel cancer screening programme over the next four years, which could save 3,000 lives a year - twice as many as the estimated 1,400 deaths a year saved by breast cancer screening.

The study started in 1994 when the screening test was offered to men and women aged 55 to 64. The test uses a flexible tube inserted through the anus to examine the lower bowel for the presence of polyps (small growths), which are burned or snipped off. Polyps occur in around one in five people over 55, and in one in 20 they develop into cancer. The procedure is safe, painless, needs no anaesthetic and is over in five minutes. Follow up over 11 years showed a long-lasting protective effect, so the test should never need repeating. The study, published in *The Lancet*¹⁰, was funded by Cancer Research UK, the MRC and the National Institute for Health Research.

The MRC Protein Phosphorylation Unit, Dundee: a model of academic/private sector collaboration

Sir Philip Cohen, director of the MRC Protein Phosphorylation Unit (PPU) in Dundee, has been studying protein phosphorylation for 35 years, during which time it has emerged as one of biology's principal control mechanisms. Abnormalities in protein phosphorylation have been shown to be a cause of global diseases such as cancer, diabetes and rheumatoid arthritis, and now constitute one of the largest areas of scientific research worldwide. The market for drugs that act on kinases (enzymes that phosphorylate proteins) was worth \$15.2bn in 2009 and is projected to reach \$20.2bn by 2014¹¹.

The PPU team has a history of successful cooperation with industry, notably its relationship with the US company Upstate, which led to the setting up of Upstate Dundee – a company with 65 employees. In 1996, Sir Philip and his colleague Peter Downes began to seek support from the pharmaceutical industry for a Division of Signal Transduction Therapy (DSTT) to help speed up the development of specific inhibitors of kinases and phosphatases (enzymes that dephosphorylate proteins).

The DSTT was established in 1998, initially with five-year support of £6.5 million from Astra, Zeneca, Pfizer, SmithKline Beecham and NovoNordisk – later joined by Boehringer Ingelheim. This unique collaboration proved so successful that it was renewed for a further five years in 2003 at a greatly expanded level (this time supported by AstraZeneca, Boehringer Ingelheim, GlaxoSmithKline, Merck and Co, Merck KGaA and Pfizer). With core funding of £15.2m plus add-ons, it is one of the largest research collaborations between the pharmaceutical industry and a UK research institution. At BIO99, Pfizer described the DSTT as their most important academic collaboration worldwide, while GlaxoSmithKline have stated that it is the model for how industrial-academic collaborations should work. With a further renewal of core funding in 2008, the DSTT has now raised a total of £23m of private sector investment to assist in the translation of research into potential new treatments for cancer, hypertension and Parkinson's disease.

The importance of the research focus of the MRC-funded groups in Dundee is highlighted by a recent decision by the Scottish Government to invest £10m to establish a new Scottish Institute for Cell Signalling, and the formation of a further spin-out company, Ubiquigent Ltd. Ubiquigent was formed to market reagents, assays, services and technologies resulting from Professor Cohen's research into the role of ubiquitylation in the innate immune system. Ubiquigent Ltd received £3m funding from Stemgent, a US-based stem cell science reagent company in 2010¹² and has now employed its first three staff.

The Dundee DSTT partnership represents one of the largest private sector investments in academic research in the UK; however, MRC e-Val collected feedback from more than 300 principal investigators who reported productive interactions with the private sector (over 250 private sector partners worldwide) in which staff, expertise, materials and funding were actively exchanged between 2006 and 2009¹³. MRC e-Val also gathered details of how MRC research had contributed to the growth and setting up of over 30 spin-out companies since 2006, representing hundreds of skilled jobs.

10 Atkin, WS et al (2010) Once-only flexible sigmoidoscopy screening in prevention of colorectal cancer: a multicentre randomised controlled trial. *The Lancet* vol 375, pp1624-1633. [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(10\)60551-X/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(10)60551-X/fulltext)

11 BCC Research (2009) *Kinase Inhibitors: Global Markets*. <http://www.bccresearch.com/report/BIO053B.html>

12 Ubiquigent Ltd: <http://www.ubiquigent.com/>

13 MRC e-Val survey 2009: <http://www.mrc.ac.uk/Achievementsimpact/Outputsoutcomes/e-Val/index.htm>

MRC research impacts on public services and public policy

Research in areas such as the relationship between health and diet, the environment and health, or other areas that result in public health interventions and policy changes rather than commercially exploitable 'products' is unlikely to find commercial market opportunities. In these areas it is vital that public funding is available to generate a sound evidence base. A significant example would be the MRC-funded research that established the link between smoking and health. The scale of the health problem caused by smoking meant that smoking cessation programmes have proved to be one of the most cost-effective and high-impact public health interventions ever introduced. There follow 11 examples where MRC research has impacted on public policy and improved the health of the UK population in 2009/10.

1 Stockings not effective at preventing venous thromboembolism in stroke patients.

MRC research at Edinburgh University published in 2009 has had significant impact on NICE and international clinical guidelines for the treatment of stroke patients. **It is estimated that the NHS may save £7m and 320,000 hours of nursing time a year by cutting the use of stockings for approximately 80,000 stroke victims a year in the UK¹⁴.**

2 New UK screening programme aims to prevent 6,000 deaths a year from abdominal aortic aneurysms.

Researchers at the MRC Biostatistics Unit contributed to the case for a UK national screening programme for abdominal aortic aneurysms (AAA). The programme to detect AAAs early was launched in 2009. AAAs affect 4 per cent of men aged 65-74 (approximately 80,000) and results in 6,000 deaths a year¹⁵.

3 Protecting newborns.

At the MRC Clinical Sciences Centre in London, Professor David Edwards and collaborators have shown that 'hypothermic neural rescue therapy' – controlled cooling of the brain – reduces the risks of death and disability in infants suffering birth asphyxia and reduces cases of cerebral palsy in survivors. This is the first practical and cost-effective treatment for this serious condition, providing not only a clinical therapy but also proof of principle that neural rescue is possible¹⁶. **It is estimated that this could help 100 babies born each year in the UK¹⁷.**

NICE has now issued full guidance¹⁸ that the treatment should become part of normal NHS practice. Through the Experimental Medicine funding call, the MRC has supported further developments of this therapy, including new imaging biomarkers and early phase studies of related treatments.

4 MRC study shows that Alexander technique benefits patients with low back pain.

The ATEAM study, which looked at the benefits of using a course of lessons in the Alexander technique¹⁹ to patients with lower back pain, was referred to in new NICE guidance²⁰. The guideline provides a synthesis of best practice for the treatment of lower back pain for general practitioners, therapists and the general public. Around one in three people suffer from lower back pain each year, a condition which was estimated in 1998 to incur health care costs of **£1.6bn (of which £0.6bn was non-NHS health care costs incurred with private acupuncturists, chiropractors, occupational therapists, osteopaths, physiotherapists and others). The indirect costs of back pain, due to lost production are larger. The 1998 estimates for these costs ranged from £3.4bn to £9.1bn a year depending on the approach used.**

The NICE guideline recommended that patients be offered a course of structured exercise and cited the Alexander technique as of benefit to patients, based on the ATEAM study.

14 The CLOTS Trials Collaboration (2009) Effectiveness of thigh-length graduated compression stockings to reduce the risk of deep vein thrombosis after stroke (CLOTS trial 1): a multicentre, randomised controlled trial. *The Lancet*, vol 373, pp1958–1965. [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(09\)60941-7/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(09)60941-7/fulltext)

15 NHS Abdominal Aortic Aneurysm Screening Programme: <http://aaa.screening.nhs.uk/>

16 Neonatal Medicine Group at the MRC Clinical Sciences Centre: <http://www.csc.mrc.ac.uk/ResearchGroupContent/ECN/NeonatalMedicinePastWork1>

17 TOBY trial – Neonatal Medicine, MRC Clinical Sciences Centre website: <http://www.csc.mrc.ac.uk/NewsEvents/News/TOBYtrial/>

18 NICE (2010) *Therapeutic hypothermia with intracorporeal temperature monitoring for hypoxic perinatal brain injury*. (Interventional Procedure Guidance 347). <http://www.nice.org.uk/nicemedia/live/11315/48809/48809.pdf>

19 MRC (2008) *Trial finds Alexander technique helps reduce back pain*. <http://www.mrc.ac.uk/Newspublications/News/MRC004790>

20 Savigny et al (2009) *Low back pain: early management of persistent non-specific low back pain*, London: National Collaborating Centre for Primary Care and Royal College of General Practitioners (NICE CG88 Low back pain: full guideline). <http://www.nice.org.uk/nicemedia/live/11887/44334/44334.pdf>

5 MRC research informs new NICE guidance on management of schizophrenia.

NICE updated its guidance on interventions for the treatment and management of schizophrenia in adults in primary and secondary care²¹ in 2009. At least two pieces of MRC research were directly referenced in this important guideline.

- Professor Fowler (University of East Anglia), with colleagues in Cambridge and Norfolk (funded through the Improving Social Recovery in Early Psychosis (ISREP) MRC trial platform grant) examined the use of Cognitive Behavioural Therapy (CBT) in social recovery of patients with psychosis. The positive results from this pilot helped the guideline review group recommend CBT as an intervention for patients with schizophrenia.
- Dr David Osborn (University College London) was funded by another MRC trial platform grant to systematically review the evidence for adverse cardiovascular outcomes in people with severe mental health illnesses. The findings of this project prompted NICE to recommend that all patients with schizophrenia be screened for cardiovascular risk factors.
- In addition, Professor Irwin Nazareth (director of the MRC General Practice Research Framework) was a member of the guideline development group tasked with synthesising evidence from a large number of sources and drafting the document, subsequently published by the National Co-ordinating Centre for Mental Health.

Schizophrenia is one of the terms used to describe a major psychiatric disorder (or cluster of disorders) that alters an individual's perception, thoughts, affect and behaviour. It has been estimated that the population prevalence of probable psychotic disorder in the UK is five per 1,000 in the 16 to 74 years age group. In 1990, the World Health Organization ranked schizophrenia as the ninth leading cause of disability of all diseases worldwide. **The total societal cost in England of schizophrenia was estimated at 2004/05 prices to be £6.7bn.**

In 2010, the All Party Parliamentary Group (APPG) on mental health²² looked at the implementation of the updated NICE guideline. The APPG sent questionnaires to every Mental Health Trust in England and just over half of the 73 Trusts responded to the survey. The results identified serious challenges to the delivery of psychological services, particularly CBT, to all service users with a diagnosis of schizophrenia. Specifically, there appear to be insufficient numbers of staff who have specialist accredited CBT skills to offer appropriate intervention. The APPG highlighted the importance of addressing this shortfall in order to reduce the large economic and social burden of these conditions, and referred to the Sainsbury Centre for Mental Health estimate of the annual cost of mental illness – around £77bn a year²³.

6 MRC research informs new NICE guidance on the treatment and management of depression in adults.

Depression refers to a wide range of mental health problems characterised by the absence of a positive affect (a loss of interest and enjoyment in ordinary things and experiences), low mood and a range of associated emotional, cognitive, physical and behavioural symptoms. Depression imposes a significant burden on individuals and their carers, health services and communities throughout the world. By 2020, depression is projected to become the second leading cause of disability in the world. **Overall, the total cost of health services for depression in England in 2007 was estimated to be £1.7bn, while lost employment increased this total to £7.5bn. By 2026, these figures are projected to be £3.0bn and £12.2bn respectively.** This highlights the loss in productivity and the burden of morbidity and mortality caused by this condition, as well as the importance of using available healthcare resources most efficiently to maximise health benefits for people with depression.

21 National Collaborating Centre for Mental Health (2009) *Schizophrenia: Core interventions in the treatment and management of schizophrenia in adults in primary and secondary care*, London: British Psychological Society and Royal College of Psychiatrists (NICE CG81 Schizophrenia (update) full guideline). http://www.nccmh.org.uk/downloads/Schizophrenia_update/CG82FullGuideline.pdf

22 All Party Parliamentary Group on Mental Health (2010) *Implementation of NICE Guideline on Schizophrenia*. <http://www.appg-mentalhealth.org.uk/SiteData/Root/File/APPG-NICE-Report.pdf>

23 The Sainsbury Centre for Mental Health (2003) *Economic and social costs of mental illness in England*, London: The Sainsbury Centre for Mental Health. http://www.centreformentalhealth.org.uk/pdfs/costs_of_mental_illness_policy_paper_3.pdf

NICE updated its full guidance on depression in adults in 2009²⁴ taking into account MRC-funded research led by Professor William Kuyken (University of Exeter)²⁵ on a technique termed 'Mindfulness-based Cognitive Therapy' (MBCT). MBCT is a therapy for people who have experienced a lot of depression and works by helping people to learn skills that can prevent depression coming back (relapse). People learn these skills in eight weekly two-hour classes of up to 15 people who have had similar experiences. Patients say that they find the treatment accessible and helpful. MBCT proved as effective as anti-depressant medication in preventing a relapse and was more effective in enhancing people's quality of life.

NICE recommended that MBCT be offered as an option for patients with recurring depression, and the NHS Health Technology Assessment programme has funded a £1.8m follow up trial of MBCT²⁶.

7 MRC research improves the treatment of prostate cancer patients.

Prostate cancer is one of the most common cancers in men. Every year there are nearly 35,000 new cases in England and Wales and 10,000 deaths. Prostate cancer is predominantly a disease of older men but around 20 per cent of cases occur in men under the age of 65 years. Over the past 10 to 15 years there have been a number of significant advances in prostate cancer management but also a number of major controversies, especially about the clinical management of men with early, non-metastatic disease. In 2000, the MRC and Cancer Funders' Forum (now the National Cancer Research Institute) launched an initiative to increase the critical mass of basic and translational cancer researchers working on prostate cancer. One development was the funding of two cancer collaborative groups in 2002. Two areas investigated by researchers in these collaboratives include the use of 'active surveillance'²⁷ and the use of Intensity-Modulated Radiotherapy (IMRT)²⁸ in the treatment of prostate cancer.

- **Active surveillance** Up to 80 per cent of men screened for prostate cancer using the prostate specific antigen (PSA) test are over-diagnosed, that is, their cancer will never cause any symptoms. As treatment for prostate cancer may have a significant impact on quality of life, such intervention should be restricted to those who need it. Active surveillance aims to individualise the management of early prostate cancer by selecting only those men with significant cancers for curative treatment. Patients on active surveillance are closely monitored using PSA levels and repeat prostate biopsies. The choice between curative treatment and continued observation is based on evidence of disease progression during this monitoring.
- **IMRT** IMRT is an advanced mode of high-precision radiotherapy that utilises computer-controlled linear accelerators to deliver precise radiation doses to a malignant tumour or to specific areas within the tumour. IMRT allows for the radiation dose to conform more precisely to the three-dimensional shape of the tumour by modulating, or controlling, the intensity of the radiation beam in multiple small volumes. By using IMRT, high doses of radiation can be delivered to a prostate tumour in order to kill cancerous cells without affecting more radiation-sensitive organs nearby, such as the small bowel and bladder.

NICE produced new guidance for the diagnosis and treatment of prostate cancer in 2008²⁹. The NICE guideline for the first time included active surveillance as a standard option for patients with early localised prostate cancer. It also highlighted the potential health economic advantages of IMRT.

A study in 2009³⁰ looked at the management details for each individual in three cohorts of 100 patients diagnosed with prostate cancer. The conclusion was that many of the recommendations made in the NICE guideline were already in practice prior to its publication. In particular, the study highlighted an increase in the number of men electing for active surveillance and that this trend actually preceded the guidelines.

24 National Collaborating Centre for Mental Health (2010) *Depression: the NICE guideline on the treatment and management of depression in adults (updated edition)*. London: British Psychological Society and Royal College of Psychiatrists (National Clinical Guidance CG90) <http://www.nice.org.uk/nicemedia/live/12329/45896/45896.pdf>

25 MRC (2008) *Treatment hope for people with recurring depression*. <http://www.mrc.ac.uk/Newspublications/News/MRC005275>

26 Preventing depressive relapse in NHS Practice through mindfulness-based cognitive therapy (MBCT): <http://www.hta.ac.uk/1924>

27 *Active surveillance of early prostate cancer*. South of England Prostate Cancer Collaborative website: <http://www.icr.ac.uk/ncr/ActiveSurveillance.htm>

28 *Intensity-modulated radiotherapy at the Royal Marsden NHS Trust*. South of England Prostate Cancer Collaborative website: http://www.icr.ac.uk/ncr/liz_adams_rmt.html

29 National Collaborating Centre for Cancer (2008) *Prostate cancer: diagnosis and treatment*. Cardiff: National Collaborating Centre for Cancer (NICE full guideline) <http://www.nice.org.uk/nicemedia/live/11924/39687/39687.pdf>

30 Boddy J et al (2009) The role of active surveillance in the management of early prostate cancer and the impact of the NICE guidelines. *British Journal of Medical and Surgical Urology* vol 3, pp101-105. [http://www.bjmsu.com/article/S1875-9742\(10\)00006-6/abstract](http://www.bjmsu.com/article/S1875-9742(10)00006-6/abstract)

9 MRC research demonstrates that shorter radiotherapy courses can benefit breast cancer patients.

The MRC-funded START trial demonstrated that a lower total dose of radiotherapy, delivered in fewer, larger treatments, was as effective as the international standard of a higher total dose delivered over a longer time to treat women with early stage breast cancer³¹.

Breast cancer is the most common cancer in England and the second most common cause of death from cancer for women. In 2005, over 38,000 new cases of breast cancer were identified. MRC-funded work has provided valuable evidence to help refine the treatment for these patients.

Since the MRC-funded START trial results were published in March 2008^{32, 33}, the Royal Marsden Hospital has changed from the current five-week regimen to a three-week schedule for most of its breast cancer patients. The same regimen is currently prescribed to the majority of British women and the trial is likely to influence practices overseas³⁴. The results strongly influenced new NICE guidance on early and locally advanced breast cancer, published in 2009³⁵.

10 MRC discovery identifies Down's syndrome babies with increased risk of leukaemia.

Research at the MRC Molecular Haematology Unit identified a common cellular defect at the first stages of blood cell production in adult patients diagnosed with early myelodysplasia (a pre-leukaemic condition). Dr Paresh Vyas's group has focused on a critical factor that is required in blood production, GATA1, which coordinates many aspects of the normal maturation programme of blood cells. Dr Vyas's research has led to a recommendation that newborns with Down's syndrome should have a full blood count to screen for this pre-leukaemic condition³⁶. Most now do (approximately 750 each year in the UK).

11 MRC expert advice contributes to tougher regulation for sunbed parlours.

Several MRC-funded researchers serve as members of the Committee on Medical Aspects of Radiation in the Environment (COMARE). In its 13th major report, the committee advised on the risks of sunbeds and made recommendations regarding legislation for the use of sun parlours³⁷.

The availability of unsupervised sun parlours and UV lamps for home use has been a cause for concern given the established link between exposure to UV radiation and skin cancer. The incidence of skin cancer in the UK has been rising. In 2006, more than 10,400 new cases of malignant melanoma and over 81,500 cases of non-melanoma skin cancer (NMSC) were registered in the UK. The cost to the NHS is considerable, with an estimated spend in 2002 of almost £58m on diagnosis and treatment of NMSC, and £13m for malignant melanoma. The misuse of sunbeds and sun lamps was estimated to lead to an additional 370 cases of melanoma and 100 additional deaths a year from skin cancer in the UK.

The report stimulated significant media coverage and added support to a Cancer Research UK campaign to stop people under 18 years of age using sun parlours. In April 2010, a Private Member's Bill was passed in the House of Lords to change English and Welsh law, and this is expected to come into effect in 2011³⁸. This follows the introduction of a ban in Scotland in 2008³⁹.

31 MRC (2008) *Shorter radiotherapy courses can benefit breast cancer patients*. <http://www.mrc.ac.uk/Newspublications/News/MRC004470>

32 The START Trialists' Group (2008) The UK Standardisation of Breast Radiotherapy (START) Trial A of radiotherapy hypofractionation for treatment of early breast cancer: a randomised trial. *Lancet Oncology*, vol 9(4), pp331-341. [http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(08\)70077-9/fulltext](http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(08)70077-9/fulltext)

33 The START Trialists' Group (2008) The UK Standardisation of Breast Radiotherapy (START) Trial B of radiotherapy hypofractionation for treatment of early breast cancer: a randomised trial. *The Lancet*, vol 371, pp1098-1107. [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(08\)60348-7/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(08)60348-7/fulltext)

34 Institute of Cancer Research (2007) "A good START for breast radiotherapy" in *Annual Research Report 2007*, London: ICR. http://www.icr.ac.uk/about_us/annual_research_report/9726.pdf

35 National Collaborating Centre for Cancer (2009) *Early and locally advanced breast cancer: diagnosis and treatment*. Cardiff: National Collaborating Centre for Cancer (NICE full guideline CG80) <http://www.nice.org.uk/nicemedia/live/12132/43413/43413.pdf>

36 Roy A et al (2009) Acute megakaryoblastic leukaemia (AMKL) and transient myeloproliferative disorder (TMD) in Down syndrome: a multi-step model of myeloid leukaemogenesis. *British Journal of Haematology*, vol 147(1) pp3-12. <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2141.2009.07789.x/full>

37 COMARE (2009) *COMARE 13th Report: The health effects and risks arising from exposure to ultraviolet radiation from artificial tanning devices*. <http://www.comare.org.uk/13thPressRelease.htm>

38 Cancer Research UK (2010) *Sunbed ban for under 18s to become law*. http://info.cancerresearchuk.org/news/archive/pressrelease/CR_015085

39 Scottish Government website: *Overview of The Public Health etc. (Scotland) Act 2008* <http://www.scotland.gov.uk/Topics/Health/NHS-Scotland/publicact/Act2008/BriefOverview>

Section 2: Quantitative Evidence of Outputs

Throughout this section of the report, any metrics highlighted in grey are additional metrics provided by the MRC, over and above those agreed with BIS to apply to all research councils.

For several metrics, data are provided from MRC e-Val. This is an online survey which the MRC successfully launched in 2009 to gather feedback from its research community on the outputs and impacts of MRC funded research. Over 80 per cent of researchers provided comprehensive feedback corresponding to £1.2 billion of research funding between 2006 and 2009.

The MRC e-Val 2009 data were gathered during October and November 2009: as such, the MRC e-Val data presented throughout this report for 2009 give only a partial picture. MRC e-Val will be opened for data collection annually, the 2010 data gathering period is scheduled for October/November 2010.

2.1 Innovation outputs and outcomes

The MRC has continued its strong track record in commercialising the outputs from its research, with licensing income receipts from all sources reaching £66.96 million during 2009/10. This brings the total cash generated from MRC intellectual property since 1998 to over £500m.

The MRC manages and tracks the commercial activity, including spin-out companies, from MRC units and institutes through MRC Technology; we now also collect information on spin-out companies resulting from grantholders through MRC e-Val.

MRC research has led to the creation or growth of over 30 spin-out companies since 2006, representing over 200 new highly skilled jobs. The MRC will continue to track the progress of 40 spin-out companies, including those established prior to 2006, where there is a significant link to MRC-funded research. Highlights in 2009/10 include:

- Interest in the work of **Heptares Ltd**, an MRC spin-out company that was established in 2007, has been significant in 2009/10, and an agreement with Novartis was announced in October 2009 with potential milestone payments of over \$200m. Heptares expects to grow to between 30 and 50 staff this year.
- The MRC established a new spin-out from the MRC Laboratory of Molecular Biology, Cambridge, called **Bicycle Therapeutics**⁴⁰. Its technology platform is based on the pioneering work of the founding scientists Sir Gregory Winter, a scientific founder for both Cambridge Antibody Technology and Domantis, and Dr Christian Heinis. The new company has obtained initial funding from Atlas Venture and Novartis Venture Fund.
- **Pentraxin Therapeutics Ltd** secured a licence deal with GlaxoSmithKline⁴¹ to explore an approach to treat amyloidosis. Pre-clinical research work is proceeding with the expectation of clinical trials commencing in 2012. Pentraxin Therapeutics Ltd is a UCL spin-out company formed in 2001 to hold the intellectual property and proprietary knowledge created by the research of Professor Mark Pepys. Professor Pepys's research has been substantially funded by the MRC for the last 30 years.
- In January 2010, **Summit Plc** announced that one of its partners, BioMarin Pharmaceuticals Inc, had initiated a phase I clinical study of a Summit Plc molecule (SMT C1100) for the treatment of Duchenne Muscular Dystrophy (DMD). The work to find a potential therapeutic for DMD was spun out of the laboratory of Professor Kay Davies (Honorary Director of the MRC Functional Genomics Unit) by Oxford University.
- In 2009, **Synaigen Plc** announced the successful outcome of a phase I safety and antiviral 'proof of mechanism' biomarker study of inhaled interferon beta in asthmatic subjects; it aims to begin phase II studies in spring 2010. Synaigen is a University of Southampton spin-out company founded on at least 20 years of development led by Professors Stephen Holgate, Donna Davies and Ratko Djukanovic. This research benefited from substantial long-term support from the MRC.

40 Bicycle Therapeutics website: <http://www.bicycletherapeutics.com/>

41 UCL Business (2009) *UCL and GSK join forces to develop combined small molecule-antibody treatment for rare disease.* <http://www.uclb.com/news-events/item/148?search>

METRIC	DATA	COMMENTS
1 Income from Commercial Activity	2009/10 £66.17m 2008/09 £66.42m 2007/08 £49.01m 2006/07 £33.98m	<p>This figure is predominantly made up of income from royalties but also includes income from milestones, reagents and other smaller, one-off activities. The figure excludes sales of goods and services.</p> <p>This figure also excludes income from licences and shares, as this is reported in metric 8.</p>
2 Co-funding/ Collaborative funding	2009/10 £78.1m 2008/09 £66.7m 2007/08 £70.7m 2006/07 £68.4m	<p>Collaborative funding includes grants from other bodies and other government departments to the MRC; for example, Department of Health, Department of International Development, World Health Organization, European Commission and other universities.</p> <p>MRC e-Val captured information about other funding obtained by researchers in addition to their MRC support. This totalled £1.7 billion, including £556 million attracted from outside the UK or from the private sector.</p>
3 Knowledge Transfer Spend	<p>Development Gap Funding</p> 2009/10 £2.00m 2008/09 £3.28m 2007/08 £2.56m 2006/07 £2.56m <p>RCUK Business Plan Competition - the MRC contribution to the present round was £36,380 in 2009/10; this is not run annually but each round takes about 18 months over two financial years.</p> <p>Biotechnology Young Entrepreneurs Scheme (YES) – the MRC contribution is approximately £50,000 per year.</p>	<p>Knowledge Transfer spend includes spend on the commercialisation of discoveries, and does not include funding of the science behind the discovery.</p> <p>The MRC Development Gap Fund helps ideas from MRC scientists with commercial potential to cross the gap between traditional academic funding and commercial development.</p> <p>The RCUK Business Plan Competition provides researchers who have ideas with commercial potential with the skills, knowledge and support needed to develop a first-rate business plan.</p> <p>The MRC, with other organisations (BBSRC, NERC, Cancer Research UK and industry partners), sponsors the Biotechnology Young Entrepreneurs Scheme (YES).</p> <p>This is a competition for teams of postgraduate and postdoctoral students that is designed to raise awareness of commercialisation of scientific research and ideas, and to encourage entrepreneurship for the benefit of the UK economy.</p>

METRIC	DATA	COMMENTS
4 External Representation in main Governing Bodies	<p>2009/10 (total 303) Government <1% Academia 71% Business 12%</p> <p>2008/09 (total 244) Government 3% Academia 69% Business 7%</p> <p>2007/08 (total 242) Government 3% Academia 85% Business 4%</p>	<p>For this data, government includes Other Government Departments and Non-Departmental Public Bodies; academia includes Higher Education Institutions and 'other' non-MRC academics.</p> <p>The governing bodies included in this are: the MRC's Council, research boards and theme overview groups and panels. The total number of members is 303.</p> <p>For 2009/10, the remaining 16% not incorporated into these percentages are from overseas organisations or the MRC. This is similar to previous years.</p>
5 Patent Applications in year	<p>MRC Technology (MRCT) works with scientists from MRC-funded units and collaborating organisations to discover and protect healthcare innovations.</p> <p>The data presented here for metrics 5, 6 and 7 are MRCT data and therefore represent the intramural part of the MRC portfolio only.</p> <p>2009/10 25 2008/09 20 2007/08 21 2006/07 26 2005/06 22</p>	<p>The decision whether to file a patent or not is based on a range of technical, legal and commercial factors. As research is a highly competitive activity, there can be conflict between the rapid dissemination of information and the requirement to patent protect an invention. As such, this does not fully reflect the number of patentable inventions from MRC unit funding.</p>
6 Patents granted in year	<p>2009/10 29 2008/09 24 2007/08 15 2006/07 15 2005/06 23</p>	<p>These data are collected through MRCT and represent the MRC's intramural portfolio only.</p> <p>Patent information is also collected through MRC e-Val: researchers reported over 200 new patent discoveries since 2006, of which 76 (35%) had been licensed worldwide by 2009.</p>
7 New spinouts generated	<p>News spinouts each year from the MRC's intramural programme only (MRCT-managed).</p> <p>2009/10 2 2008/09 0 2007/08 1 2006/07 0</p>	<p>These data are collected through MRCT and represent the MRC's intramural portfolio only.</p> <p>The MRC also collects data on spin-out companies through MRC e-Val. Between 2006 and 2009, MRC funding contributed to the set up or growth of at least 30 spin-out companies. Secondary research has identified a further 10 spin-out companies formed prior to 2006 that owe their origins to MRC-funded research.</p>
8 Income from intellectual property (IP) in various forms	<p>2009/10 £66.96m 2008/09 £54.98m 2007/08 £85.44m 2006/07 £64.77m</p>	<p>Income from IP includes licence income and receipts from sales of shares in MRC companies.</p>

2.2 Knowledge generation

MRC-funded research delivers scientific knowledge of the highest quality, and this work is effectively translated into new treatments that improve health and wellbeing.

Recent analysis has shown that the citation impact of publications attributable to MRC research is fully twice that of the world average and higher than the remainder of UK medical research. It is this selection and support of excellence over the long term which yields results for the UK: research that leads to new understanding, new products and processes, and that strongly attracts expertise and inward investment.

The MRC aims to sustain the UK's ability to attract the most talented graduates into careers in medical research, and to attract high achievers from other sectors and locations. MRC training schemes seek alignment with the skills needed in industry; for example, through increased provision of training positions in whole-organisms science and toxicology. The MRC aims to support scientists from early career stages to established research leaders, and to facilitate the flow of people between industry and academia and between the UK and internationally for a healthy UK science base.

- The MRC e-Val survey indicated that MRC research projects are successfully delivering skilled people to the workforce. Researchers reported details of the next destinations of more than 3,000 staff previously employed on MRC grants or unit programmes between 2006 and 2009. Of these 3000, 62 per cent remained in the academic sector and 10 per cent obtained their next position in the private sector.
- Collaborative Industrial CASE (iCASE) PhD studentships provide students with not only a challenging research project, but also first-rate training involving intellectual and technical collaboration between scientists in industry and academia. The value of working across academic and commercial cultures is highlighted repeatedly by our iCASE students. Recognising the benefits of the scheme for students, companies and academics, the MRC has increased support for iCASE awards by 40 per cent, committing £2.5m in 2009/10. Both the quality and demand for the iCASE competition in 2009/10 were unprecedented and the MRC awarded studentships to 34 outstanding projects. These involved 20 UK-based companies, including seven small and medium enterprises (SMEs).
- In 2010, the MRC launched a £3.5m flagship programme in clinical pharmacology and pathology, enhancing professional skills and driving collaboration with industry.

2.2.1 Translational research

A priority for the MRC is ensuring that MRC research is efficiently developed into new treatments and interventions or better designs for new research. In the current spending review period, the MRC will spend an additional amount up to £130m on building translational research capacity and accelerating developments in this area. Together with the National Institute for Health Research (NIHR), an additional £350m will be invested in this area. Just two years into this programme, the main impact is an increase in the volume of high-quality research in the UK.

In 2008, the MRC introduced a 'managed programme' of funding for translational research, available to researchers at universities as well as within our units. The aims is to build translational research capacity, increase the pipeline of new products and interventions in development and address key gaps in the development process.

The managed programme consists of two schemes. First, the Developmental Pathway Funding Scheme (DPFS) supports preclinical development of novel therapies, interventions and diagnostics, and any necessary research tools for development of therapeutics. Second, the Developmental Clinical Studies (DCS) scheme covers exploratory clinical research as far as phase I and II trials, the natural next stage in development.

The managed programme supports goal-oriented, structured development, giving priority to research that will lead directly to new treatments and providing specialist advice and access to high-cost facilities. This programme complements the general support for exploratory experimental medicine research into treatments already available through grants and fellowships.

There is a deliberate overlap between DPFS and DCS to seamlessly support the development of new therapeutics and diagnostics from the fundamental discovery stage through preclinical development to first-in-man clinical trials. In both schemes, projects are based on scientific milestones, with decisions on progression taken on the likelihood of success at each milestone with the possibility of termination if the research results or project progress are unlikely to achieve the planned objectives.

The MRC also works with the NIHR to deliver jointly a coordinated programme of methodology research. This stream of activity aims to strengthen the tools, theories and disciplines that underpin health research and is another important component of the MRC's translational strategy. The Methodology Research Panel supports research that is investigator-initiated as well as projects that arise from identified priorities.

The MRC's Translational Stem Cell Research Committee (TSCRC) was established in 2009 to fund research that will drive stem cells towards application, both clinically and in disease modelling and drug discovery. Among the awards made, the committee funded four early-phase clinical trials involving adult stem cells: two using stem cell transplantation to address blindness and bone repair respectively, one activating dormant stem cells in the body to treat Addison's disease, and one targeting cancerous stem cells in chronic myeloid leukaemia. The TSCRC also made 10 awards totalling £3.5m under a targeted call for proposals addressing preclinical barriers that hinder progress towards the therapeutic use of stem cells.

9 Translational Research Activities

Data for projects awarded (note some of these may not have started yet):

Scheme	2008/09		2009/10	
	Awards #	Value £	Awards #	Value £
Developmental Pathway Funding Scheme (directly managed)	17*	£5.1m	17	£8.7m
Developmental Clinical Studies	-	-	3	£5.3m
Methodology Research Panel				
- Investigator led	14	£4.9m	12	£4.5m
- Needs led	4	£1.2m	11	£3.0m
Translational Stem Cell Research Committee	12	£6.4m	13	£7.3m

* Nine of these DPFS awards were small awards to encourage and enable embedding of translational activities within the university. As such, these do not have milestones.

To date, of the DFPS projects directly overseen by the MRC (the rest being supported and managed through the Devolved DPFS portfolio funding; see below), 11 studies are on course to reach the planned first milestone, 10 projects have met and passed their first milestone, and a further two projects have met and passed their first two milestones. One project did not meet its first milestone and will be terminated.

Devolved Developmental Pathway Funding Scheme Awards:

Portfolio	2008/09		2009/10	
	Awards #	Value £	Awards #	Value £
University of Dundee	-	-	10	£2.6m
University of Edinburgh	-	-	7	£2.0m
King's College London	-	-	5	£1.7m
University of Nottingham	2	£0.3m	6	£1.8m
Sevenside Alliance for Translational Research (SARTRE)	-	-	14	£2.0m

2.2.2 New products and interventions

The MRC has invested significantly to build translational research capacity in the UK, with the aim of accelerating the development of new products and interventions including drugs, medical devices and other types of therapy. MRC e-Val gathered evidence of more than 300 new products and interventions at all stages of development. Twenty four new products had been launched onto the market since 2006 as a result of MRC-funded research. These included 10 new drugs, of which nine were based on monoclonal antibody technology, some of which are being used for conditions which affect 1-2 per cent of the world's population. A further 12 drugs are in phase II trials and these include monoclonal antibodies for multiple sclerosis, type 1 diabetes, asthma, psoriasis, approaches for the treatment of tuberculosis and amyloidosis, and to modify the immune response prior to organ transplantation.

The MRC has recently published a brochure highlighting progress in the area of experimental medicine⁴² which includes 10 case studies illustrating the way in which MRC researchers are working to understand disease mechanisms or testing the validity of new discoveries in development. MRC e-Val highlighted 64 such developments at an early stage of clinical assessment. Two notable examples of products which are progressing rapidly to the clinic are:

Benlysta for the treatment of Lupus MRC Laboratory of Molecular Biology combinatorial library/phage display technology was used by Cambridge Antibody Technology and Human Genome Sciences to develop Benlysta® (belimumab) with GlaxoSmithKline (GSK). Benlysta is the first new promising treatment of systemic lupus erythematosus (SLE) for 50 years. In 2009, the drug successfully completed phase III trials and in 2010, GSK submitted its first application for marketing authorisation⁴³.

Cryptococcal disease prophylaxis trial An MRC/Uganda Virus Research Institute trial in Uganda showed the most common disease of the central nervous system in HIV-infected African people could be prevented with a pill. Around 10 per cent of HIV-positive people in Africa are affected by cryptococcal disease and about half of those people die from it. An MRC trial helped to show that HIV-positive people are far less likely to get the deadly disease if they take a regular dose of the medicine fluconazole, an inexpensive drug which is safe to take⁴⁴.

A major clinical research success for the MRC was the publication of results from the DART (Development of AntiRetroviral Therapy in Africa) trial. The trial results were published in *The Lancet* online at the end of 2009⁴⁵. The article was one of eight that were nominated for *The Lancet* Paper of the Year 2009 and was voted the runner up.

Antiretroviral therapy (ART) is often managed without routine laboratory monitoring in Africa; however, the effect of this approach was unknown. DART was designed to test whether ART could be safely and effectively delivered without the need for expensive, routine laboratory tests. It was the largest clinical trial ever carried out in Africa: 3,316 HIV-infected, symptomatic, ART-naïve adults took part between 2003 and 2009 across three centres in Uganda and one in Zimbabwe.

The results showed that first-line ART can be delivered safely without routine biochemistry and haematology monitoring for toxic effects. CD4-cell count monitoring had a small but significant benefit in terms of disease progression and mortality. This suggests a role for CD4-cell testing from the second year on ART to guide the switch to second-line ART, and should encourage simpler, cheaper point-of-care CD4 tests. Laboratories will remain important for assessing eligibility for ART, diagnosing and managing opportunistic infections, and assessing clinical toxicity and drug contraindications. As fewer routine tests are required, funding can be focused on drug procurement, diagnostic laboratory services and training to ensure quality clinical monitoring. Overall, the DART results have major implications for ART programmes in Africa, where most people still cannot access treatment⁴⁶.

42 Medical Research Council (2010) *Experimental Medicine: Showcasing successes of MRC research*, London: MRC <http://www.mrc.ac.uk/Ourresearch/ResearchInitiatives/ExperimentalMedicine/index.htm>

43 Human Genome Sciences press release (2010): <http://www.hgsi.com/latest/human-genome-sciences-and-glaxosmithkline-announce-fda-priority-review-designation-for-benlysta-belimumab-as-a-potential-treatment-for-systemic-lupus-erythema-2.html>

44 MRC (2008) *Drug prevents common disease of the central nervous system*. <http://www.mrc.ac.uk/Newspublications/News/MRC005043>

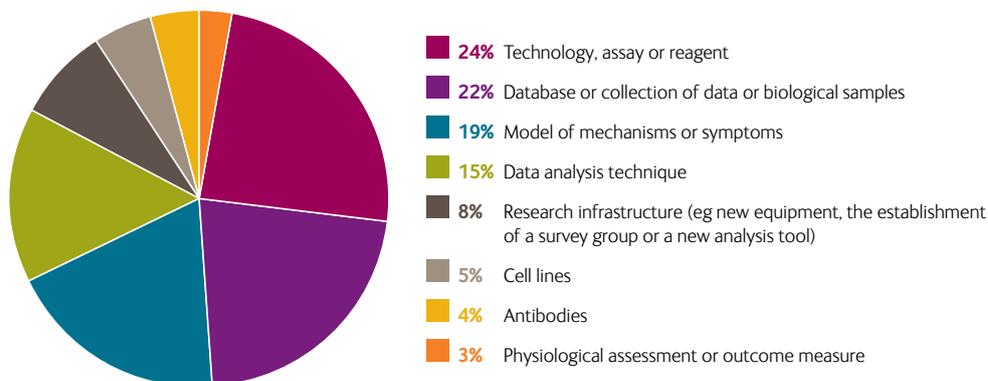
45 DART Trial Team (2010) Routine versus clinically driven laboratory monitoring of HIV antiretroviral therapy in Africa (DART): a randomised non-inferiority trial. *The Lancet*, vol.375, pp123–131. [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(09\)62067-5/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(09)62067-5/fulltext)

46 MRC (2009) *Thousands more could be treated for HIV in Africa if expensive routine lab tests are dropped*. <http://www.mrc.ac.uk/Newspublications/News/MRC006546>

2.2.3 Research materials

Another measure of the productivity of MRC research is the utility of new research materials produced, whether these are shared or licensed to others, and the way in which these stimulate new avenues of research.

MRC e-Val gathered details of almost 2,000 new or improved research materials. The data included the following types of research materials:



Examples of the research materials reported include:

OpenCDMS (University of Manchester) OpenCDMS evolved out of PsyGrid, an e-Science project funded by the MRC and the Department of Health. The aims of the PsyGrid project were to track a very large cohort of schizophrenia sufferers from their first episode of psychosis and to develop the applications/middleware required to conduct wide-area epidemiology on this scale. The project has received further funding from the UK Mental Health Research Network and the National Institute for Health Research to develop openCDMS as a complete system for data management of clinical studies and trials.

Quantum Dot technology (Dr Paola Borri, University of Cardiff) Dr Borri reported new silica-coated quantum dots as a step toward a sensitive biophotonic method for in vitro and in vivo applications. Dr Borri's work has subsequently been recognised with a prestigious £1.1m Engineering and Physical Sciences Research Council Leadership Fellowship.

New mouse model of glomerulonephritis (Imperial College London). Researchers at Imperial College London reported an improved mouse model which has already been used in the private sector in the pre-clinical development of novel anti-inflammatory drugs.

2.2.4 Awards and recognition

A number of research organisations highlight 'measures of esteem' for their faculty and these details are considered internationally when assessing research excellence⁴⁷. The MRC is interested in examining the validity of such measures and understanding the ways in which researchers are recognised for their contribution to academia and wider society.

MRC e-Val gathered brief details of the prizes, awards and other types of recognition received by MRC-funded researchers. The emphasis was on collecting details of recognition that had an element of peer review and were awarded on the basis of merit. In total, there were 2,243 reports made in this section. The results demonstrated a wide variety of ways in which scientists are recognised. Around 800 individual researchers reported such awards or recognition and the information highlighted the very significant contribution that UK researchers have made and continue to make to international science. These contributions could be categorised into five broad groupings: involvement in the publication of research (such as the editor of a journal), membership of learned societies (for example the Royal Society), prize lectures, poster prizes and other honours (eg Order of the British Empire).

Forty MRC-funded researchers reported being elected Fellows of the Academy of Medical Sciences, 20 reported being elected to the Royal Society and 18 received an order of chivalry (an OBE, CBE or knighthood) between 2006 and 2009.

⁴⁷ The Australian Research Council planned to collect information on measures of esteem in 2010 as part of the Excellence in Research for Australia (ERA) Initiative: http://www.arc.gov.au/pdf/ERA_Indicator_Descriptors.pdf

METRIC	DATA	COMMENTS																														
10 Refereed publications	<p>Numbers of unique publications submitted by MRC-funded researchers (both intramural and extramural) to MRC e-Val during the data gathering period in Oct/Dec 2009. Therefore the number of publications noted here for 2009 is only a partial picture.</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Total</th> <th>Reviews</th> <th>Articles</th> </tr> </thead> <tbody> <tr> <td>2009 (partial)</td> <td>5,111</td> <td>530</td> <td>4,581</td> </tr> <tr> <td>2008</td> <td>4,510</td> <td>499</td> <td>4,011</td> </tr> <tr> <td>2007</td> <td>3,786</td> <td>367</td> <td>3,419</td> </tr> <tr> <td>2006</td> <td>2,923</td> <td>292</td> <td>2,631</td> </tr> </tbody> </table>	Year	Total	Reviews	Articles	2009 (partial)	5,111	530	4,581	2008	4,510	499	4,011	2007	3,786	367	3,419	2006	2,923	292	2,631	<p>This figure is predominantly made up of income from royalties but also includes income from milestones, reagents and other smaller, one-off activities. The figure excludes sales of goods and services.</p> <p>This figure also excludes income from licences and shares, as this is reported in metric 8.</p>										
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11 Principal Researchers	<p>Principal Investigators on grants</p> <table border="1"> <tbody> <tr> <td>2009/10</td> <td>1,081</td> </tr> <tr> <td>2008/09</td> <td>1,006</td> </tr> <tr> <td>2007/08</td> <td>943</td> </tr> </tbody> </table> <p>Programme Leaders and Programme Track Leaders in MRC units/institutes</p> <table border="1"> <tbody> <tr> <td>2009/10</td> <td>346</td> </tr> <tr> <td>2008/09</td> <td>349</td> </tr> <tr> <td>2007/08</td> <td>351</td> </tr> </tbody> </table>	2009/10	1,081	2008/09	1,006	2007/08	943	2009/10	346	2008/09	349	2007/08	351	<p>Data are expressed in terms of posts at 31 December.</p> <p>This is the number of distinct people: where a person holds more than one grant, they have been counted only once.</p>																		
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12 Research Fellows	<p>MRC-funded fellows</p> <table border="1"> <tbody> <tr> <td>2009/10</td> <td>362</td> </tr> <tr> <td>2008/09</td> <td>368</td> </tr> <tr> <td>2007/08</td> <td>327</td> </tr> </tbody> </table>	2009/10	362	2008/09	368	2007/08	327	<p>Data are expressed in terms of posts at 31 December.</p> <p>This is the number of distinct people: where a person holds more than one grant, they have been counted only once.</p>																								
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13 Research students	<p>Total by academic year</p> <table border="1"> <tbody> <tr> <td>2009/10</td> <td>317</td> </tr> <tr> <td>2008/09</td> <td>412</td> </tr> <tr> <td>2007/08</td> <td>405</td> </tr> <tr> <td>2006/06</td> <td>462</td> </tr> </tbody> </table>	2009/10	317	2008/09	412	2007/08	405	2006/06	462	<p>Number of MRC-funded students registered on the Je-S System by academic year.</p> <p>From a snapshot taken on 30 July 2010.</p>																						
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14 Submission rates after five years	<p>Percentage of students submitting their thesis within five years of commencing their studies, split by academic year.</p> <table border="1"> <thead> <tr> <th>Registration year</th> <th>2004</th> <th>2004 %</th> <th>2005</th> <th>2005%</th> </tr> </thead> <tbody> <tr> <td>Within five yrs</td> <td>232</td> <td>90.3%</td> <td>210</td> <td>86.8%</td> </tr> <tr> <td>Greater than five yrs</td> <td>9</td> <td>3.5%</td> <td>0</td> <td>0.0%</td> </tr> <tr> <td>Delayed submission</td> <td>7</td> <td>2.7%</td> <td>23</td> <td>9.5%</td> </tr> <tr> <td>Will not submit</td> <td>9</td> <td>3.5%</td> <td>9</td> <td>3.7%</td> </tr> <tr> <td>Total number of records</td> <td>257</td> <td></td> <td>242</td> <td></td> </tr> </tbody> </table>	Registration year	2004	2004 %	2005	2005%	Within five yrs	232	90.3%	210	86.8%	Greater than five yrs	9	3.5%	0	0.0%	Delayed submission	7	2.7%	23	9.5%	Will not submit	9	3.5%	9	3.7%	Total number of records	257		242		<p>Data only shown for records which completed the Je-S submission survey in February 2010. Please note that this is an incomplete return.</p>
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METRIC	DATA	COMMENTS
15 Recruitment and retention of students	First destination of PhD students qualifying or who completed their courses between 1 August 2007 and 31 July 2008.	Taken from DLHE (Destination of Leavers from Higher Education) data 2007/08. Students completing their studies in the 2007/08 academic year. 2008/09 data to be published in September 2010. Source: Annabel Clifton Research Councils UK (EPSRC). Previous year totals collected though final reports - these are no longer collected.
	Calculated Category with number of MRC-funded students:	
	Engaged in Study	12
	Government & Public Sector (not research related)	9
	Government & Public Sector (research related)	6
	Higher Education (academic)	3
	Higher Education (mainly research)	70
	Higher Education (other)	1
	Industry & Commerce (research related)	3
	Industry & Commerce (not research related)	11
	Not employed	8
	Not known or not reported	1
	Other Employment	0
	R & D Sector Unknown	25
	School (Education other)	1
School Teaching or Teacher Training	1	
Self Employed, Voluntary and Unpaid work	2	
Total	153	
Inflow/outflow		
MRC-funded students remaining in HEI: 86/153 = 52.21%		
Business		
MRC-funded students moving into a business environment: 14/153 = 9.15%		
Public Sector		
MRC-funded students moving into the public sector: 17/153 = 11.11%		
Third Sector		We do not have any data to report against the third sector.

METRIC	DATA	COMMENTS																																								
16 Diversity	<p>Female % Female</p> <table> <tr><td>2009/10</td><td>58.57%</td></tr> <tr><td>2008/09</td><td>58.15%</td></tr> <tr><td>2007/08</td><td>61.23%</td></tr> <tr><td>2006/07</td><td>59.78%</td></tr> </table> <p>Ethnic minorities % non White</p> <table> <tr><td>2009/10</td><td>7.48%</td></tr> <tr><td>2008/09</td><td>9.49%</td></tr> <tr><td>2007/08</td><td>6.17%</td></tr> <tr><td>2006/07</td><td>6.74%</td></tr> </table>	2009/10	58.57%	2008/09	58.15%	2007/08	61.23%	2006/07	59.78%	2009/10	7.48%	2008/09	9.49%	2007/08	6.17%	2006/07	6.74%	<p>Collected from records submitted to Je-S by 30 July 2010, sorted by registration date.</p> <p>Collected from records submitted to Je-S by 30 July 2010, sorted by registration date.</p>																								
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2006/07	6.74%																																									
17 Non-paper outputs	<p>Influence on Policy and Practice (see 11 examples in introduction)</p> <table> <tr><td>2009 (partial)</td><td>256</td></tr> <tr><td>2008</td><td>249</td></tr> <tr><td>2007</td><td>147</td></tr> <tr><td>2006</td><td>180</td></tr> <tr><td>No Year</td><td>96</td></tr> </table> <p>Products or Interventions (see section 2.2.1)</p> <table> <tr><td>2009 (partial)</td><td>134</td></tr> <tr><td>2008</td><td>53</td></tr> <tr><td>2007</td><td>37</td></tr> <tr><td>2006</td><td>37</td></tr> <tr><td>No Year</td><td>42</td></tr> </table> <p>Research Materials (see section 2.2.2)</p> <table> <tr><td>2009 (partial)</td><td>286</td></tr> <tr><td>2008</td><td>284</td></tr> <tr><td>2007</td><td>218</td></tr> <tr><td>2006</td><td>275</td></tr> <tr><td>No Year</td><td>863</td></tr> </table> <p>Awards and Recognition (see section 2.2.3)</p> <table> <tr><td>2009 (partial)</td><td>711</td></tr> <tr><td>2008</td><td>670</td></tr> <tr><td>2007</td><td>436</td></tr> <tr><td>2006</td><td>330</td></tr> <tr><td>No Year</td><td>96</td></tr> </table>	2009 (partial)	256	2008	249	2007	147	2006	180	No Year	96	2009 (partial)	134	2008	53	2007	37	2006	37	No Year	42	2009 (partial)	286	2008	284	2007	218	2006	275	No Year	863	2009 (partial)	711	2008	670	2007	436	2006	330	No Year	96	<p>These data were all reported through MRC e-Val.</p> <p>Influence on Policy and Practice includes outputs such as researcher participation in a National Advisory Committee, membership of a guideline committee, citation in policy document, citation in clinical guidelines.</p> <p>Products or Interventions includes the development of diagnostic tools such as screening, therapeutic interventions such as drugs, vaccines, medical devices or surgery, preventive interventions, health/ social care services and several others.</p> <p>Research Materials covers reports of databases, data analysis techniques, cell lines, models of mechanisms or symptoms, new equipment, and so on.</p> <p>Awards and Recognition has five main categories - involvement in the publication of research (such as the editor of a journal), membership of learned societies (for example the Royal Society), prize lectures, poster prizes, and other honours (eg Order of the British Empire).</p>
2009 (partial)	256																																									
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METRIC	DATA	COMMENTS												
18 Recruitment and retention of MRC staff	<p>787 staff joined the MRC during 2009/10 and 746 left (20% of total staff). Females comprised 57% of starters and 56% of leavers. For individuals where ethnicity was known, 20% of starters indicated that they were from non-white ethnic origins; 18% of leavers indicated that they were of non-white ethnic origins.</p> <p>861 staff joined the MRC during 2008 and 858 left (25% of total staff). Females comprised 58% of starters and 56% of leavers. People of non-white ethnicity comprised 20% of starters and 21% of leavers where ethnicity was known.</p> <p>882 staff joined the MRC during 2007/08 and 835 left (24% of total staff). Females comprised 58% of starters and 58% of leavers. People of non-white ethnicity comprised 16% of starters and 21% of leavers where ethnicity was known (in around 48% and 83% of cases respectively).</p> <p>881 staff joined the MRC during 2006/07 and 779 left (23% of total staff). Females comprised 57% of starters and 56% of leavers. People of non-white ethnicity comprised 16% of starters and 19% of leavers where ethnicity was known (in around 72% and 89% of cases respectively).</p>													
19 Active researchers (FTE)	<p>Data is expressed in terms of posts at 31 December.</p> <p>Grants/fellowships</p> <table border="1" data-bbox="544 1384 710 1473"> <tr> <td>2009/10</td> <td>4535</td> </tr> <tr> <td>2008/09</td> <td>4409</td> </tr> <tr> <td>2007/08</td> <td>4198</td> </tr> </table> <p>MRC units/institutes</p> <table border="1" data-bbox="544 1529 710 1619"> <tr> <td>2009/10</td> <td>1396</td> </tr> <tr> <td>2008/09</td> <td>1301</td> </tr> <tr> <td>2007/08</td> <td>1245</td> </tr> </table>	2009/10	4535	2008/09	4409	2007/08	4198	2009/10	1396	2008/09	1301	2007/08	1245	<p>Overall number of distinct staff for grants and fellowships.</p> <p>For MRC units and institutes these data are a total count of scientific staff and includes directors, Programme Leaders, Programme Leader Track, Investigator Scientists, fellows and students.</p>
2009/10	4535													
2008/09	4409													
2007/08	4198													
2009/10	1396													
2008/09	1301													
2007/08	1245													

2.3 Investment in the research base

In 2009/10, the MRC's gross research expenditure was £765.8 million. This support for world-class medical research to improve human health and enhance the economic competitiveness of the UK included:

- £287.6m on over 1,100 grants to researchers in universities, medical schools and research institutes.
- £374.6m on over 500 programmes within the MRC's own research units and institutes.
- £78.2m on studentships and fellowships; there were 1,500 postgraduate students and 350 fellows in March 2010.
- £17.8m for international subscriptions.

The MRC's large-scale investments include three major institutes, 28 research units (including two transferred this year to university management and two in Africa) and 28 centres. All institutes, units and centres are reviewed by the MRC every five years. During 2009/10, more emphasis was placed on addressing the wider and more strategic issues during the five-yearly reviews, implementing actions addressed in 2008/09.

Around 1,475 grant applications had a final funding decision during 2009/10: 279 awards were made, committing over £180m.

METRIC	DATA	COMMENTS
20 DEL	2009/10 £722.2m 2008/09 £680.8m 2007/08 £550.1m 2006/07 £548.6m	DEL as per Annual Report.
21 Other Income	2009/10 £16.9m 2008/09 £13.0m 2007/08 £5.9m 2006/07 £5.7m	Other income as per Annual Report. Other income includes sales of laboratory and library services, as well as proceeds from the sales of radioisotopes etc. This figure excludes commercial income (see metric numbers 1 and 8).
22 Total Income	2009/10 £739.0m 2008/09 £693.7m 2007/08 £556.0m 2006/07 £554.3m	
23 % DEL and Other Income in Total	2009/10 98% 2008/09 98% 2007/08 99% 2006/07 99%	

METRIC	DATA	COMMENTS			
24 Expenditure – response mode grants	Research grants	As per Annual Report. 'Other Research' covers funding for initiatives such as Biobank core funding, UK national stem cell bank, Complementary Therapies renewal (NCRI), NCRI PET Initiative, ACORRN at the Paterson Institute of Cancer Research, capacity development program for Africa, Review of e-Science (held at EPSRC).			
	2009/10		£249.3m		
	2008/09		£229.5m		
	2007/08		£178.3m		
	2006/07		£175.9m		
	Other Research				
	2009/10		£38.3m		
	2008/09		£36.9m		
	2007/08		£27.3m		
	2006/07		£36.0m		
	Postgraduate/Training				
	2009/10		£78.2m		
	2008/09		£67.9m		
	2007/08		£57.6m		
2006/07	£52.2m				
International Subscriptions					
2009/10	£17.8m				
2008/09	£15.3m				
2007/08	£12.4m				
2006/07	£11.3m				
Total:					
2009/10	£383.6m				
2008/09	£349.6m				
2007/08	£275.5m				
2006/07	£275.5m				
25 Capital - New capital spend	2009/10 £53.6m 2008/09 £110.9m 2007/08 £105.2m 2006/07 £32.5m	New Capital Spend as per Annual Report. This includes the additions to assets under construction.			
26 VFM savings		2009/10	2008/09	2007/08	2006/07
	Reducing the proportion of RC expenditure attributable to admin costs	£1.0m	£1.8m	£1.6m	£1.3m
	Demonstrating effective reprioritisation of programme spend	£12.3m	£10.8m	£23.3m	£11.5m
	Increasing the efficiency of research council institutes	£14.8m	£16.7m	£1.3m	£2.1m
	Growing the level of co-funding of research	£16.5m	£6.2m	£1.9m	£1.2m
	Growing the costs of research				
	Total	£44.6m	£20.5m	£28.1m	£16.1m
27 % grant applications internationally competitive	2009/10 25.3% 2008/09 23.3% 2007/08 27.3%				

2.4 Public engagement

MRC e-Val, the MRC's online data-gathering tool, collects information about interactions between MRC scientists and non-specialist audiences.

A total of 3,888 separate engagement activities with non-specialist audiences took place over the last four years and involved almost 60 per cent of MRC-funded scientists.

- 1,166 Principal Investigators, out of the 1,983 who submitted data, provided details of interactions.
- The number of interactions rose each year, indicating that public engagement is increasingly seen as a normal part of an MRC research career.

The number of interactions reported for 2009 is slightly lower than for 2008, but as these data were collected part-way through the year we expect this number to increase above the 2008 figure following the next data-gathering period.

The e-Val data also illustrate the range of non-specialist audiences that MRC-funded scientists engage with, from the general public and journalists (as conduits to the public) through patient groups and participants in research to health professionals, policy-makers and parliamentarians.

We are currently analysing the qualitative aspects of the MRC e-Val data and can report here in detail only on our scientists' interactions with schools. Further information on different audience types will be available soon and can be provided on request.

Most schools events and activities provided by MRC scientists are with sixth form pupils and these are split fairly evenly between pupils visiting research labs and researchers visiting schools. Most activities focus specifically on the scientist's own research and not on research in general, which demonstrates an appetite from this audience for detailed information on the nature of the research being undertaken by MRC-funded scientists. Talks and presentations are the most popular type of activity, followed by lab demonstrations and other activities, with publications and online activities less common.

Although the impact of public engagement is difficult to assess, MRC scientists are asked to report on what they consider to be the impact of their interactions with various non-specialist audiences. Reports most commonly include raising awareness of, and support for, particular areas of research, including better recruitment and retention in patient and population studies. However, documented cases of more specific impacts have also been recorded, including: increased support for the use of animals in research; the revision of NICE guidance; contributions to government strategy and guidelines; improved exam results among school pupils; and increased applications from schools to the local university.

28 Funding for public engagement

Through its five-yearly assessment mechanisms, the MRC ensures that all its investments in research include an element of public engagement activity which is delivered directly by scientists as part of their funding agreement. In addition, all MRC units, institutes and centres are obliged to produce annual plans detailing how they will engage with non-scientific audiences, and to report on these annually.

The MRC is active in the strategic coordination of cross-council public engagement initiatives through its membership of the RCUK Public Engagement with Research Group (PERG). This group manages research councils' investments in a range of initiatives, resources and schemes that help build links between researchers and schools (such as Researchers in Residence, CREST Awards and Nuffield Bursaries) and help embed public engagement in Higher Education Institutes by supporting the active involvement of research staff with non-specialist audiences.

The MRC's involvement in PERG ensures that there is no duplication within the MRC of work being coordinated or funded through RCUK, and that knowledge and best practice are shared with other research councils on strategies for effective public engagement by researchers.

29 Events by type

Dissemination activities in MRC e-Val 2009, by method of dissemination and year. (As with all MRC e-Val data used in this report, due to the timing of the data gathering period the data for 2009 is incomplete).

	2009	2008	2007	2006	Total
Information to a group/panel	258	329	264	162	1,030
Talk/ presentation	372	541	373	280	1,599
Press/media	197	192	132	89	619
Activity/workshop	270	337	270	179	1,070
Open day/visitor	58	75	66	41	244
Article	227	273	195	127	838
Total for year	1,382	1,747	1,300	878	5,400



Medical Research Council (Swindon office)
 2nd Floor David Phillips Building
 Polaris House
 North Star Avenue
 Swindon
 Wiltshire
 SN2 1FL

Medical Research Council (London office)
 14th Floor
 One Kemble Street
 London
 WC2B 4AN

Phone (+44) (0)1793 416200

www.mrc.ac.uk