Research CHANGES lives

MRC STRATEGIC PLAN 2009-2014
STRATEGIC AIM ONE
Picking research that delivers: Setting research priorities which are most likely to deliver improved health outcomes

RESEARCH PRIORITY THEME ONE  Resilience, repair and replacement
10  Natural protection
   To explore resilience to disease and degeneration, understanding how it may be exploited for new interventions that ameliorate disease processes.

13  Tissue disease and degeneration
   To advance knowledge in the biology of ageing and degeneration of human tissue; to understand the mechanism and impact of chronic inflammation.

14  Mental health and wellbeing
   To explore the relationship between mental health, wellbeing and resilience to disease processes.

15  Repair and replacement
   To translate the burgeoning knowledge in regenerative medicine into new treatment strategies.

RESEARCH PRIORITY THEME TWO  Living a long and healthy life
18  Genetics and disease
   To use genetics, imaging and biological indicators to understand predispositions for disease, and to target treatments to disease subtypes.

19  Life course perspective
   To drive forward interdisciplinary research addressing health and wellbeing from childhood to older age.

20  Lifestyles affecting health
   To determine the most effective strategies for tackling lifestyles that are detrimental to health.

21  Environment and health
   To explore the impacts of changes in our environment on health and wellbeing.
22 STRATEGIC AIM TWO  
Research to people: Bringing the benefits of excellent research to all sections of society

24 Translation of research  
To bring the health impacts of fundamental research to people more quickly.

25 Regulation, ethics, governance and working with decision-makers  
To uphold and guide ethical research practice and the highest standards of research governance; to enhance the regulatory process by providing innovative approaches.

27 Communication  
To enhance communication with scientists, the public, policy-makers and partners.

28 STRATEGIC AIM THREE  
Going global: Accelerating progress in international health research

30 Partnerships and shaping the agenda  
To provide international leadership in partnerships which enhance the competitiveness of the UK knowledge and health base.

31 Global health  
To support global health research that addresses the inequalities in health which arise particularly in developing countries.

32 STRATEGIC AIM FOUR  
Supporting scientists: Sustaining a robust and flourishing environment for world-class medical research

34 Capacity  
To strengthen and sustain a skilled research workforce through targeted support for excellent training and the development of world-class research leaders.

35 Use of population-based data  
To exploit fully the complexity and benefits of population-based data; to maximise sharing and linkage of data, and to develop data collection and storage.

36 Research environment  
To provide a world-class research environment.

38 ACHIEVING OUR STRATEGIC AIMS AND OBJECTIVES

40 MEMBERS OF COUNCIL, STRATEGY BOARD AND MANAGEMENT BOARD
MRC researchers are global leaders in their fields of science, as the 28 Nobel Prizes over our 95-year history indicate. Always at the international forefront, the MRC addresses the most difficult scientific and health challenges of the day. Now, as we approach our centenary in 2013, we must not be complacent. We must remain driven by the needs of populations, individuals and patients and the desire of scientists to strive for new discoveries to improve human health through prevention and treatment.

To achieve this goal, we must build on our strong history and continue to recognise the importance of taking on fundamental problems by supporting basic science. This not only delivers discoveries but provides the basis for translation of research into patient benefit. We must ensure that scientists supported by the MRC have confidence that, even in difficult economic circumstances, science of the highest quality and excellence can and will be supported and sustained, as it takes many years before discoveries achieve their potential in patient care.

Building for the future requires the development of careers and opportunities for young scientists – the future of the UK biomedical enterprise. We will also invest in infrastructure to support our scientists and trainees ensuring that they continue to have access to the best and newest technologies and facilities to maintain excellence in a competitive world. Further, we will aim to create the right enabling environment to undertake the highest quality research, to produce and evaluate the optimal outputs and outcomes, and to communicate the impact to all parts of society.

Throughout the history of the MRC, the problems and the nature of scientific discovery and translation have not stayed the same. The MRC must respond quickly to a changing world. New infections continue to emerge and, despite major advances in their control, remain a major cause of mortality worldwide. Non-communicable diseases – diabetes, cancer, cardiovascular disease and mental disorders – account for a large proportion of the burden of disease in low- and middle-income countries.
Similarly, people are living longer in virtually every country. As the population ages, we need new approaches in understanding the biology of ageing and how it relates to frailty and disease. This requires investigation of our ‘life course perspective’ in large cohort studies, linking population biology with a greater understanding of the disease processes themselves.

Other challenges facing the world, including environmental change, energy supply and food security, affect health. We must work in partnership with others, including other research councils, to study the impact of these issues and to provide solutions across the multitude of disciplines that deal with these problems.

We will channel resources into areas that have the most potential for translation into impacts and benefits for human health and society. This will take advantage of our 100-year history of achievement and our current excellent research. It will also reflect the need to enhance progress towards clinical application, and we will work with industry partners as appropriate. We are fortunate to have a strong partnership with the National Institute for Health Research (NIHR) and the Devolved Administrations, coordinated through the Office of Strategic Coordination of Health Research (OSCHR), to place these in the context of wider health challenges and speed their progress to the clinic and changes in public policy.

These are difficult but worthwhile challenges; our objective is to improve the health and wellbeing of individuals and populations in the UK and beyond. This aim remains as valid today as it has been throughout our history.

Sir John Chisholm
Chairman

Sir Leszek Borysiewicz
Chief Executive
Over the last year, the MRC has been in conversation with its major stakeholder groups to review and evaluate its strategic direction. Discussions with the MRC’s Council, Strategy Board, its research boards and overview groups have reflected on how the MRC can be best positioned to deliver its mission to policy-makers, the general public and the healthcare, life science, devices and medical engineering industries. This strategy defines the MRC’s distinctive role in contributing to faster and more effective ways for medical research to flourish, at all stages – from working to understand the fundamental science prior to having specific health questions in mind, to tackling some of the most pressing health issues facing society.

The 2009-2014 MRC Strategic Plan, set out in this document, takes the theme of Research Changes Lives, emphasising the impact that world-class research has on improving the health and wellbeing of society. Research Changes Lives sets the path for delivering better health and wellbeing through developing prevention interventions, new treatments for diseases, producing well-founded policy guidance for research governance and ethics, and maintaining excellence in the basic research that underpins these activities.

Mission
Established by Royal Charter in 1913, the MRC’s mission in the 21st century remains pivotal in setting the strategic direction and requires the MRC to:

- Encourage and support research to improve human health and wellbeing.
- Produce and make use of skilled researchers.
- Advance, disseminate and apply knowledge and technology to improve the quality of life and economic competitiveness of the UK.
- Promote dialogue with the public about medical research.
Over the next five years the MRC aims to support medical research which increases the pace of the transition to better health.

We will achieve this through:

**STRATEGIC AIM ONE**
Picking research that delivers: Setting research priorities which are most likely to deliver improved health outcomes.

**STRATEGIC AIM TWO**
Research to people: Bringing the benefits of excellent research to all sections of society.

**STRATEGIC AIM THREE**
Going global: Accelerating progress in international health research.

**STRATEGIC AIM FOUR**
Supporting scientists: Sustaining a robust and flourishing environment for world-class medical research.

IMAGE: Spongy bone tissue. False-colour scanning electron micrograph of trabeculae in cancellous (spongy) bone tissue. © Prof P. Motta/Dept. of Anatomy/University "La Sapienza", Rome/Science Photo Library
These strategic aims, set out in more detail in the following sections, explain how the strategy will drive progress in support of the MRC’s mission, and deliver measurable impact of the outcomes of research. Each aim follows a hierarchical structure, with objectives to outline the goal, information about the current situation, the future desired scenario and an explanation of how we will reach this goal.

Our strategy is to support excellent research in areas that are poised to deliver substantive progress in tackling health challenges facing the UK and the world. While aiming for maximum impact, we also support excellent science in areas that would be otherwise neglected or under-funded. To achieve this, the MRC supports research across the biomedical spectrum, from basic science to clinical studies. The MRC will continue to fund high-quality research through response-mode grants.
Picking research that DELIVERS

SETTING RESEARCH PRIORITIES WHICH ARE MOST LIKELY TO DELIVER IMPROVED HEALTH OUTCOMES

STRATEGIC AIM ONE
The MRC will speed up the exploitation of the best ideas in medical science, from fundamental discovery science to innovative, preventive and therapeutic interventions in humans. We will fund science of the highest quality across the breadth of disciplines relevant to improving human health.

RESEARCH PRIORITY THEME ONE: Resilience, repair and replacement

RESEARCH PRIORITY THEME TWO: Living a long and healthy life
RESEARCH PRIORITY
THEME ONE
Resilience, repair and replacement

Discovery science has opened up new opportunities for intervention in many diseases such as cancer, dementia, heart disease and restricted mobility through bone and joint disease. Understanding more about the mechanisms of resilience, repair and replacement will help channel discoveries towards preventing and treating disease.

OBJECTIVES

**Natural protection:** To explore resilience to disease and degeneration, understanding how it may be exploited for new interventions that ameliorate disease processes.

**Tissue disease and degeneration:** To advance knowledge in the biology of ageing and degeneration of human tissue; to understand the mechanism and impact of chronic inflammation.

**Mental health and wellbeing:** To explore the relationship between mental health, wellbeing and resilience to disease processes.

**Repair and replacement:** To translate the burgeoning knowledge in regenerative medicine into new treatment strategies.

A VISIONARY PAST; A PIONEERING FUTURE

MRC research stemming from the 1970s has led to the development of monoclonal antibodies – which now make up a third of all new drug treatments for a variety of major diseases.

1973  Mouse antibodies isolated by César Milstein and Georges Köhler at the MRC Laboratory of Molecular Biology.

1986  Michael Neuberger, Herman Waldmann, and Sir Gregory Winter humanised mouse antibodies leading to the first genetically engineered monoclonal antibody (Campath® – alemtuzumab) to enter the clinic.

Sir Gregory develops and patents technology for producing human antibodies in the test tube, leading to Humira®.

2003  Humira® is licensed in the UK to treat rheumatoid arthritis.

2005  MRC sells royalties due on Humira® to Abbott Laboratories Limited.

11 antibody drugs are now on the market for treating breast cancer, leukaemia, asthma, arthritis, and transplant rejection.
Natural protection

The human immune system protects the body throughout life, providing innate resilience to disease and degeneration. Understanding this – and how resilience breaks down with age or disease – is critical for developing new therapeutic advances for transplantation and the treatment of infectious diseases, autoimmune diseases and allergy.

OBJECTIVE

To explore resilience to disease and degeneration, understanding how it may be exploited for new interventions that ameliorate disease processes.

NOW

Basic science linking laboratory-based knowledge to clinical investigation is crucial in delivering discoveries that guide development of new treatments or medical practices. The MRC invests strongly in basic and other research on natural mechanisms that protect the body against disease.

- The MRC launched a partnership initiative to boost infection research through the UK Clinical Research Collaboration.
- We support the MRC Human Immunology Unit in Oxford where scientists investigate the intricacies of the immune system in health and disease, prioritising development of therapeutic interventions. We also fund the MRC/University of Birmingham Centre for Immune Regulation where scientists work to understand how immune responses are controlled in autoimmune disease and infection.

We have several current avenues of translational funding related to understanding the body’s mechanism for dealing with disease.

- In 2008 we supported the search for and the validation of new biomarkers – the biological indicators of disease.
- We funded initiatives in experimental medicine – the link between basic research and people – and research to develop better models of human disease.
- A recent award for a new MRC Centre for Transplantation in London combines expertise in basic immunology and transplantation biology with clinical research, uniting teams at King’s College London with teams at Imperial College London and collaborators at Harvard in the US.

We also fund research on infectious diseases worldwide, tackling global challenges such as emerging infections.

- We invested £3.5 million in a translational vaccine research call, and funded six new projects with the potential to prevent diseases including influenza, malaria and cervical cancer.
- We support extensive research on human pathogens and the diseases they cause, including AIDS, tuberculosis (TB) and newly-acquired viral infections, and have invested in a community-based programme to study the determinants of seasonal influenza transmission (Fluwatch).

In a 2007 review of human immunology, we identified a number of gaps in our current knowledge and identified strategies to address them, which should be key to improving the health and outcomes of those suffering from immune diseases. These include gaining a better understanding of innate immune mechanisms and improving our knowledge of the genetic basis of diseases of the immune system.

FUTURE

We aim to understand the life course of the immune system from early life to old age, defining the relationship between the genetic basis of disease and failures in the function of the immune system.

We aim to accelerate the transition from model systems to experimental medicine approaches in humans, investigating why innate immunity declines with age, and to determine:

- The role of the innate immune system in shaping the normal immune response in infancy and its role in normal and abnormal pregnancy.
- The association of innate immunity with the origins and persistence of chronic inflammatory diseases.
- How we can develop new vaccines that are safer and more potent.

Fundamental research remains vital, to avoid premature testing of vaccine candidates and setbacks in vaccine development.

HOW

Interdisciplinary environments will create the opportunities to bring together geneticists, molecular cell biologists and immunologists, modellers, clinicians, physicists and chemists.

- There is to be a joint immunology and inflammation initiative with industry. Objectives would be to encourage alignment, at both a strategic and a practical level, in areas where there are good prospects for added value through joint working, and to set up research collaborations.

- We will stimulate new research and make key appointments in strategic areas to boost capacity.

- We will set up centres of excellence in university and medical school environments, form partnerships with other funders and improve access to clinical facilities and services.
Tissue disease and degeneration

As the proportion of older people in the population increases, we need new approaches to unravel the complex biology of ageing and to understand its links with frailty and disease. Throughout life, cells and tissues are subject to attack from long-term biological processes such as chronic inflammation. These cause serious tissue deterioration, which can be responsible for symptoms ranging from breathlessness in asthma to bowel disease.

OBJECTIVE

To advance knowledge in the biology of ageing and degeneration of human tissue; to understand the mechanism and impact of chronic inflammation.

NOW

The gradual lifelong accumulation of a wide variety of molecular and cellular damage causes tissue destruction and dysfunction seen in later life. We have made progress in understanding these mechanisms.

- In neurodegeneration, following a review of investment we have launched calls in partnership with other funders to build capacity. These calls are key in providing links to clinical infrastructure, industry and international collaborators.
- We have invested in brain-banking facilities, and are leading an initiative to establish an independent, coordinated network of UK brain banks to provide a national resource for research on brain disorders that will operate for the benefit of donors, researchers and future patients.

The application of modern molecular techniques to immunology has dramatically improved our understanding of inflammatory mechanisms in health and disease. Altering cellular processes has resulted in major breakthroughs in the treatment of chronic inflammatory diseases such as rheumatoid arthritis, ankylosing spondylitis, juvenile arthritis and Crohn’s disease.

Many of the great successes in drug discovery in inflammation have been made in the UK. However, to maintain our world leadership, we need better insight into genetic and environmental interactions underlying chronic inflammatory disorders and better understanding of how different physiological processes work together.

FUTURE

The challenge is to improve our understanding of the mechanisms underlying tissue disease and destruction. We aim to apply our knowledge about ageing mechanisms to understand the question of whether there is a functional decline in later years.

- We aim to unravel the processes of chronic inflammation which underlie the origin of a range of tissue pathologies.
- We aim to explore how immune, inflammatory and structural cells interact in chronic diseases such as chronic obstructive pulmonary disease and inflammatory bowel disease, osteoarthritis and osteoporosis.
- We aim to develop an understanding of the contribution of cellular processes of neurodegeneration to cognitive decline.

HOW

We will boost and sustain the UK’s competitive edge in this field through greater collaboration between researchers and increased multidisciplinary working.

- We will ensure that enabling technologies and infrastructures are supported – such as cellular and positron emission tomography imaging, computational biology and tissue and brain banking.
- By addressing the interaction between molecular and cellular damage and effects across physiological systems, we will encourage the integration of studies of damage across cell components.
- By studying the impact of potential therapies on chronic inflammation, we may learn more about the underlying mechanisms of disease progression.
- We will train more researchers to take an integrative approach to the study of molecular and cellular ageing processes, and build research excellence in neurodegeneration.
Mental health and wellbeing

Mental disorder is widespread; at any one time nearly one in six UK adults has a common mental disorder such as depression. Depression is the leading global contributor to years lived with disability, and is associated with increased future risk of heart disease. The UK Government’s Foresight Mental Capital and Wellbeing Project called for greater recognition of the extent to which individuals’ cognitive resources affect their ability to prosper. Therefore in addition to the need to address the burden of mental ill health, there is a need for research that tackles questions concerning the relationship between optimal wellbeing, mental and physical health.

OBJECTIVE
To explore the relationship between mental health, wellbeing and resilience to disease processes.

NOW
Neuroscientists are uncovering clues that can predict the onset of mental disorder. Imaging technologies can demonstrate which regions of the brain play significant roles in cognitive function in health and disease.

MRC scientists are also investigating social, environmental and genetic determinants of mental health disorders, including risk factors for antisocial behaviour and depression and the mental health determinants of physical health, including heart disease and stroke.
- The MRC’s broad portfolio of neuroscience and mental health research places us in a unique position to respond to the challenge of mental ill health and its relationship with physical health and wellbeing. We are pursuing the biological understanding of neuronal cellular processes in health and disease, real-time imaging of brain function and the study of biological indicators in large groups of people.
- The MRC funds research centres specialising in mental health. Researchers at the MRC Social, Genetic and Developmental Psychiatry Centre in London and the MRC Centre in Neuropsychiatric Genetics and Genomics in Cardiff investigate the role of genetics and its interaction with environmental factors in the development of mental ill-health.
- In Cambridge, the Behavioural and Clinical Neuroscience Institute links clinical research at the level of functional neural systems to basic work on the brain in order to understand better the mechanisms of psychiatric illness and addiction. Scientists at the MRC Cognition and Brain Sciences Unit, also in Cambridge, carry out research on cognitive processes such as memory and emotion and how these processes may be disrupted in disorders of the brain.

FUTURE
There is huge scope for improving mental health in the population.
- We aim to understand what goes wrong at a cellular level in the brain during mental disorders, and determine which treatments work for which patients.
- We aim to explore the fundamental science behind associations between mental disorders, physical health and factors that affect society as a whole.

HOW
We will continue to support and develop research across the breadth of neuroscience and mental health, with a particular emphasis on linking fundamental understanding of cognitive processes with behaviour, and addressing public health and goals for prevention.
- We will form partnerships with other stakeholders to build capacity, helping to address the decline in academic psychiatry and learn from advances in biological understanding, population-based studies and technologies.
- We will be a major contributor to developing UK brain imaging capability and its coordination, through support of skilled individuals and new technologies.
- We aim to ensure more selective groups of people are recruited to clinical trials to address more specifically the effectiveness of potential new therapies.
- To increase our understanding of causes and effects, we will carry out multidisciplinary longitudinal (long-term) studies involving genetics, neuroscience, psychosocial risk factors, behaviour and physical health outcomes.

Repair and replacement

Regenerative medicine is set to transform the opportunities for cell- and tissue-based therapies. Tissue engineering is the generation of a renewable source of transplantable tissue by combining the principles of engineering, physical science and medicine. Scientists are pursuing both replacement and regeneration techniques for repairing human tissue. Therapies can be inorganic, such as bone implants and hip replacements, or living tissue – transplantation or stem cells. Therapies are already being developed to treat neurodegenerative diseases; blood vessel blockage in heart attack, stroke or pulmonary embolism; and the repair of damaged tissue to help regain normal body functions.

OBJECTIVE

To translate the burgeoning knowledge in regenerative medicine into new treatment strategies.

NOW

Stem cell research offers the potential for new treatments for many diseases that currently have no effective cures. Researchers have shown in the laboratory that stem cells have the ability to develop into almost all other types of cell and tissue – and are now attempting to integrate such cells in living systems so that they can take on the functions of spinal cord, heart, pancreatic, retinal and brain cells.

• The MRC has invested in new regenerative medicine research centres in Edinburgh and Cambridge, and supported research programmes that promote translational adult, embryonic and fetal stem cell research, its translation towards application, and continued development of the UK Stem Cell Bank.
• We have funded three centres to develop human embryonic stem cell lines that will be suitable for clinical use and available through the UK Stem Cell Bank. We have also held recent calls for proposals to support research into induced pluripotent stem cells, to address preclinical barriers and to develop collaborative programmes addressing specific disease targets.

FUTURE

Long-term clinical therapies and treatments must move beyond the replacement of tissues and organs to the exploitation of the intrinsic repair and regenerative potential of the human body.

• We aim to develop a fuller understanding of how to control stable growth and differentiation of stem cells into particular cell types, and be able to carry out the process on a large enough scale to allow clinical application.
• We aim to address technological and immunological barriers to cell transplantation, and devise new approaches to monitor the safety of stem cell therapies.
• We aim to investigate further the technological application of novel biomaterials in biological systems.
• We will help develop the application of stem cell technology to provide improved drug discovery and toxicology programmes in collaboration with industry.
• One of the biggest challenges will be the design of clinical trials to assess novel interventions, especially in the early phases. The MRC Hubs for Trials Methodology Research – which will link innovation in methodology to conduct in early and late phase trials – will have a key role to play in the testing of repair and regenerative therapies.

HOW

We will boost disease-based or system-based collaborative programmes, build capacity and establish links between the best basic and clinical teams to enhance therapeutic development and the translation of basic findings to the clinic.

• We will help bring scientists with skills in the mathematical, physical and engineering sciences into this field.
• Our scientists will culture cells for specific repair purposes and undertake ‘first into human’ studies and early phase clinical trials.
• We will work with the biopharmaceutical sector and regulatory agencies to ensure efficient development of stem cell therapies.
• We will explore how stem cells may also be used as vehicles for drug delivery to specified targets in the body.
• We will work with public and private partners in the Stem Cells for Safer Medicine Initiative to promote the shared academic-industry development of stem cell technologies.
RESEARCH PRIORITY
THEME TWO
Living a long and healthy life

Health professionals, policy-makers and individuals can potentially improve the chances of having a healthier life by addressing the complex interplay between genetics, development, and life events or lifestyles.

In the fields of genetics and genomics, population sciences, and in tailoring treatments to individual needs, there are opportunities for research aimed at determining how these factors influence the quality and length of life.

OBJECTIVES

**Genetics and disease:** To use genetics, imaging and biological indicators to understand predispositions for disease, and to target treatments to disease subtypes.

**Life course perspective:** To drive forward interdisciplinary research addressing health and wellbeing from childhood to older age.

**Lifestyles affecting health:** To determine the most effective strategies for tackling lifestyles that are detrimental to health.

**Environment and health:** To explore the impacts of changes in our environment on health and wellbeing.

A VISIONARY PAST; A PIONEERING FUTURE

The MRC Population Health Sciences Research Network (PHSRN) is a collection of MRC research units and centres. The central aims of the network are to add value to the MRC’s overall investment in the population health sciences, encourage collaborative research and build research capacity in the population health sciences. One of the first of the network’s outputs is a web-based facility to help researchers who are addressing new, important and difficult questions. The facility enables scientists to use the most appropriate methodology to address particular lifestyle research problems.
Genetics and disease

We are beginning to understand the link between genetics and disease. The challenge now is to determine the biological relevance and mechanism of action of genes, and to develop this knowledge for clinical application. To do this, scientists will develop new biological markers for determining disease subtype, predicting risk or predicting response to treatment; or use new insights into disease mechanisms to develop new drugs.

OBJECTIVE

To use genetics, imaging and biological indicators to understand predispositions for disease, and to target treatments to disease subtypes.

NOW

Genome-wide association studies (GWAS) – investigations on variations in the human genome and their links to disease – have led to the identification of genes associated with complex characteristics.

- The MRC has invested in DNA collections, many of which were used by the Wellcome Trust Case Control Consortium, and in GWAS such as the nationwide British Genetics of Hypertension study and the international Autism Genome Project.

Developments in high throughput sequencing technology – a fast method of determining the sequence of DNA – offer the potential for much greater understanding of genetic effects on disease risk and its characteristics.

- We have awarded funding for an investigation of the function of a candidate gene for diabetes across various cohort studies.

The mouse is being used extensively as a model organism for studies on the function of individual genes.

- The UK is a world leader in mammalian models of gene function and disease, through the basic research at the MRC Mammalian Genetics Unit and others, and through targeted applied research to create models useful in developing new treatments.

We are enhancing the UK Biobank resource – a 30-year epidemiological study which is building the world’s largest information resource on the genetic and environmental factors that cause or prevent human disease.

FUTURE

The challenge will be to identify and study the mechanism of action of genes that are already known to be associated with human disease, to find new targets for treatments. We also aim to explore epigenetic modification – changes in gene expression caused by mechanisms other than changes in the underlying DNA sequence.

- We aim to understand how different mutations in the mouse genome give rise to different characteristics and apply this knowledge to develop greater understanding of human disease mechanisms, better animal models for human disease and identification of new drug targets.

- We aim to understand better the environmental influences that affect genetic risk, so that preventive strategies can be developed at the earliest time point.

- To enable better targeting of therapeutic or preventive interventions and reduction in side effects of treatments, we aim to understand the reasons underlying individual differences in response to treatment; a stratified approach to the genetic basis of research.

HOW

By bringing new methods to genetics research, we will link specific genes with disease, allowing better targeting of therapies to individuals.

- By investing in high throughput sequencing, we will bring new tools to animal and human genetics research, allowing exploration of types of genetic variation.

We are working with partners to develop an internationally-coordinated programme to determine the phenotypes of mouse mutants and make data available to researchers worldwide.

- We will continue to invest in supporting the UK’s leading position in epigenetics and explore the clinical applications of this knowledge.

- We will work to ensure the development of new statistical methodologies as well as improved standardisation and calibration across studies to allow better exploitation of the research data within existing collections.

- We will invest in basic research in mitochondrial biology to understand mechanisms of diseases in which mitochondrial function is compromised.

- As we identify genes and mechanisms associated with disease, and study somatic (non-hereditary) mutations in cancer, we will find new targets for drug therapies.

- We will assess the associations between genetic variation in populations and relevant infectious and metabolic diseases and traits using epidemiological research projects in Africa as a platform.
Life course perspective

Life expectancy continues to increase in much of the developed world at the rate of five or more hours a day. As we push forward the results from basic research into health benefits for society, it is important that we study diseases in the context of the entire age spectrum from birth to adulthood.

OBJECTIVE

To drive forward interdisciplinary research addressing health and wellbeing from childhood to older age.

NOW

A significant proportion of the MRC’s research aims to understand factors that influence healthy ageing throughout life.

As well as supporting research into ageing processes, the MRC invests in a number of ageing-related and childhood resources such as cohorts and longitudinal studies.

• The MRC funds a number of birth cohorts – studies of large groups of people from birth. The MRC Unit for Lifelong Health and Ageing, for example, has unique data from birth to age 63+ years on the health and social circumstances of a sample of men and women born in 1946 in England, Scotland and Wales. This is the oldest of the British birth cohort studies.

• The MRC leads on Lifelong Health and Wellbeing (LLHW), a major cross-council initiative and multidisciplinary research priority theme for Research Councils UK (RCUK), supporting research addressing factors that influence healthy ageing and wellbeing in later life. We are one of five UK research councils which participate in the New Dynamics of Ageing programme. This is a seven-year multidisciplinary research initiative with the aim of improving quality of life for older people.

• The MRC is also the lead organisation for ageing research under the OSCHR public health research arrangements.

Through these and future initiatives, there is a need to build capacity and boost collaborative working in ageing research, so that we can enhance our understanding of how ageing is linked to disease.

FUTURE

The development of a strong base in ageing research will enable us to address challenging scientific questions.

• We aim to understand the link between intrinsic ageing and wellbeing. Age is the single biggest risk factor for diseases such as cancer, osteoporosis, neurodegeneration and diabetes, and we need better understanding of the intrinsic ageing process that makes the body more vulnerable to disease.

• We aim to understand more about life expectancy, reducing morbidity in older age and how factors such as physical exercise, mental health, nutrition and stress influence wellbeing and ageing.

HOW

Researchers will study factors that influence age-related change at the molecular, physiological system and individual levels, and that lead to an increased risk of disease in later life. This will involve multidisciplinary research linking basic and population science.

• Partnerships between researchers and stakeholders from a range of sectors, including cross-research council funding programmes, will be important in translating discoveries and influencing policy and practice.

• By linking with other funders and stakeholders in the LLHW programme we will drive forward the translation of scientific findings into benefits for public health. LLHW provides an excellent multidisciplinary platform for the development of other activities, including international partnerships.

• To understand the genetic basis of disease, our researchers will study large groups of people from birth for genome-wide associations to exploit data on variation in the human genome. They will also explore epigenetics.

• We will try to understand the basic mechanisms of typical and atypical brain and cognitive development in infants and young children, and to identify risk factors in infancy or adverse outcome in later life.
Lifestyles affecting health

Over recent decades, researchers tackling behaviour related to health have studied ways to change lifestyles at an individual level. Although some initiatives have been successful, we need to develop more effective strategies, which have a greater focus on community, macro-level or multi-level interventions, taking into account social factors that play important roles in behaviour and lifestyle.

OBJECTIVE

To determine the most effective strategies for tackling lifestyles that are detrimental to health.

NOW

The MRC provides support for the development and evaluation of new intervention strategies that encourage behaviour beneficial to health and discourage unhealthy choices. We are an active partner in several major initiatives on prevention research, developing and evaluating interventions which affect and address poor diet, lack of physical activity, excessive alcohol intake and risky sexual behaviours.

- The MRC guidance Developing and evaluating complex interventions: new guidance\(^2\) updates previous MRC work to guide researchers through the challenges in designing and undertaking high-quality research in this area.
- We are also beginning to understand addiction and are developing interventions to tackle addictive behaviour. The MRC is leading the development of a national strategy for addiction research with the Health Departments, Home Office and others.
- Since 2004, the MRC has managed and contributed to the National Prevention Research Initiative (NPRI) – a major national initiative made up of 16 funding partners to encourage and support research on chronic disease prevention.
- As part of a consortium of eight funders, the MRC has contributed £3m towards funding five UK Clinical Research Collaboration Public Health Research Centres of Excellence across the UK to tackle public health issues that have a significant impact on the health of the nation.
- The MRC and the Scottish Government fund the Scottish Collaboration for Public Health Research and Policy (SCPHRP) to build capacity to develop and evaluate novel public health policies, programmes and interventions.

FUTURE

The challenge for us is to explore the complex relationships between health behaviours, education, social inequalities and environmental factors as they affect health.

- We aim to understand the factors that make it hard to reverse the increasing levels of obesity in children and adults.
- We aim to develop new approaches to tackle addiction, substance abuse and non-addictive alcohol use.
- We aim to improve the preparatory work carried out before public health interventions are tested in large trials so that research questions are more refined and targeted more to specific problems.

HOW

Partnerships are paramount. We will build networks, working towards understanding the interplay between lifestyle factors, health and wellbeing to deliver benefits to human health.

- We will evaluate the impact of complex interventions on lifestyle, and set up partnerships between researchers and policy-makers.
- We will offer increased support for intervention development and, through continued partnership with the NIHR, for large-scale evaluations particularly of community, macro-level and multi-level interventions.
- In addiction research, we will strive for increased coordination and connectivity across existing groups, and innovative, cross-disciplinary studies. Interaction of genetics with lifestyle will be studied in addictions, including smoking and alcohol.
- The MRC Hubs for Trials Methodology Research will play a key role in addressing how best to define the public health intervention and to design and analyse the large-scale evaluations.

A VISIONARY PAST; A PIONEERING FUTURE

Sixty years ago, smoking was generally regarded as innocuous. Now it is recognised as the main cause of lung cancer, the world’s most common fatal cancer. Pioneering MRC researchers helped establish a link between smoking and cancer 50 years ago. Over several decades, they identified the full hazards of smoking and the benefits of stopping, which has influenced public policy and behaviour. This has prevented millions of untimely deaths and culminated in government bans on smoking in enclosed places that will save the country billions of pounds.

Environment and health

During a period of environmental change, research has a major role to play in society’s ability to adapt in order to maintain levels of human health and wellbeing. The relationship between humans and the environment in areas such as air and water pollution, changing patterns of infectious disease, allocation of natural resources, housing, food security, obesity and traffic all require cross-disciplinary solutions.

OBJECTIVE

To explore the impacts of changes in our environment on health and wellbeing.

NOW

The MRC is a partner in the Living with Environmental Change initiative, a priority multidisciplinary research theme for RCUK, led by the Natural Environment Research Council (NERC). This scheme involves research councils, government departments and agencies. The initiative coordinates and prioritises research in a number of areas, including environmental change, human health and wellbeing and the distribution and spread of diseases.

- The MRC is involved in the NERC-led Environment and Human Health programme, established in 2006.
- Nanotoxicology – the study of the toxicity of very small materials (smaller than one-tenth of a micrometre in at least one dimension) – has been a priority for the MRC since 2007. We have encouraged innovative, high-quality research applications with the aim of informing policy development.
- In a 2006 strategic review of toxicology, the MRC identified the need for a national programme of training and capacity building in integrative toxicology. The Integrative Toxicology Training Programme provides funding for studentships and fellowships.
- We are enhancing UK Biobank, which is linking genetic and environmental factors that cause or prevent human disease.
- We have recently awarded funding, with the Health Protection Agency, to a new Centre for Environment and Health at Imperial College and King’s College London which aims to improve the science base underlying the development of environmental health policy. In addition the MRC Centre for Outbreak Analysis and Modelling was established in 2007 at Imperial College London as a centre of excellence for research on the epidemiological analysis and modelling of novel infectious disease outbreaks.

FUTURE

We aim to build capacity and training, preparing us for responding to and mitigating disease threats in an uncertain future.

- We aim to understand better how environmental change may affect population health, and how social and ecological environments affect patterns of diseases.
- We aim to assess the links between the natural environment, ecosystem services and human wellbeing and how these may continue to develop within environmental limits.
- We aim to play a key role in human, plant and animal health by predicting how disease, pests and other environmental hazards will alter during periods of environmental change.
- We aim to gain better knowledge of how pollutant and temperature stresses affect human populations and to work with others in formulating interventions which improve public health.

HOW

In close partnership, including interdisciplinary research across the research councils, we will expand on our research support in the area of environmental health, building evidence on the impact of environmental change on health and wellbeing.

- We will fund research using longitudinal cohort resources to study the impact of environmental factors on disease.
- We will fund research to gain a better understanding of the relationship between aspects of the environment, such as exposure to toxins, and human health. To do this, scientists will use biological markers of disease and develop methods to measure exposure. The results will feed into considerations of policy needs.
- As well as understanding how social and ecological environments affect patterns of infectious disease, a better understanding of the impact of interventions, both preventive and therapeutic, on these patterns will also be key.
Research to PEOPLE

BRINGING THE BENEFITS OF EXCELLENT RESEARCH TO ALL SECTIONS OF SOCIETY

STRATEGIC AIM TWO
The MRC will work with researchers in public and private sectors, regulators, and the breadth of stakeholder communities to ensure that research of the highest quality is translated into tangible benefits for society as a whole.

OBJECTIVES

Translation of research: To bring the health impacts of fundamental research to people more quickly.

Regulation, ethics, governance and working with decision-makers: To uphold and guide ethical research practice and the highest standards of research governance; to enhance the regulatory process by providing innovative approaches.

Communication: To enhance communication with scientists, the public, policy-makers and partners.

IMAGE: Extracted DNA. Close-up of DNA (deoxyribonucleic acid) in its purified form. Normally, these fine wispy strands are tightly coiled around proteins in condensed genetic structures known as chromosomes. DNA contains sections, called genes, that encode each cell’s structure, function and behaviour. © Patrick Landmann/Science Photo Library
Translation of research

We are driving the translation of discoveries from basic laboratory and clinical science into benefits for human health. Using these insights, we are further enhancing our knowledge of the fundamental pathways in health and disease. An essential component of this bidirectional process is sustaining strong support of the basic science that underpins it.

OBJECTIVE

To bring the health impacts of fundamental research to people more quickly.

NOW

The 2007 settlement for the MRC included an additional £132m targeted towards translational research – demonstrating the Government’s clear support for this activity. The MRC is delivering on this investment in coordination with our OSCHR partners and others.

- We have put in place bespoke mechanisms to encourage and drive the translation of medical research, building on existing translational activities and schemes.
- We have introduced dedicated funding streams – for example, to promote translational stem cell research – and specific initiatives targeted at areas that need boosting, supporting key facilities, coordinating existing infrastructure, and capacity development.
- The managed programme, consisting of the Developmental Pathway Funding Scheme and the Developmental Clinical Studies stream, supports the preclinical and early clinical development of novel therapies, interventions and diagnostics, and the research tools used to achieve this. Projects have clearly defined outcomes and future value.
- The Efficacy and Mechanism Evaluation programme, part of the coordinated strategy of the MRC and the NIHR, is managed by the NIHR and funded by the MRC. The programme supports primarily ‘science-driven’ late phase studies with an expectation of substantial health gains.
- As the lead organisation for methodology research under OSCHR, we are delivering on a programme of novel methods development research which includes the MRC-NIHR Methodology Research Programme and increased training and capacity development, to ensure that the translation of health research is accelerated, and built upon the best available evidence.

FUTURE

We will drive basic research discoveries into new treatments and products and feed clinical results back to the laboratory, with the aim of achieving better translation in strategically important areas.

- We aim to strengthen research support in areas of unmet need.
- By working with our partners and stakeholders, we aim to enable effective coordination from the laboratory to the clinic and wider healthcare settings.
- We aim to ensure that researchers are well trained, confident and willing to transfer knowledge out of their own area of responsibility.
- We aim to ensure that the approach to intellectual property protection and management is appropriate, and to explore how to develop an intellectual property strategy that benefits all parties involved in collaborative research appropriately.
- We aim to better address ‘back-translation’ – questions raised by results from epidemiologic studies or clinical trials which are fed back to work carried out on fundamental mechanisms.
- We aim to help governments improve the ability of their health systems to deliver effective interventions and care and to ensure that the outputs of research can influence policy and practice.

HOW

We will build on our existing translational schemes and continued investment in fundamental laboratory, clinical and population research.

- To achieve translational activities, we will provide access to the required technology platforms and infrastructure.
- We will embed the ethos of translation in academic communities.
- Using expert input from partners and stakeholders we will prioritise clinical, patient, scientific and industrial research needs and match these priorities to the translational research we support.
- Exploiting the emerging opportunities from enhanced genetic knowledge will allow more sophisticated approaches to early stage trials. Wider use of patient groups categorised (stratified) according to their characteristics, imaging and biological indicators will also be possible.
Regulation, ethics, governance and working with decision-makers

The MRC is recognised by regulatory authorities as a key stakeholder and plays an important role in influencing UK and European policy-makers.

OBJECTIVE

To uphold and guide ethical research practice and the highest standards of research governance; to enhance the regulatory process by providing innovative approaches.

NOW

The MRC has played a central role in the development of policy and legislation relating to the regulation of medical research. This is helped by detailed discussions between Parliament, Government, regulators and researchers.

- We have worked with decision-makers in the Department of Health and the National Institute of Health and Clinical Excellence, to identify and address key methodological research needs.

All MRC units must adhere to the high standards of the MRC guidance on ethics and governance as must MRC grantholders, in accordance with terms and conditions of funding. Internationally, the MRC has a strong reputation regarding its guidance on research ethics, regulation and governance.

In early 2006, we set up the MRC Regulatory Support Centre (RSC) to help the MRC and wider scientific community to implement legislative and good practice requirements relating to research involving human participants, their tissues or data.

- The RSC provides training and advice on regulatory matters across the spectrum of MRC-funded research involving humans.
- In collaboration with NIHR Clinical Research Network, the centre provides an advice service, available across the UK to researchers and research and development managers, and training on the use and storage of human tissue and data, consent and confidentiality.

In May 2008, we led a workshop dealing with regulation and its impact on research. The conclusions were:

- Regulation of medical research is necessary but complex.
- There are difficult balances between public benefit and participants, patient and consumer risk, and many stakeholders making competing demands on regulators.
- Developing regulations for medical research has tended to be piecemeal leading to duplication of requirements from different regulators. Consequently scientists experience delays that hold up their research.

The MRC works with the other research councils through RCUK to address governance issues and to develop policies that cut across the research base. Current issues include open access publishing and good research conduct.

- In 2008, RCUK commissioned a report on open access to research outputs. The purpose of the study was to identify the effects and impacts of open access on publishing models and institutional repositories in light of national and international trends.
- In April 2008, RCUK jointly sponsored a workshop at Keele University on ‘Promoting Good Research Conduct’.

FUTURE

We aim to reduce the bureaucracy involved in regulatory approval while ensuring that the UK retains its high standards of research ethics and integrity.

- We aim to aspire to achieve clarification and – if appropriate – simplification of regulations, as well as improvement in communication and engagement with all concerned.
- We aim to ensure that European Union (EU) and UK regulations, such as those set out by the EU Directive on Clinical Trials and NHS Research Governance, and interpretation of these regulations do not present unnecessary barriers to producing evidence about the safety and efficacy of treatments.
- We aim to pay attention to research regulation, ethics, governance and working with decision-makers in developing countries as well as in the UK.

HOW

- We will engage with policy groups considering uses of health and Human Fertilisation and Embryology Authority data in research.
- We will develop new guidance for stem cell researchers, in the light of the new Human Fertilisation and Embryology Bill, the review of the role of the Global Forum on Bioethics in Research and developments in international discussions in the area.
- We aim to take a leading role in the development of policy and regulatory framework on the use of the electronic healthcare records in research.
- We will work with other stakeholders to ensure that European legislation concerning the use of animals in research is implemented.
research maintains appropriate standards of animal welfare, and balances the need for appropriate regulation with the resources needed for world class research.

- We will continue to work with the Human Tissue Authority and other regulators with the aim that processes and guidance for researchers are as simple and efficient as possible.
- We will continue to work through RCUK and other partners to develop policies and appropriate governance arrangements that foster UK research and maintain its integrity.
- Through RCUK, we will work with Universities UK and others to establish a common approach to good research conduct across the UK.

A VISIONARY PAST; A PIONEERING FUTURE

The MRC played a leading role in providing scientific briefing for parliamentarians on the Human Fertilisation and Embryology Bill, as it made its way through both Houses of Parliament. This area of work is a key element of our remit, establishing the MRC as a valuable source of knowledge and expertise to inform legislation and policy-making.

The Human Fertilisation and Embryology Bill took a full year to become law, from first reading in November 2007 until Royal Assent in November 2008. During this time, we contributed input across a large number of organisations to ensure briefing materials were delivered in a timely and targeted manner. We assisted parliamentarians in drafting amendments to sections of the bill, coordinated meetings with them and organised media interviews.
Communication

The MRC is funded by the UK taxpayer. We recognise our responsibility to inform and involve the public, policy-makers and our partners about our work. Through our initiatives, many of which involve MRC-funded scientists, we develop effective relationships with a range of audiences.

OBJECTIVE

To enhance communication with scientists, the public, policy-makers and partners.

NOW

We work to keep the public informed with the progress of our research and policies, in order to address areas of uncertainty, take account of public concerns and ensure that our work reflects public acceptability.

• We use a wide range of communication channels, including publications, exhibitions, the mass media and face-to-face involvement, to deliver messages about the MRC and its work to our stakeholders.
• The MRC website is regularly tested and reviewed, and improvements made to functionality, content and structure.

We have improved our capacity to engage effectively with the public and other non-specialist audiences. We have devised and implemented a programme of science communication and media training for our scientists.

• We set up a public panel – a network of individuals who provide a broad range of public views, experiences and expertise on different aspects of the MRC’s work.
• We regularly undertake public consultations on societal issues, often jointly with other research councils, on topics such as stem cell research and lifelong health.
• We are developing an MRC-wide strategy for internal communication to ensure that our scientists and staff know and understand the strategic direction of the MRC.

A key element of our remit is to work closely with parliamentarians, establishing the MRC’s reputation and facilitating an effective route for MRC knowledge and expertise to inform legislation and policy-making.

• We achieve this primarily through the All Party Parliamentary Group on Medical Research and through ongoing public affairs programmes at Westminster and Holyrood.
• We regularly participate in parliamentary consultations and inquiries.

FUTURE

The challenge is to show the public that the funding we receive is well spent. We aim to make the MRC’s work more accessible to the public and policy-makers, demonstrating the value of our research and highlighting our achievements both nationally and internationally.

• We will encourage and support more transparency in MRC decision-making.
• We will improve MRC accountability by maintaining and enhancing the mechanisms we use for public involvement.
• We aim to improve understanding of and stimulate support for medical research among the parliamentary and policy-making communities.
• We will support the continuing need for evidence-based policy and decision-making.
• We will continue to provide expert advice and information about our research, and to share the results and impacts of our work with the public and other stakeholders.
• We will also communicate the need for and the results of MRC research to the public in low and middle-income countries and to the UK public, explaining the rationale and outputs of the research in those countries.

HOW

To enhance our capacity for communication, we will increase our support for our scientists to help them communicate the results of their research. We will improve our effectiveness by working closely with our partner organisations, to share best practice and maximise the use of resources.

• We will help the public understand our scientific findings, and assess the impact these may have on their own lives, by improving access to our scientists and research findings through more face-to-face interaction, and better provision of information online and in the media.
• We will continue to inform debate and help shape policy through the timely provision of accurate, up-to-date information on policy-relevant topics.
• We will encourage our scientists to nurture relationships and share information with policymakers and parliamentarians, to guide policy and the regulation of research.
• We will continue to stress the importance of animal models in certain areas of research.
• We aim to embed a culture of public dialogue and stakeholder engagement in our organisation by providing communication training as an integral part of the skills development programme for our scientists.
• We will build a community of MRC ambassadors, drawn principally from our own scientists, boards and Council members, to take an active role in disseminating MRC information.
Going GLOBAL
ACCELERATING PROGRESS IN INTERNATIONAL HEALTH RESEARCH
STRATEGIC AIM THREE
The MRC will use its experience, expertise and resources to encourage partnership working in the international community to tackle important and challenging research goals.

OBJECTIVES

Partnerships and shaping the agenda: To provide international leadership in partnerships which enhance the competitiveness of the UK knowledge and health base.

Global health: To support global health research that addresses the inequalities in health which arise particularly in developing countries.
Partnerships and shaping the agenda

The landscape for research across the world is changing due to large investments in science and innovation in emerging economies, particularly Asia, and increased opportunities for international cooperation. Governments recognise that investment in research and development is a key factor for economic growth, and are creating centres of excellence in rapidly developing areas of research such as stem cells or neuroscience. The MRC has opportunities to develop strategic partnerships to develop world-leading collaborative research and to enable UK scientists to engage with the best minds, ideas and resources wherever they are located.

OBJECTIVE

To provide international leadership in partnerships which enhance the competitiveness of the UK knowledge and health base.

NOW

The MRC is the UK lead on the health theme for the EU’s Seventh Framework Programme (FP7) and provides the national contact point for UK academics. We engage with UK stakeholders, within both the public and private sectors, to ensure that the UK is in a strong position to maintain its success in FP7 and also in related programmes such as the Innovative Medicines initiative, a programme co-funded by the European Commission and the European Federation of Pharmaceutical Industries and Associations.

We are committed to developing the European Research Area, a shared European vision through which researchers based in Europe will benefit from greater opportunities for transnational movement and cooperation. Pooling European resources to maintain and develop world-class research infrastructures is a vital part of this goal. The MRC advises on the strategy regarding European infrastructure projects, including biobanking and infrastructure for structural biology and informatics.

MRC-funded research includes a high proportion of collaboration with scientists overseas – the top collaborating countries are the US, Germany, France and the Netherlands. Publications from MRC units and institutes show that about a quarter of overseas collaborators on co-authored publications are from the US, with just over half co-authored with Europe and most of the rest with Asia, Africa and Australasia.

FUTURE

The MRC aims to use its experience, expertise and resource to encourage international partnerships to tackle important and challenging research goals. Our objective is to encourage opportunities for UK scientists to engage with the best researchers in the world.

• We aim to capitalise on the MRC’s reputation for excellence, authority and independence to influence the international research agenda.
• In Europe, we aim to play a leading role in influencing the research agenda and to strengthen the European Research Area.
• We aim to work with RCUK offices in China, India and the US to strengthen international research links.

HOW

We will develop large international projects and partnership schemes to help stimulate interactions between MRC scientists and scientists in other countries which offer a particular competitive benefit and where links are not strong or need to be shaped.

• Working with other research councils and the Department for Innovation, Universities and Skills, we will ensure that we can influence the development of the next European Framework Programme and work effectively with funding agencies in other countries.
• We will develop strategic alliances with the major European national funding agencies, including a new European Union initiative on joint programming in areas such as neurodegeneration or ageing.

A VISIONARY PAST; A PIONEERING FUTURE

A mother’s diet influences her child’s susceptibility to diabetes. The MRC funds a research grant based in India, led by Dr Caroline Fall at the University of Southampton, investigating whether adult disease is preventable by measures that optimise fetal, infant and childhood nutrition. Dr Fall’s team has found that there is a link between diabetes in the mother to diabetes in the child. Also, if the child has a low birth weight, doesn’t grow well during the first year and then grows rapidly after the age of two – even without being obese – there is an increased risk of diabetes. An added benefit of Dr Fall’s grant is that it contributes to better infrastructure in the Indian centres and allows exchanges of UK and Indian scientists.
Global health

In the foreword to the Government’s strategic document, *Health is Global*, the Prime Minister identified the challenge of bringing the benefits of biomedical research to all people across the world. The MRC’s support for global health research will bring a distinctive and effective contribution to health problems, while recognising that there are excellent African scientists who are part of the solution.

**OBJECTIVE**

To support global health research that addresses the inequalities in health which arise particularly in developing countries.

**NOW**

The MRC has supported health research in developing countries for over 80 years, with a changing focus from nutrition research to infections research. The MRC units for delivering research include the MRC Laboratories in The Gambia and the MRC/UVRI Uganda Research Unit on AIDS (UVRI stands for Uganda Virus Research Institute). Through the European and Developing Countries Clinical Trials Partnership (EDCTP), the MRC and Department for International Development have also supported European and African collaboration on drug and vaccine trials for HIV, TB and malaria. This programme brings together 16 European countries which together spend €200m in this area, along with €200m from the Commission itself.

**FUTURE**

The MRC will build on our existing strengths to carry out world-class research and deliver its benefits to global communities.

- We aim to help governments improve the ability of their health systems to deliver effective interventions and care, to ensure that the outputs of research can influence policy and practice, and to determine how health systems can best cope with the already overwhelming burden of infections and the additional burden of non-communicable diseases that are yet to come.
- In this era of unprecedented numbers of emerging infections, and with the imminence of a flu epidemic or pandemic and drug-resistant TB, we aim to respond quickly to new and emerging infections. We also aim to address problems in health inequalities.
- We aim to continue our leading role in tackling diseases such as HIV, TB, malaria, and neglected tropical diseases such as leishmaniasis which impact so heavily on the health and wellbeing of populations in resource poor settings.

**HOW**

We will engage with governments, public and private sector global research funders and development agencies to build sustainable local or regional networks to support research on health inequalities through to implementation by policy makers. We will remain committed to a substantial portfolio of work and to support and develop existing centres of research excellence in Africa.

- We will create opportunities for such centres to build on key methodological and technological strengths supported through MRC funding in the UK.
- We will launch a new scheme to support scientific leadership in Africa, working closely in each country to obtain high-level support and sustainable commitment.
- Where possible we will seek to leverage funds from other agencies, product development partnerships or programmes such as EDCTP to help accelerate progress with these major diseases.
- We will work with partners to identify the best ways to take forward research on health care infrastructure in developing countries to ensure that the outputs of MRC research lead to healthier lives.

We will work with our partners across the world to develop a global alliance to tackle the grand challenge of non-communicable diseases in developing countries.

- Working with scientists in India, China and sub-Saharan Africa, we will identify opportunities for research that will lead to affordable strategies for the prevention and treatment of non-communicable diseases that now account for a large proportion of the burden of disease in low- and middle-income countries.
- We will try to understand the interactions between communicable and non-communicable diseases and the impact of infectious diseases on population genetics – a cutting-edge field at global level.

**A VISIONARY PAST; A PIONEERING FUTURE**

An MRC-funded trial in Africa has shown that the most common disease of the central nervous system in HIV-infected African people can be prevented with a pill. Up to 10 per cent of HIV-infected African people are affected by cryptococcal disease and about half of those people die from it. The trial built on development work done by Pfizer in their UK laboratories and was carried out by scientists from the MRC unit in Uganda and the Liverpool School of Tropical Medicine. The study revealed that African people with HIV are less likely to get the deadly cryptococcal disease if they take a regular dose of the drug Fluconazole.

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SUSTAINING A ROBUST AND FLOURISHING ENVIRONMENT FOR WORLD-CLASS MEDICAL RESEARCH

STRATEGIC AIM FOUR
The MRC aims to strengthen the UK research base to enable the scientific community to respond effectively to current and future grand challenges in medical research.

OBJECTIVES

Capacity: To strengthen and sustain a skilled research workforce through targeted support for excellent training and the development of world-class research leaders.

Use of population-based data: To exploit fully the complexity and benefits of population-based data; to maximise sharing and linkage of data, and to develop data collection and storage.

Research environment: To provide a world-class research environment.
Capacity

The MRC has an important national role in training future research leaders across a range of basic science and clinical disciplines. We will continue to work with a range of partners to identify and respond to national gaps in strategic biomedical research skills, to continue our tradition of supporting the UK’s most talented individuals at critical stages of their research careers and to seek novel ways of enabling career research scientists to flourish.

Interdisciplinary research and training lead to new research opportunities and drive innovation. Maintaining a cadre of highly-skilled researchers in the UK is essential for the innovative research that increases our understanding of health, disease and treatments. A skilled research workforce is also essential if the UK is to be the preferred country for the pharmaceutical, biotechnology and devices industries to undertake pre-clinical and clinical research.

OBJECTIVE

To strengthen and sustain a skilled research workforce through targeted support for excellent training and the development of world-class research leaders.

NOW

In the financial year 2007/08, the MRC spent about 14 per cent of the MRC grant-in-aid on fellowships, and has a variety of schemes and initiatives which aim to boost capacity, especially in strategic areas. In December 2007, the MRC’s Council agreed to increase the research careers budget. This included a rise in junior and intermediate clinical awards and PhD capacity-building studentships. Capacity-building schemes for 2008/10 are based on four broad skill-sets that are consistent with the industry identified priorities and those of the MRC’s research boards. These are physiology, toxicology and drug safety; advanced Masters and capacity development PhD studentships; methodology, bioinformatics and public health scientist fellowships; and health economic fellowships.

- We increased our provision for advanced Masters course places and capacity-building PhD studentships in four key skills areas: mathematics and statistics applied to biomedicine, biomedical imaging, in vivo skills and stem cell biology. We also increased the provision for industrial PhD studentships.
- The Skills Gap Awards Scheme, designed in response to rapid changes in the UK and global economies, aims to ensure that we develop high-quality scientific and research support skills.
- As part of the MRC’s continuing commitment to developing research methodologies, we launched a new postdoctoral scheme in this area in 2008/09. It reshaped the health of the public scheme in the form of a new population health sciences fellowship.

FUTURE

Using our resources optimally, we aim to support excellent individuals and invest in areas that have the most potential to deliver results for human health.

- We aim to assess how effective our existing capacity building schemes are in addressing strategic skills gaps, and to determine how we can strengthen the evidence that underlies prioritisation of training needs. We also aim to work with our higher education institution (HEI) partners.
- We will help our HEI partners to attract, train and develop outstanding doctoral trainees in excellent research and training environments.
- We aim to build capacity in research methodologies and in strategic skills that we and our partners together identify as critical for the UK.
- We will train and sustain the careers of the future research leaders.

HOW

We will respond to needs identified by the MRC’s research boards by prioritising strategic areas as part of a refreshed skills and careers strategy.

- We will promote the development of high-quality training environments through our doctoral training schemes.
- We will monitor the quality and uptake of our enhanced capacity-building schemes, further shaping and balancing priorities in response to evidence of gaps in provision.
- We will provide skills training and information about career tracks for technologists in instrumentation, bioinformatics and data management.
- We will also invest in clinical research training. MRC fellowships are highly sought after by clinicians of exceptional ability seeking a demanding and rewarding research experience at various stages of their careers.
- To strengthen networking among our students and junior fellows, the MRC will work with research organisations to launch a pilot set of strategic skills-oriented summer schools. We will also consult on the potential value and form of regionally-based early trainee research networks that bring together the diverse range of trainees supported by the MRC.
- We aim to invest in the development of global health research capacity among UK health researchers, to ensure that there are opportunities to train future leading scientists for work in this field.
Use of population-based data

Data are at the heart of the MRC’s ability to improve the understanding of human health. To maximise the exploitation of MRC data sets, it is important to ensure that the MRC plays a strong leadership role in the development of informatics and infrastructure that enables the effective use and analysis of MRC data. We must recognise that the maintenance and development of population cohorts and the data sets that flow from them need active and effective management across discipline boundaries.

OBJECTIVE

To exploit fully the complexity and benefits of population-based data; to maximise sharing and linkage of data, and to develop data collection and storage.

NOW

Large long-term population-based data sets or cohorts are an essential resource for health research, in which the MRC has invested significantly, often in partnership with other funders. Although the benefits and rewards of cohort investments can take several years to come to fruition, investment in these data sets over the last 60 years now puts the UK in an unrivalled position internationally with a number of unique, high-quality data sets which cannot be easily replicated.

• Developments in information technology, particularly the capacity to handle ever increasing quantities of complex data and the potential of the NHS Connecting for Health programme, provide new opportunities for ‘big science’ through data pooling and data linkage.
• We also have funding initiatives to promote data sharing and to maximise the use of existing data sets and we are developing strategy across UK funders to develop a UK-wide framework for population-based research.

FUTURE

Through strategic enhancement and additional resources to facilitate data pooling and linkage to other data sets, the MRC aims to enable the use of population-based data sets for the laboratory, clinical and population health research community. This will be not only to understand better the basis of health and disease but also to develop new ways to diagnose and prevent common diseases.

• We aim to play a pivotal role in ensuring that the rich and unique data captured within large population-based data sets are used to their maximum potential. UK researchers will be able to address complex questions about the major social, genetic and environmental determinants of health and disease.
• We aim to develop methods to enable increasingly large and complex data sets to be assessed, evaluated and synthesised for research; to improve the conduct and increase the efficiency of clinical and population-based research designs. The major funders of health research in the UK, under the auspices of the OSCHR e-health board, are currently developing an e-health research framework.

HOW

The MRC will build on a number of initiatives and strategies including our policy on data sharing and preservation and the MRC Data Support Service. We also have funding initiatives to promote data sharing and to maximise the use of existing data sets and we are developing strategy across UK funders to develop a UK-wide framework for population-based research.

• We will address scientific priorities and stimulate cross-disciplinary working through strategic investment in the most appropriate data sets.
• We will achieve cultural change so that data-sharing and better data access become common practice.
• We will proactively manage existing and new population-based cohort investments in partnership with other funders.
• To understand and address methodological issues that arise from linking and combining data sets, including those that arise from cross-disciplinary collaboration, we will support research.
• We will provide leadership in data-sharing and data access policies.
• To remove unnecessary obstacles, we will implement the recommendations of the Academy of Medical Science’s January 2006 report on the use of health records in research.

5 National Prevention Research Initiative Phase II call for proposals, March 2007; Wellcome Trust/MRC/Economic and Social Research Council/Engineering and Physical Sciences Research Council Electronic Patient Record and Databases call for proposals September 2007; MRC licence to use the GPRD database, December 2005.
6 Personal data for public good: using health information in medical research. The Academy of Medical Sciences, January 2006.
Research environment

Working across disciplines is key to achieving the best results with new and emerging technologies. We will support top research centres and technology facilities to accelerate progress in research, and attract and retain world-leading scientists in the UK.

OBJECTIVE

To provide a world-class research environment.

NOW

The MRC’s three institutes are pre-eminent research centres. They provide an excellent research environment that attracts and retains scientists from all over the world and provide long-term funding that allows ambitious, multidisciplinary projects to be pursued.

The MRC has a number of units in the UK, which carry out research across the biomedical research spectrum, from fundamental science at the molecular level to large-scale epidemiological studies. We also have units in The Gambia and Uganda, for research on improving treatments and interventions for major infectious diseases in the developing world.

The MRC has invested in facilities and research technologies, both within its own institutes and units and in universities. The MRC is managing the operation of the new research complex at Harwell (RCaH) which will provide the environment and facilities for researchers in the life and physical sciences to undertake research and encourage synergy between these areas of UK research excellence. On a smaller scale, the MRC supports the formation and development of centres of excellence, and provides strategic direction for long-term research.

FUTURE

The UK aims to retain world-class facilities and scientists. To achieve this, it must create environments to allow innovative medical research to flourish. Increasingly, these will need greater research capacity, so that world-leading technologies are provided cost-effectively, to achieve greater disciplinary breadth and to enable collaboration and translation.

• We will invest strategically to deploy equipment and facilities at laboratory, national or international level. This deployment will take into account the need to provide the best technologies, available to the most researchers, at good value for money, and to people who are best able to run and exploit it.

• We aim to prepare for an increase in genetic and population data, combining low-cost, high-speed sequencing, and better use and management of healthcare and population-based data, to provide opportunities for research and application to healthcare.

HOW

We aim to develop new, larger facilities and new partnerships, such as links with universities, to strengthen centres of excellence.

• The UK Centre for Medical Research and Innovation will bring together four of the world’s leading biomedical research organisations – the MRC, Cancer Research UK, Wellcome Trust and University College London – to create a new UK medical research institute.

• The MRC will continue to provide opportunities to develop new centres of excellence in partnership with universities.

• We will work with MRC unit directors and universities to achieve close integration of units and universities, and we will stimulate interdisciplinary collaboration between biological and physical sciences.

A VISIONARY PAST; A PIONEERING FUTURE

Plans are underway to form a new strategic partnership with Oxford University to develop the world renowned Weatherall Institute of Molecular Medicine (WIMM), as an MRC-University Institute. This is an innovative way of working with a university to deliver the MRC’s translation strategy.

The WIMM was established in 1989 through a collaboration between the MRC, Imperial Cancer Research Fund (now Cancer Research UK), Wellcome Trust, Nuffield Medical Trust, EP Abrahams Trust and Oxford University, to support research in the field of molecular and cell biology with a direct application to study human disease. The WIMM has a high international profile and has been cited as a model of success for UK translational science.
A VISIONARY PAST; A PIONEERING FUTURE

The MRC Laboratory of Molecular Biology (LMB) in Cambridge is a world-leading centre of molecular biology research. Since the structure of DNA was discovered, LMB has hosted 12 Nobel Prize winners. More than 12 companies have been started up by LMB scientists, including Celltech and Cambridge Antibody Technology.

The MRC has a vision for the future of LMB, built on its tradition of scientific excellence. Work has already started on the project to provide a new LMB building, an investment of over £200m to construct a new state-of-the-art laboratory, development of neurobiology facilities, enhanced capacity for research infrastructure and equipment, and increased effort in translating research. Maintaining facilities at a world-class level will ensure that the institute retains its top cadre of scientists, who continue to make discoveries and inventions that result in substantial benefits to the wealth and the health of the nation and the world.
Participation in global health research policy-making and implementation.

A leading role in defining the agenda for support of the science base in the UK and Europe.

A measurable increase in skilled people working in health and medical research and development.

Major infrastructure projects completed on time and to budget.

New technologies, methods and tools benefiting medical research and development.

Demonstrable advancement of the national and international knowledge base in health and medical science, and positive economic impact generated.

Pushing forward new frontiers in medical research through encouraging research proposals of the highest excellence.

Funding profile aligned with research priorities.

Measurable impact on the development of new policy and practice in the health research domain.

New products, policies and procedures leading to improved prevention, diagnosis and treatment of disease.

Increased involvement of community sectors in health research debates and discussion.

Participation in global health research policy-making and implementation.

A leading role in defining the agenda for support of the science base in the UK and Europe.

Playing a key role in the implementation and evaluation of major research programmes in resource-poor settings.

A measurable increase in skilled people working in health and medical research and development.

Major infrastructure projects completed on time and to budget.

New technologies, methods and tools benefiting medical research and development.

We will measure progress against our aims and objectives over the life course of this Strategic Plan.

KEY SUCCESS INDICATORS WILL BE:

**STRATEGIC AIM ONE**
*Picking research that delivers*

Setting research priorities which are most likely to deliver improved health outcomes.

**STRATEGIC AIM TWO**
*Research to people*

Bringing the benefits of excellent research to all sections of society.

**STRATEGIC AIM THREE**
*Going global*

Accelerating progress in international health research.

**STRATEGIC AIM FOUR**
*Supporting scientists*

Sustaining a robust and flourishing environment for world-class medical research.

*IMAGE: Circular genome map using the computer program, Circos. The diagram shows relationship of the genes in human chromosome 1 to the same genes distributed across all 21 chromosomes of the mouse (mm5). The brown lines connect genes in mouse chromosome 4 with corresponding genes in human chromosome 1. The blue lines relate one region in human chromosome 1 with corresponding regions across the mouse genome. © Martin Krzywinski/Science Photo Library*
HOW WE WILL EVALUATE OUR PROGRESS

We have developed a new approach to capturing the output of research funded by the MRC. From 2009, this will add to our capability to evaluate the progress, productivity and quality of MRC-funded research. This new approach will engage all researchers in receipt of MRC support in a shared effort to understand and analyse the impact of MRC funding. Our aims are to:

- Capture and assess the achievements of specific funding calls and strategic funding initiatives.
- Review and assess the success of providing skilled people to the biomedical research community.
- Evaluate the success of building infrastructure in the form of new technologies, methodology, or laboratories.
- Measure our effectiveness in working across research sectors to yield synergy between funding agencies and deliver value for money for the UK science base.
- Determine the economic impact of MRC supported science.

We will deliver a minimum of four major strategic evaluations a year, and a number of smaller focused evaluations. We will work in partnership with universities and research institutions to offer them the information needed to maximise the value of the support they receive from the MRC.
Members of Council, Strategy Board and Management Board

AS AT 1 MAY 2009

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