MRC Research Funding
Strategy and Priorities 2001-2004

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The science budget allocations for the three years 2001/2–2003/4 announced in November 2000 (Spending Review 2000) will boost MRC’s income by £89 million over the three years. By 2003/04, MRC’s core funding from OST will rise to £380 million each year, and total funding will reach £430 million each year.

- £65 million of the extra funding has been awarded for genomics research, including basic research into gene function, work on medical application of new information about gene function, and developing post-genome research methods. This includes £12 million earmarked for capital investment in MRC research units.
- £8 million has been awarded for health informatics, bioinformatics and e-science.
- £16 million has been awarded to cover costs of inflation, expansion in other programmes, and to provide for higher stipends for postgraduate students.

Medical research will also benefit from:

- £41 million awarded to EPSRC to allocate on behalf of all the Research Councils to research on basic technologies; some of this will feed into areas relating to human health.
- £675 million provided for University research infrastructure (with a further £225 million from the Wellcome Trust), as part of the Science Research Infrastructure Fund.

These special priorities for medical research can be found at: http://www.dti.gov.uk/ost/ostbusiness/srif_strategy_doc623feb.pdf
Twenty-first century biology focused on the analysis of individual components of complex systems. Studies of individual genes represented major achievements and the cataloguing of all the genes (and all their proteins) in a number of organisms opened the way to a more global perspective on life processes. Twenty-first century biomedical research takes as its starting point the complete and publicly accessible human genome sequence, and the sequences of twenty or so model organisms and pathogens. The mouse genome map is expected shortly. Sequencing studies have revealed connections between genes that had previously seemed unrelated and have also shown that strikingly similar proteins are encoded in the genomes of organisms as distantly related as yeast, nematodes and mice.

In the twenty-first century, the focus in basic biomedical research will shift to questions of protein structure, function, and interactions, developmental and physiological pathways and systems biology, as routes to the medical application of this knowledge. By studying the role of large numbers of genes and the proteins simultaneously we will begin to understand how component parts interact to form the whole organism, and how these interactions vary normally and in disease states. Techniques such as array technologies, databases of sequence, structure and function, and computational modelling will underpin rapid research progress, and there is potential for new methods in structural biology and molecular/cellular imaging to accelerate research further.

Studies in mice and other model organisms such as Drosophila and C.elegans will be key, since the study of spontaneous mutants and experimental genetic changes are often the most effective way of revealing the functions of particular genes or proteins and modelling their role in disease.

These exciting new approaches promise a stunning breadth of perspective for all areas of medical science – in identifying new genetic risk factors and understanding disease variability, and developing new diagnostics, vaccines, drugs, therapies, and materials. Realising these opportunities will depend on strengthening the UK’s translational research and applied clinical research, through support for new multi-disciplinary problem-oriented teams, coupled with better organisation of infrastructure and information for clinical trials and population research.

In taking forward this strategy:

- MRC will continue to invest in high quality research and training across all areas of medical research, as the only comprehensive and inclusive funding agency for medical research in the U.K. Most funding will be allocated in response to high-quality applications from the community.
- MRC will take special responsibility for developing the national facilities that the UK needs, using its scale, breadth, and flexible funding/partnership arrangements.
FROM GENE FUNCTION TO IMPROVED HEALTH

Support for Novel Approaches
- Gene Function
  - Structural Genomics
  - Post-genome Technologies
  - Model Organisms

Gene / Environment Interaction

Translational and patient-oriented research
- Population-based Studies
- Cardiovascular Initiative
- Cancer Initiative
- Mental Health Initiative
- New Medical Technologies
- Social Factors in Health and Policy

Knowledge
- New Drug / Diagnostic Targets
- Understanding Disease Variability
- Understanding Response to Treatment
- Environmental Risk Factors
- Genetic Risk Factors

Outcomes
- Commercial Products
- Improvements in Clinical Practice
- More-effective Health Policy
- Better Public Knowledge about Health

Figure 1: Research Approaches and Initiatives
we will invest in people and careers, developing new research skills, encouraging inter-disciplinary links, and helping to attract outstanding international scientists to the UK. Skills shortages will need to be addressed and competitive salaries offered to high achievers.

The chart below shows how MRC’s research and training spend currently breaks down between research approaches.

![Pie chart showing research spend](image)

**Figure 2: Spending by scientific field (estimated gross spend in 2000/01)**

Our plans for the three special areas given extra funding in the Spending Review are set out in the following text.
Theme 1: Genetic Information and Biological Function
Analysing the details of the biological processes that underpin health is a key step in the search for new ways of treating disease. Universities will have important opportunities to acquire leading edge facilities for large-scale screens, sequence and expression analysis, sample banking, and bioinformatics through the Science Research Infrastructure Fund. MRC’s main efforts will be devoted to long-term investments to build up the UK infrastructure supporting leading research in these areas. The following topics are MRC’s priority areas:

Research on model organisms
The MRC is keen to strengthen research using a number of organisms to model human disease, but with the mouse being the primary focus as it is generally agreed to be the most useful model. The MRC’s priority is to boost research on mouse models by improving UK infrastructure (housing, transgenics facilities, embryo banking) for the whole of the research community.

Macromolecular structure
Detailed knowledge of macromolecular structures is often needed before function can be understood or new therapies developed. MRC will set up facilities to improve methods of high throughput protein purification, crystallisation and analysis so that the UK biomedical research community can fully exploit the opportunities for more widespread structural analysis provided by the new synchrotron which will be located at the Rutherford Appleton Laboratory.

Theme 2: Translational Research on Major Clinical Problems
The MRC will strengthen clinical and translational research in key disease areas, using both grant funding and developing new centres, resources, and networks proactively:

Mental Health Research Priority
MRC intends to strengthen a whole range of research relevant to mental health, from basic studies on psychiatric genetics and biological mechanisms, imaging and neuroinformatics, through to work on effective health service delivery, in partnership with the Department of Health and the NHS. Special funding opportunities will be publicised in due course; in the meantime, MRC welcomes high-quality applications from the research community.

Cardiovascular Research Priority
MRC, in partnership with the British Heart Foundation, will shortly set up centre(s) of excellence in cardiovascular disease research around individuals of international stature and having strong links to other key groups in the UK and USA.
Cancer Research Priority
MRC is developing its cancer portfolio in close co-operation with other funders of cancer research. Priorities include the development of resources needed to explore the genetic basis of cancer, cancer cell biology and prostate cancer research.

Human Population Based Studies
MRC has highlighted the need for large collections of well characterised human DNA samples for research to identify genes involved in the development or progress of disease and those affecting the response to treatment. Following a call for proposals early in 2000, Council has now funded a number of DNA collections from patient cohorts and case-control studies, covering a wide range of major causes of morbidity and death.

MRC, in partnership with the Wellcome Trust and the Department of Health, plans to set up a large prospective adult cohort to study the interactions between genetic and environmental risk factors for common multi-factorial diseases in a cohort of half a million people, to help determine the relative contributions of environmental and genetic factors to the development of chronic diseases (diabetes, stroke, heart attacks) in middle and later life. The protocol for this initiative will be drafted during the Spring and Summer of 2001.

New medical technologies
Advances in medical understanding will often need to be matched with new technologies to find application. MRC will continue to welcome proposals for novel research into genetic screening, tissue regeneration/engineering (including stem cell therapy), immunotherapy, antibody engineering, surgery, gene therapy, and drug design – in addition to evaluations of existing and alternative treatments.

Innovative health technologies and the public
MRC will continue working with ESRC to explore the factors that determine society’s ability to benefit from advances in medical knowledge. The MRC is working closely with other Research Councils in co-ordinating efforts in areas such as technology development, bioinformatics, gene function research, and economic and social research.

Please contact the MRC Post-Genome Office (Dr Mike Davies 020 7670 5227) for more information about MRC funding.
The stunning advances in genomics achieved to date have been facilitated by key developments in sequencing, robotics, chips, imaging, detectors and mass spectrometry. For the future, we will require increased sensitivity and improved high throughput methods, coupled with advances in both nanoscale and materials science. All this will require biologists, chemists, computer scientists, engineers, materials scientists and physicists to work together synergistically on innovative technology development that will bring value to both the physical and life sciences communities.

£41 million has been allocated to EPSRC on behalf of all the Research Councils to fund basic research into new and developing technologies. Calls for proposals in defined areas will be made in 2001 and 2002. Funding will normally be allocated as £1 million or £5 million grants, following peer review by panels of experts selected for the area. University scientists and researchers from MRC establishments will be eligible to apply. Calls will be publicised on this WebSite, as well as on a Joint Research Council Web site.

MRC urges the biomedical research community to work with colleagues in the physical sciences, engineering, and IT to develop imaginative new lines of research.

Further information and advice may be obtained from Dr Mark Palmer at the MRC Basic Technologies Office. Tel. 020 7670 5360. Email: mark.palmer@headoffice.mrc.ac.uk
Another key challenge arising from the recent focus on genomics research lies in dealing with the massive amounts of data generated. New ways need to be devised for archiving, mining, manipulating and sharing information derived from multiple sources. Achieving interoperability of databases will be an essential component of this process so that sequence data, spatial and temporal gene expression data, protein structure data, physiological data, and information from patient records may be integrated, transformed and analysed. This will permit us to identify, amongst other things, the basis of development, metabolic processes and disease, and understand gene regulation and structure determination; it will in turn inform the rational design of new therapies.

Better methods for compiling, comparing, and analysing health information will also be invaluable in strengthening public health and epidemiological research, and in supporting more efficient and effective clinical trials.

The £8 million awarded to MRC for e-science will be used for research, methods development, work on database interoperability, infrastructure and career awards in bioinformatics, neuroinformatics, computational biology, and health informatics. MRC will shortly be issuing a call for expressions of interest in these areas, and will particularly wish to encourage proposals that form part of, or complement initiatives in structural biology, genetic epidemiology, clinical trials, mental health, cardiovascular disease, or cancer.

As well, a £15 million cross Council core programme is being established to tackle issues common to all Councils. The core programme will be a focus for links with industry and DTI, as well as with infrastructure providers, such as SuperJANET, to ensure that UK researchers have the communications bandwidth they need. The programme is managed by EPSRC, and led by an e-Science Director (Professor Tony Hey) who will be assisted by Scientific and Technical Advisory Teams.

Further information may be obtained from Dr Ian Viney at the MRC E-Science Office. Tel. 020 7670 5239. Email: ian.viney@headoffice.mrc.ac.uk
MRC will continue ongoing initiatives to promote research and training/career development in six broad areas where UK effort needs to be strengthened:

- the health of the public - especially addressing the effects on health inequalities, and broader social and economic factors - http://www.mrc.ac.uk/hop.html and http://www.mrc.ac.uk/left_5c.html
- primary care research - ten grants, including five trials and two new Programme Grants, were awarded in the first round, and second round awards will be made in 2001/02 - http://www.mrc.ac.uk/new_pubs.html
- environment and health (with NERC) - http://www.mrc.ac.uk/nerc.html
- chemical biology - http://www.mrc.ac.uk/cb_call.html and http://www.mrc.ac.uk/left_5b.html#priority
- social and economic aspects of Innovative Health Technologies (in partnership with ESRC) - http://www.esrc.ac.uk/curprog.html
- refinement or replacement of animal experiments - http://www.mrc.ac.uk/animal_use_in_research_call.html

MRC will also give special support for applications in the following areas, to address specific health problems or gaps in knowledge:

- transmissible spongiform encephalopathies - details of current support are at - http://www.mrc.ac.uk/tse_c.html
- antibiotic resistance - following calls in 1999 and 2000, seven grants have been awarded, with more expected in the 2001 session - http://www.mrc.ac.uk/abres.html
- AIDS epidemiology - a new call planned (in partnership with the Department of Health). Further details will be posted on the MRC website when they become available.
- intensive/critical care research - http://www.mrc.ac.uk/critcare.html
- food allergenicity in relation to GM foodstuffs - http://www.mrc.ac.uk/gmfood.html
- mobile telecommunications and health (through a joint LINK programme) - http://www.doh.gov.uk/mobilephones/research/index.htm and http://www.iegmp.org.uk
- irritable bowel disease and autism - http://www.mrc.ac.uk/autism.html
Figure 3. shows projected change in areas over the period 1999-2003 (shown in two-year averages, to smooth out once-off capital spend). Based on recent awards (including many which have not yet started) and planned strategic initiatives, we expect increased spend in all areas, but with the fastest growth in Medical Physiology and Disease Processes (which includes cancer, heart disease, tissue repair, toxicology, nutrition) and in People and Population Studies (which includes all clinical trials, epidemiology, and primary care research).

![Figure 3: Projected change in net spend by area (1998/99 to 2003/04) based on 2-year rolling averages](chart.png)
ABOUT THE MRC

What is MRC?
The Medical Research Council (MRC) is funded mainly by the UK Government through the Office of Science and Technology (OST). It works closely with government departments, including the Department of Health, industry and research charities. It is independent in its choice of which research to support.

How does MRC decide which research to fund?
The MRC does not earmark funds for particular topics. Research proposals in all areas compete for the funding available. Research excellence and importance to health are the main considerations in funding decisions.

You can find further information about MRC’s research strategy on our web site: www.mrc.ac.uk