Cardiovascular disease research system in Britain

Retrosight country profile

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WR-468-RS
February 2007
Prepared for Project Retrosight
This working paper has been prepared for the International consortium of cardiovascular disease (CVD) research funders involved in Project Retrosight. Project Retrosight is investigating the payback on CVD research in four countries (Australia, Britain, Canada and New Zealand). The main objective of this suite of documents is to provide an overview of the CVD situation, CVD research and the funding systems in place for CVD research.

This background information will be useful in providing context to the case studies of specific CVD research projects that form the majority of Project Retrosight. Each country involved in the project will produce 4-16 case studies of research conducted around the early 1990s, following the outputs and outcomes from that research. The case studies will use the Payback framework used by the UK study team in previous health research studies.¹

This document looks specifically at the British perspective on CVD research and provides:

- An introduction to CVD, including the different forms of the disease, risk factors and the impact of CVD.
- An introduction to CVD research, covering the different areas of CVD research, the key advances, high-impact research and future expectations for research.
- A brief summary of the health research system and how it impacts on the funding for CVD research.

This is a living document that can be updated when new advances are made or if new information comes to light on CVD research or general health research funding situation within Britain.

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¹ Studies for the Arthritis Research Campaign (ARC), the English Department of Health (DH) and Economic and Social Research Council (ESRC) in the UK and research for the Alberta Heritage Foundation for Medical Research (AHFMR) in Canada have used the “payback” methodology to understand the impact of funded research and the key drivers, facilitators and inhibitors of this impact.
multidisciplinary analysis. This report has been peer-reviewed in accordance with RAND’s quality assurance standards\(^2\) and therefore may be represented as a RAND Europe product.

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\(^2\) For more information, see [http://www.rand.org/about/standards/](http://www.rand.org/about/standards/)
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<tr>
<td>AMRC</td>
<td>Association of Medical Research Charities</td>
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<td>BHF</td>
<td>British Heart Foundation</td>
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<td>BRBH</td>
<td>Best Research for Best Health</td>
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<td>CHD</td>
<td>Coronary Heart Disease</td>
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<td>CVD</td>
<td>Cardiovascular disease</td>
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<tr>
<td>DALYs</td>
<td>Daily Adjusted Life Years</td>
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<tr>
<td>DfES</td>
<td>Department for Education and Skills</td>
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<td>DH</td>
<td>Department of Health</td>
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<td>DTI</td>
<td>Department of Trade and Industry</td>
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<td>EU</td>
<td>European Union</td>
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<td>FP</td>
<td>Framework Programme</td>
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<td>HDL</td>
<td>High Density Lipoprotein</td>
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<td>HEFCE</td>
<td>Higher Education Funding Council for England</td>
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<td>HMSO</td>
<td>Her Majesty's Stationary Office</td>
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<td>LDL</td>
<td>Low Density Lipoprotein</td>
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<td>MOD</td>
<td>Ministry of Defence</td>
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<td>MRC</td>
<td>Medical Research Council</td>
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<td>NAO</td>
<td>National Audit Office</td>
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<td>NHS</td>
<td>National Health System</td>
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<td>NIHR</td>
<td>National Institute of Health Research</td>
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<td>OSI</td>
<td>Office of Science and Innovation</td>
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<td>PRISM</td>
<td>Policy Research in Science and Medicine</td>
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<td>SCI</td>
<td>Science Citation Index</td>
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<td>UKCRC</td>
<td>United Kingdom Clinical Research Collaboration</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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<td>Abbr.</td>
<td>Description</td>
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<tr>
<td>YLD</td>
<td>Years Lived with Disability</td>
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<td>YLL</td>
<td>Years Life Lost</td>
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Cardiovascular disease (CVD) is not a single disease, but a cluster of diseases and injuries that affect the cardiovascular system (the heart and blood vessels). These include: coronary heart disease (CHD); angina; stroke; rheumatic heart disease; congenital heart disease; peripheral arterial disease; aortic aneurysm and dissection; deep vein thrombosis; and other, less common, cardiovascular diseases. In general they affect people in later life (with incidence rising sharply after the 30-44 age range).

1.1 Disease burden

Prevalence of disease is notoriously difficult to estimate in a population since it requires an idea of those not presenting for healthcare and undiagnosed cases. Based on reporting statistics, the main forms of CVD in Britain are CHD and stroke. It is estimated that around 2.5 million people in Britain have CHD (based on whether they have ever had a CHD incident reported to their doctor). In their 2005 Stroke report, the National Audit Office (NAO) suggested that the annual number of strokes in Britain was 110,000, with 300,000 living with the effects of a stroke. Currently around 2 million people in Britain suffer from angina, the pain associated with CHD cases. CVD is the main cause of death in Britain, killing over 216,000 people in 2004. Although mortality due to CVD has been falling over time, morbidity due to the disease is rising in Britain. This is particularly true in older age groups. For example in the over 65s, morbidity has gone up by around 20% since the late 1980s.

1.1.1 Change over time

As mentioned, currently the main forms of CVD in Britain are CHD and stroke, although around 2 million people in Britain suffer from angina. Death rates from CHD have been falling since the 1970s in Britain: for example, for people over 65, deaths due to CHD
dropped by 44% from 1996-2006.\textsuperscript{7} Despite mortality due to CHD falling, or perhaps even because of, morbidity due to CHD has been on the rise in Britain, particularly in the over 65s. Since the late 1980s, the morbidity due to CHD has gone up by around 20% in that age group.\textsuperscript{8} Stroke rates have been steadily dropping in Britain since the 1950s and in the 4 years between 1994 and 1998, the rates for both men and women dropped from 2.2 and 1.7 per 1000 population to 2.0 and 1.4 respectively.\textsuperscript{9}

1.1.2 Mortality and morbidity
In Britain CVD is the main cause of death, accounting for over 215,000 deaths in 2004: around 40% of all deaths. About half of all deaths from CVD are from CHD (105,842) and about a quarter from stroke (60,458).\textsuperscript{10} This means that CHD is the single largest cause of death in Britain (see Figure 1). Nearly all CHD deaths in Britain are heart attacks. Of the 230,000 heart attacks a year in Britain, around 30% of sufferers die. Stroke accounts for 11% of all deaths in England and Wales; and between 20 and 30% of those who have a stroke die within one month.\textsuperscript{11}

![Figure 1. Deaths in Britain in 2004 and major causes](image)

Morbidity due to CVD (measured in DALYs - Disability Adjusted Life Years)\textsuperscript{12} in Britain has, in contrast to mortality, been growing over the last 10-15 years. As previously mentioned, morbidity for the over 65 age group has increased by around 20% since the late 1980s.\textsuperscript{13} In the case of stroke, morbidity has increased as the population has aged, since those over 85 years old have a one in four chance of having a stroke.\textsuperscript{14}

\textsuperscript{7} BHF Health promotion research group (2006)
\textsuperscript{8} Ibid
\textsuperscript{10} BHF Health promotion research group (2006)
\textsuperscript{11} NAO (2005) p5, box 2
\textsuperscript{12} DALYs are calculated by taking the sum of two components; average or expected Years of Life Lost (YLL) and Years Lived with Disability (YLD) using the formula: DALY = YLL + YLD. This takes into account the effect on both length and quality of life.
\textsuperscript{13} BHF Health promotion research group (2006)
\textsuperscript{14} NAO (2005) p5, box 2
1.1.3 Economic and socio-economic costs

The economic cost of CVD is not only the healthcare costs associated with the disease, but one that reflects the loss to productivity due to CVD and general care costs to the economy. With CVD so highly prevalent, this economic cost can be substantial, especially in countries that have higher morbidity due to CHD and stroke.

CVD is estimated to have cost the British economy £29.1 billion in 2004, with CHD and Stroke accounting for 29% (£8.5 billion) and 27% (£8.0 billion) of the total, respectively. The major cost component of CVD was healthcare, which accounted for 60% of the cost, followed by productivity losses due to mortality and morbidity, accounting for 23%, with the remaining 17% due to informal care related costs. The British Heart Foundation (BHF) figures suggest that, of the £3.5 billion healthcare costs of CHD annually, 79% are for hospital costs, and 16% are drug and dispensing costs. Stroke patients take up more acute hospital bed days than any other disease group, accounting for over 2.6 million per year. The BHF claim that one of every six UK healthcare pounds is spent on CVD.

Socio-economic costs are more pronounced in parts of the population with lower socio-economic status. For example, in the early 1990s premature death from CHD was 58% more common amongst male manual workers than male non-manual workers. This was also the case for women, with premature death from CHD more than twice as likely for manual workers.

1.1.4 Risk factors

CVD is a complex collection of diseases, with a number of risk factors. Many of these risk factors interact. For example, both obesity and diabetes are major risk factors for the development of CVD, but obesity is also a risk factor for type II diabetes. As such it is very difficult to produce any sort of summative formula for predicting CVD based on risk factors, merely to say that having more than one risk factor will increase your risk of contracting one form of CVD. The key risk factors are shown in Box 1, more details are provided in the “Overview of cardiovascular disease research” document.

- Smoking
- Obesity
- Diabetes
- High blood pressure (hypertension)
- High LDL cholesterol
- Socio-economic risks

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16 BHF Health promotion research group (2006)
17 NAO (2005) p5, box 2
18 See http://news.bbc.co.uk/2/hi/health/4735142.stm
Box 1. Major risk factors for developing CVD

In Britain, the most prevalent risk factor is inactivity, with 37% of CHD deaths related to inactivity as compared to only 19% related to smoking. In fact, 70% of women and 60% of men in Britain are not active enough to achieve the health benefits from physical activity. It is expected that 9% of deaths from CHD in Britain could be avoided if people who are currently sedentary or have a light level of physical activity increased their activity to a moderate level.\textsuperscript{19}

Levels of obesity have increased by 50% in adults over the past 10 years,\textsuperscript{20} nearly 24 million adults were obese or overweight in 2003 (over 50% of the adult population), with nearly 14% of children classified as obese.\textsuperscript{21} Diabetes is also increasing rapidly in the British population, with a 100% rise in men and an 80% rise in women from 1991 to 2006.\textsuperscript{22} Smoking in the British Population currently stands at around 25% of the population and smoking is more likely among households of manual workers and amongst south Asian populations.\textsuperscript{23} The BHF estimates that regular exposure to second hand smoke can increase the risk of CHD by up to 25%.\textsuperscript{24} Around 66% of men and women in Britain have high cholesterol, whilst around 34% of men and 30% of women have high blood pressure.\textsuperscript{25}

Psychosocial factors, such as work stress, inadequate social support and depression, also contribute to CHD risk in Britain. For example, in England, men and women in semi-routine or routine jobs have lower levels of social support and associated higher risk of CHD. Also in England, 15% of women and 11% of men have high levels of psychological distress. As well as this psychosocial risk, there are also risks associated with where people in Britain live, based on the prevalence of risk factors in their geographic area. Men living in Scotland have a premature death rate due to CHD that is 60% higher than their counterparts in South East England. For women this is even more pronounced, with the premature death rate due to CHD more than twice as high in Scotland.\textsuperscript{26} This location specific response is determined by the number of risk factors it correlates with such as lower socio-economic groups in Scotland compared to the South East of England.

\textsuperscript{19} http://www.nhsinherts.nhs.uk/hp/health_topics/CHD_stroke/CHD_stroke.htm
\textsuperscript{20} BHF Health promotion research group (2006)
\textsuperscript{21} DH Statistics, available at: http://tinyurl.com/ynsxza
\textsuperscript{22} BHF Health promotion research group (2006)
\textsuperscript{23} Ibid
\textsuperscript{24} BHF Health promotion research group (2006)
\textsuperscript{25} Ibid
\textsuperscript{26} Ibid
increased levels of obesity and smoking, and higher levels of cholesterol at younger ages.\(^{27}\) Smoking is also correlated with lower socio-economic status in south Asian populations in Britain.\(^{28}\)

Racial origin is also a risk factor in genetic terms, aside from the socio-economic correlations. The Afro-Caribbean community are particularly at risk, with age adjusted risk for first stroke being twice as high as for the white community in Britain.\(^{29}\)

1.2 Future of disease

In Britain, mortality due to CVD has dropped over the last 10-15 years. Mortality in the under 75’s between 1992 and 2002 due to CHD declined by 44%, that due to stroke dropped by 30%.\(^{30}\) There has however been a corresponding rise in both the prevalence of CVD and morbidity due to CVD.\(^{31}\) Because of this trend towards an increasing number of people with the disease (up to around 2.6 million people with some form of CVD in Britain in 2006) and the increasing morbidity seen with those over 65 years old, it is likely that CVD mortality may well start to rise again in Britain. This is due in part to rising levels of obesity and diabetes in Britain.\(^{32}\) As the population ages and the prevalence of CVD increases, the costs to the health system will increase accordingly. With the percentage of people over 65 years old expected to rise by 7% in Britain up to 2031, the cost of stroke care will rise steeply, going up by 30% by only 2010.\(^{33}\)


\(^{29}\) NAO (2005) p5, box 2

\(^{30}\) Ibid

\(^{31}\) See http://news.bbc.co.uk/2/hi/health/5384502.stm


\(^{33}\) NAO (2005) p5, box 2
Web of Science contains 1,437 papers published from Britain to do with cardiovascular topics in the calendar year 2006. Of these papers, the majority came from England, although the most papers came from the University of Glasgow (96 papers). Well over half of the publications (65%) were articles, and – perhaps unsurprisingly – the most papers were in the journals “Cardiac and Cardiovascular Systems” (20%) and “Peripheral Vascular Disease” (14%).

In 1995, the Wellcome Trust Policy Research in Science and Medicine unit (PRISM) produced a report looking at Foresight in cardiovascular science. In this, they showed that through the 1980’s and early 90’s, the UK produced (on average) 6% of the world total of CVD papers. PRISM surveyed researchers to identify what were priority topics for cardiovascular research. The top three topics identified were: vascular endothelium; molecular genetics of cardiovascular disease risks; and atherogenesis. The top suggestions for strengthening the infrastructure for CVD research were: more long term funding; protecting blue skies research; and developing European collaborations.

2.1 High profile research

One way to identify high-profile scientific research is to analyse publications and citations arising from those publications. This technique has been criticised in the past as it biases against applied clinical research due to citation practice differences between basic and clinical science. The bibliometric analysis of research in CVD in Britain is being produced separately to this document.

Work by the Wellcome Trust in 1998 looked at publications in biomedical science and their distributions. This included looking at distribution of papers in the Science Citation

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54 Search on Web of science for “Cardiovascular”, “2006” and refined to only find papers from countries within Britain (England, Scotland, Wales and Northern Ireland).


56 Ibid, p35, Figure 14(b)

57 Ibid, p37, Figure 15(b)

CVD Research system in Britain

Index (SCI) across different research areas, countries and funders. Overall, cardiology papers represented 11% of all papers in biomedical research. Of these cardiology papers, the majority came from researchers based in the USA. Britain accounted for 9% of the global total of cardiology papers. According to World Health Organisation (WHO) data, there are more trials into CVD subjects than any other, even if only looking at clinical trials on coronary heart disease (Figure 2).

![Figure 2. Number of global clinical trials published in Medline in selected biomedical subjects](image)

In Britain, CVD research accounts for 10% of the biomedical research papers. In an analysis of publications from 1981-1986 (performed in 1995), Glasgow University and Oxford University lead the way on both publication numbers and citations in UK cardiovascular science, however the British Postgraduate Medical Federation and the University of London Postgraduate Medical School lead the way on citations per publication. WHO data shows Britain to be the third largest publisher of CVD research, with over 2,500 publications indexed in Medline (behind the USA and Japan).

In terms of cardiovascular clinical trials, of the 3,318 trials registered with the UK clinical trials register, 317 trials use the keyword “cardiovascular”. This compares with 552 studies that use the keyword “cancer”. The UK clinical trials register contains both completed and ongoing studies.

2.2 Future research agenda

As discussed earlier, the future for cardiovascular research in Britain was highlighted by the Wellcome Trust PRISM work in the mid 1990s, however the priorities in research change

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39 WHO (2004) chapter 18
40 Dawson, Lucocq, Cottrell and Lewison (1998)
42 WHO (2004) chapter 18
43 http://www.controlled-trials.com/mrct/ukctrsearch.html
quickly and in 2004, the European Commission held a conference on “The future of cardiovascular disease research in Europe”. This gathering of leading researchers in both clinical and basic biomedical cardiovascular research, as well as stakeholders from the EC, aimed to identify future research priorities, funding issues and research capacity issues.

In terms of future scientific priorities for research, the conference identified a number of key areas to study (Box 2).

**Box 2. Priorities for cardiovascular disease research in Europe**

Understanding the differentiation of cardiovascular cells
Predicting atherosclerotic plaque behaviour and thrombosis
Understanding how diabetes leads to atherosclerosis
Understanding change in heart rhythm that leads to atrial fibrillation and sudden death
The molecular basis of heart failure
Imaging of the cardiovascular system
Individual tailored treatment
Gene and stem cell therapy
Understanding the mechanisms of ageing in the cardiovascular system
Understanding the cardiovascular vulnerability of women


Other priorities identified included the need for coordination of research between member states and ways to increase the number of “physician scientists”.

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In this chapter, we provide overall details of the health research system in the UK, outlining the key players and then focus on the funding of CVD research, which has a slightly different balance of funders, notably with charity funding more important than in the overall health research system.

### 3.1 Funders within the health R&D system

Britain’s health research is funded by a number of departments and agencies, although this is likely to change since the publication of the Cooksey review in December 2006.\(^45\)

The Department of Health (DH) is not the only funder of health research in Britain. While it is the largest single contributor in the public sector, the funding councils, research councils and research charities all play significant roles. Industry is also a major investor in health R&D. Figure 3 summarises the British health R&D funding system.

\(^45\) Cooksey (2006) "A review of UK Health Research Funding", HMSO
### 3.1.1 Government

Spend on health R&D by government bodies includes the money put forward by the DH and also the money spent by HEFCE and the MoD.

**Department of Health**

The Department of Health (DH) invests in research to support government objectives for public health, health services and social care, and also to contribute to the government science strategy. In 2006 the English DH changed the way that they fund R&D, in a new strategy called *Best Research for Best Health (BRBH)*.46 Between 2001 and 2006 the NHS R&D programme had two main streams of support, as announced in *Research and Development for a First Class Service*.47 NHS Support for Science and NHS Priorities and Needs R&D funding. Support for Science paid the service supports (but not treatment) costs of research to NHS bodies and providers of NHS services, which, in 2005, was estimated at £350 million. The direct costs of research were often funded by other bodies such as research councils and charities. Priorities and Needs R&D funding also identified NHS needs for research and commissions research as appropriate, which was estimated at £98 million. Total funding to NHS trusts was around £500 million in 2005.48

*BRBH* was published in 2006, and aims to support the Government’s ambitions to improve the nation’s health and increase the nation’s wealth as set out in the ten-year Science and Innovation Investment Framework 2004–2014; place people at the centre of a research system that focuses on quality, transparency and value for money; respond to changes in society and the environment; and respond to the challenges in the current system for applied health research.49

As part of the strategy, *BRBH* has founded a virtual “National Institute for Health Research” (NIHR).50 The NIHR provides a framework through which the DH can monitor the funding of researchers, projects, systems and infrastructure.51 *BRBH* also established funding for biomedical research centres, which are centres of excellence in either general medicine or specific specialities. There are five comprehensive biomedical research centres and six specialist centres (although none of these specialise in CVD research). Each centre receives £450 million over five years.52 In total, the DH budget for health research in 2006/2007 is £753 million.53

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47 Department of Health (2000) "Research and development for a first class service: R&D funding in the new NHS" Department of Health, London

48 http://www.dh.gov.uk/assetRoot/04/10/85/60/04108560.xls

49 Department of Health (2006), p3

50 NIHR is likely to be upgraded to a real institute through the recommendations in the Cooksey review

51 Department of Health (2006), p9

52 http://www.nihr.ac.uk/programmes_biomedical_research_centres.aspx

The DH and NHS have identified major strategic research developments in seven key DH priority areas: Coronary heart disease; Cancer; Mental health; Ageing and older people; Public health; Genetics; and Diabetes. The priorities reflect analysis of the burden of disease, potential benefits and government priorities and take account of the responsibilities of other funders.

**Higher Education Funding Council for England**

The Department for Education and Skills (DfES) provides research infrastructure funding for the science base in universities via the Higher Education Funding Council for England (HEFCE). HEFCE aims to promote and fund excellent research that will increase knowledge and contribute to the social, cultural and economic wealth of the nation. DH and HEFCE have developed joint task groups to examine a number of issues:

- health-related research and the research assessment exercise\(^5^4\)
- interdependency between research, teaching and patient care in the funding of university medical schools
- research in nursing and the allied health professions

### 3.1.2 Research Councils

The research councils are the main public investors in fundamental research in Britain, with interests ranging from biomedicine to the environment, engineering and economic research. The Medical Research Council (MRC) is responsible for biomedical research. Several other research councils also fund health R&D following concordats with the other four UK health departments. In addition, Research Councils UK\(^5^5\) was established as a strategic partnership through which Britain’s eight research councils work together to champion the research, training and innovation that they support.

**Medical Research Council**

The MRC is a national organisation funded by the British taxpayer, which was established in 1913. MRC researches all areas of medical and related sciences with the aim of improving the health and quality of life of the British public and contributing to the wealth of the nation. The MRC is funded by British government and receives an annual grant in aid from parliament via the Office of Science and Innovation (OSI) within the Department of Trade and Industry. Bids for additional resources are made by the MRC (and other research councils) to the Treasury every two years via the Office of Science and Technology.

Working through its council, scientific boards and committees, the MRC chooses the research that they fund independently of OSI and government. It does, however, work in close partnership with health departments, other research councils, industry and others to identify and respond to current and future needs.

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\(^{54}\) The research assessment exercise is a series of exercises conducted nationally to assess the quality of UK research and to inform the selective distribution of public funds for research across all disciplines by the four UK higher education funding bodies. The next exercise is in 2008 (see [http://www.rae.ac.uk/default.htm](http://www.rae.ac.uk/default.htm)).

\(^{55}\) Research Councils UK, see: [http://www.rcuk.ac.uk/](http://www.rcuk.ac.uk/).
The MRC funds high-quality research in a number of ways: by employing full-time scientists to work on important research topics in their own research establishments (intramural funding); by supporting university researchers through a range of grant schemes designed to meet scientific needs (extramural funding); and by personal awards for research training and career development.

The MRC supports a broad biomedical research portfolio that ranges from basic biology to medical practice. In 2005/2006 the MRC spent £279.4 million on intramural research. MRC total spend on grants for research in universities and teaching hospitals was £172.4 million, and £51.8 million on training awards for postgraduate students and fellows.56 MRC total expenditure for 2005/2006 was £500 million. The majority of MRC and research charity funding is provided through research grants awarded on a response mode basis. Most proposals are investigator-initiated, although to encourage research in strategic priorities areas the MRC sometimes issue highlight notices or calls for proposals in priority areas. Figure 4 shows how the MRC’s research spend is divided into six broad areas. The MRC takes into account the areas of greatest scientific opportunity and issues of greatest importance to health.

Figure 4. Research areas and estimated gross spend (£ millions) in 2005/2006
Source: Medical Research Council, Annual Report 2006

3.1.3 European Commission
Research and development sponsored by the European Commission is supported within successive comprehensive framework programmes, each of which usually runs for four years. The Sixth Framework Programmes, running from 2002–2006, comprise seven thematic priorities, including genomics and biotechnology for health, and information society technologies.

56 Medical Research Council (2006) “Annual report and accounts”, MRC, p4
3.1.4 Industry

Industry is also a major investor in health R&D, providing just over £5 billion to pharmaceutical and health sector R&D in 2005/2006. Government departments aim to buy at least 2.5% of their R&D requirements from smaller businesses through the Small Business Research Initiative. The research councils will move to meet the same target and draw upon new money. The target is £50 million of government research to be brought from smaller firms.

3.1.5 Charity

There are 111 charities within the Association of Medical Research Charities, which cover a wide range of diseases. Of these, six specifically fund CVD research, to the tune of around £64 million in 2005-06. In addition, 15 charities fund research that does not focus on a specific disease state, of which four specifically mention CVD research in their list of research topics. Their combined expenditure on medical research in 2005/2006 was around £700 million per annum. This represents around one third of public spending on UK health research. The Wellcome Trust and British Heart Foundation are provided as key examples of charitable funders, since both fund CVD research.

The Wellcome Trust

The Wellcome Trust mission is to foster and promote research with the aim of improving human and animal health. To achieve its mission, the Wellcome Trust focuses on four aims:

- knowledge base: to advance knowledge and understanding in the biomedical sciences and their impact on society – past, present and future
- resources: to contribute to a long-term vibrant research environment
- to advance the translation of trust-funded research into health benefits
- public engagement: to engage with the public through informed dialogue

The Trust offers grants in biomedical sciences, technology transfer, medical humanities and public engagement, from various funding streams. The Wellcome Trust’s total charitable expenditure for 2006 was £484 million, £278 million of which supported biomedical research grants. Of Wellcome spending, 67% was for grants awarded; 8% support and administration costs; and 25% direct activities (including projects managed by the Wellcome Trust itself, such as the Wellcome Library and the Wellcome Trust Sanger Institute).

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58 Small Business Research Initiative website: http://www.sbri.org.uk/about.shtml#a_two

59 Taken from: http://www.amrc.org.uk/index.asp?id=3


**British Heart Foundation**

The British Heart Foundation (BHF) plays a leading role in the fight against disease of the heart and circulation by supporting research into its causes, prevention, diagnosis and treatment. The BHF is the largest independent funder of heart research in Britain, and also plays an important role in funding education for the public and health professionals. Fund raising mechanisms include: shops, local and national events, corporate partners and donations.

Since the BHF fund exclusively in CVD research, their funding profile will be dealt with in Chapter 4.

### 3.2 Collaboration

Partnerships are seen as an effective means of coordinating and influencing research activities within British health R&D systems. Britain has several examples of collaboration initiatives which encourage research into policy and practice, such as the UK Clinical Research Collaboration (UKCRC).\(^{62}\) The UKCRC brings together the MRC, health departments, NHS, medical charities, patients and industry to speed up the development and translation of new medicines and treatments from the laboratory into practice and the commercial sector.

The MRC has strategic partnerships with other organisations, including other research councils, the NHS and health departments, other government departments, higher education institutions, industry, research charities and local authorities. Through its units and institutes the MRC participates in a large number of international collaborations with other international bodies and national agencies from other countries.\(^{63}\)

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\(^{62}\) For further information, see: http://www.ukcrc.org/

In the UKCRC analysis of research funding in the UK, which used data from all the major health research funders except the DH infrastructure funding, CVD came out as the 4th largest research area by research spend. It accounted for just under 10% of UK research funds (circa £105 million), and was below Cancer, Neurological and Infection research. Of the money spent on CVD, the balance of funds in different parts of the research pathway is shown in Figure 5.

![Figure 5. Proportion of spend in CVD research in the UK](source)

Source: UKCRC, UK Health research analysis (definitions of research areas are provided in UKCRC; 2006)

Of the total research on CVD performed and funded in the UK, the BHF is the largest single independent funding organisation, providing just over £46 million in 2002-2003. Other major funders include the DH (who funded £11.8 million to their CVD priority area between 1996 and 2002); the Wellcome Trust and the MRC.

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64 UKCRC (2006) “UK Health Research Analysis”, UKCRC, p26


66 [http://www.dh.gov.uk/assetRoot/04/06/46/10/04064610.pdf](http://www.dh.gov.uk/assetRoot/04/06/46/10/04064610.pdf)
4.1 **British Heart Foundation (BHF)**

In 2006, the BHF spent £60.4 million on research. The BHF funds projects, programme grants and fellowships. In 2002-2003, the BHF provided more than 170 awards, to the value of £20.3 million (the BHF supported more than 905 such projects in total), and research was in progress for more than 60 programmes across Britain. The BHF also awards fellowships at varying levels of seniority, including travelling fellowship schemes. In 02–03 the BHF made awards to 90 fellows amounting to £8.3 million. Overall they supported more than 300 fellows. Figure 6 shows the breakdown of BHF spending by research area in 2005-2006. It shows that the majority of BHF funding is nearer the basic science end than the treatment end of research.

The BHF has invested in the Cardiovascular Initiative, which is a multimillion investment in providing heart specialists with the equipment and facilities that they need for cutting-edge research and treatment. In addition it funds the British Heart Foundation Family Heart Study; involving 2,000 families to discover the genes that can cause heart disease. It is also involved in education, raising awareness and medical training activities.

Between 1997 and 2001, Britain contributed just under 9% of almost 32,000 cardiology publications worldwide. The British Heart Foundation supported about one-fifth of the total UK output. It also supported about half as many papers again outside the cardiology field. Further, the British Heart Foundation-funded science papers appeared in higher impact journals than the British average. The British Heart Foundation also actively produces literature for health professionals and the public.

**Figure 6. BHF spending by UKCRC research category**

![Figure 6. BHF spending by UKCRC research category](source: UKCRC, UK Health research analysis)

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68 BHF website details:

4.2 **Department of Health**

The department of Health in England has a strategic research area on CHD. The National Service Framework for CHD was published in 2000, which sets national standards of care for preventing and treating CHD, and a National Director of Heart Services was appointed in the same year. The DH is currently looking at the research needs to underpin the implementation of the framework.

The DH also chairs the “Cardiovascular Research Funder’s Forum”, established to bring together the major cardiovascular research funding bodies to look at how best to plan and share research expertise. Membership is drawn from the Medical Research Council, the British Heart Foundation, the Wellcome Trust, Diabetes UK and the Health Departments of England, Northern Ireland, Scotland and Wales.

As part of the *BRBH* strategy, the DH set up a research network in Stroke, to provide support for clinical research in stroke, by developing a world-class health service infrastructure, facilitating the running of research studies and involving people who have had a stroke, their carers, and professionals in stroke research.\(^{70}\) The stroke network receives £4 million per annum from the DH.

The research programme put in place in 1993 by the DH to look specifically at cardiovascular disease and stroke set 19 priority areas for research (Box 3). These priorities were chosen on the basis of: Burden of disease; Scientific feasibility; Likely benefits relative to likely costs incurred in achieving such benefits; and Prominence in the Government’s White paper on the Health of the Nation.\(^{71}\) The programme ran from 1993-2001 and during this time the DH provided £11.8m to fund 57 project grants.

| 1. Hormone replacement therapy and cardiovascular disease |
| 2. The effects of lowering cholesterol on all-cause and cause-specific mortality |
| 3. Measurement and evaluation of rehabilitation outcome for stroke patients |
| 4. Secondary prevention in people with manifest cardiovascular disease |
| 5. Improving care of women, the elderly and ethnic minorities |
| 6. Social and ethnic variations in cardiovascular disease |
| 7. Efficacy of methods of health related behavioural change |
| 8. Improving management of acute myocardial infarction |
| 9. Optimum management of patients with stable angina |
| 10. Incidence of stroke and ischaemic heart disease |
| 11. Reducing cardiovascular disease risk associated with elevated blood pressure |

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\(^{70}\) http://www.uksrn.ac.uk/

12. Rehabilitation after acute myocardial infarction
13. Detection, investigation and treatment of heart failure
14. Failure to apply available knowledge to the primary and secondary prevention of CVD
15. Imaging modalities for use in cardiovascular disease
16. Appropriate use of implantable electronic devices for pacing and for control of ventricular tachyarrhythmias
17. Prevalence and incidence of abdominal aortic aneurysm
18. The link between diet and dietary advice and serum cholesterol levels
19. Patients with congenital heart disease - detection and management

Box 3. Priority research areas in the DH Cardiovascular and Stroke research programme (1993-2001)

4.3 **Wellcome Trust**

CVD research at the Wellcome Trust comes under more than one of their strategic research areas: Populations and public health; Physiological sciences; and Molecules, genes and cells. Therefore it is very difficult to say exactly how much funding the Trust provides for CVD research, or how many projects and fellowships they fund. According to a DH report, in 2000-2001 the Wellcome Trust committed to funding 24 project grants, 23 fellowships, five studentships and seven research collaboration grants in cardiovascular science at a total cost of £6.8 million.

The Wellcome Trust has a specific Cardiovascular Research Initiative, launched in 1996 on the back of the PRISM report on CVD research in Britain. The initiative supports two research centres (based in Oxford and Edinburgh) for CVD research. The centres receive seven years funding from the Trust, and were formed in 1998 and 2000 respectively. The Edinburgh centre receives £1m per year from the Wellcome Trust in support, but also receives funds from other groups (e.g. £5m from the BHF).

4.4 **MRC**

As the MRC funds across areas and not by disease type, specific current figures for CVD research are difficult to come by, however in 1999-2000, they funded £10.56 million in CHD research, and more in stroke and basic research underpinning CVD research. In

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72 DH (2002) “Strategic reviews of research and development: Coronary heart disease”, p14, paragraph 4.8
74 http://www.cvs.med.ed.ac.uk/content.asp?SubCatID=52
75 DH (2002) paragraph 4.12
1999/00, of the £10.56 million MRC spend on CVD, £4.36 million was spent on grants, £5.46 million on Units/Institutes and £0.74 million on clinical research fellows. Spend on clinical trials totalled £2.60 million. This was part of a total spend by the MRC of £345.1 million.

Currently, cardiovascular research comes specifically under the remit of Physiological Systems and Clinical Sciences, but there are other pieces of research in more basic biomedical science that are CVD related that would not fall under this field.

Interestingly, the Engineering and Physical Sciences Research Council also funds CVD research, looking at diagnostic techniques, specifically imaging techniques.

4.5 Other Charity

There are many other charities and organisations that fund CVD research in Britain. For example Diabetes UK funds research into vascular complications associated with diabetes, and are considered a large enough funder to take part in the Cardiovascular Research Funder’s Forum. Diabetes UK in 2006 funded ten studies that looked at molecular vascular complications associated with diabetes, totalling circa £890,000 of funding in both project and fellowship awards.

Small charities also fund a significant amount of research into CVD. The academy of medical sciences lists 5 specific CVD charities other than the BHF. Together they fund around £2.6 million of research (see Table 1). The 2006 Association of Medical Research Charities (AMRC) report, “The role of charities in medical and health research in the UK”, states that CVD research made up 9% of charity funding in health research.

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76 DH (2002), paragraph 4.14


### Table 1. Charities (excluding the BHF) who specifically fund CVD research

<table>
<thead>
<tr>
<th>Charity name</th>
<th>Total funding in 2006 (£)</th>
<th>Types of funding available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest, Heart and Stroke Scotland</td>
<td>600,000</td>
<td>Grants and Fellowships</td>
</tr>
<tr>
<td>Circulation Foundation</td>
<td>2,700</td>
<td>Grants</td>
</tr>
<tr>
<td>Heart Research UK</td>
<td>894,798</td>
<td>Grants, Fellowships and BSc funding</td>
</tr>
<tr>
<td>Northern Ireland Chest, Heart and Stroke Association</td>
<td>126,006</td>
<td>Grants</td>
</tr>
<tr>
<td>William Harvey Research Foundation</td>
<td>1,000,000</td>
<td>Grants, Fellowships, Institute and Studentships</td>
</tr>
</tbody>
</table>

#### 4.6 International CVD

The European Society of Cardiology, International Society for Heart Research and the European Atherosclerosis Society all fund research in Britain. The European Society of Cardiology funds fellowships to encourage CVD researchers to move to positions in different countries in order to improve their knowledge of research techniques.

The International Society for Heart Research funds only one research grant per year, in 2007 this is for €20,000. The European Atherosclerosis Society mainly acts as a society for scientists in atherosclerosis research, however they do fund grants for young researchers to attend international meetings and prizes for particularly strong publications in the field.

The EU has a thematic area in cardiovascular disease research, under the FP6 Programme. Between 2002 and 2005, the EU allocated €76 million to CVD research, mainly to five initiatives funded through FP6.

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80 [http://www.ishr-europe.org/Awards_and_Prizes/awards_and_prizes.htm](http://www.ishr-europe.org/Awards_and_Prizes/awards_and_prizes.htm)