

# 7 Monitoring, information management and research

Monitoring disease trends and differentials, applying technology to improving information management and fostering research all underpin the developments in prevention and management described in previous chapters. This chapter examines current monitoring of heart, stroke and vascular disease through the national monitoring system, explores the wider role of information management in improving patient care, and describes the current status of research into heart, stroke and vascular disease in Australia.

## 7.1 National Cardiovascular Monitoring System

A major recommendation of the *Better Health Outcomes* report (DHS 1994a) was to establish a national monitoring system for heart, stroke and vascular disease, its risk factors and management. In 1995, the National Health Information Development Plan also categorised the continuing surveillance of risk factors and improved information on heart, stroke and vascular disease as high priority areas. In the same year, the AIHW published its *Outline of a National Monitoring System for Cardiovascular Disease* (AIHW 1995), following extensive consultation with representatives of government and non-government agencies, public health researchers and epidemiologists. The Commonwealth Department of Health and Family Services subsequently provided funding support to the AIHW to establish and develop the monitoring system.

The monitoring system comprises the National Centre for Monitoring Cardiovascular Disease, an advisory committee and externally funded projects. The National Centre is located within the AIHW and monitors trends and differentials in risk factors, disease incidence, emergency care, medical and surgical hospital care, rehabilitation, follow-up care, disease prevalence, functional status and death. It also develops and monitors national indicators for cardiovascular health, promotes national data standards and develops national data systems.

The Advisory Committee advises on the development of the monitoring system, guides and reviews its work program and helps determine priorities. The committee includes representatives from Commonwealth, State and Territory health departments, the NHF, the RACGP and academics with expertise in the fields of heart, stroke and vascular disease, data collection and analysis. The capacity to fund projects outside the Centre enables the expertise in key agencies and centres of excellence around Australia to be integrated into the system.

A list of the principal data sources that feed into the monitoring system is given in Table A3.1 in Appendix 3 (pages 181–83). These data sources are used to monitor each aspect of cardiovascular health and to provide data for monitoring national indicators.

### Activities

The National Centre for Monitoring Cardiovascular Disease is active in data collection, analysis, development and dissemination, and all its projects have the approval of the AIHW Health Ethics Committee. The Centre works closely with the National Centre for Aboriginal and Torres Strait Islander Statistics on matters of mutual interest, and other government and non-government organisations.

### Prevention

The Centre monitors trends and inequalities in risk factors using national sample survey databases. With the support of the NPHP, the Centre is developing a proposal for a national survey of biomedical risk factors, especially blood indices.

National data standards have been developed for the definition, measurement and analysis of body fatness and smoking for inclusion in the *National Health Data Dictionary*. The process is almost complete for physical inactivity, and will commence shortly for high blood pressure and high total cholesterol (and other lipid risk markers).

A project has been commissioned to develop methods for determining the incidence of heart attack, stroke, unstable angina and heart failure.

### Treatment and management

The Centre is supporting the Australian Resuscitation Council to develop a national ambulance database that will provide data on pre-hospital and emergency care in Australia. It will enable monitoring of national indicators that are not able to be monitored at present (eg the average delay between the onset of chest pain and presentation for emergency care).

A baseline report *Medical Care of Cardiovascular Disease in Australia* (AIHW 1998a) examines the most recent data available on cardiovascular problems and their care. The report covers general practice; hospital separations; the use of cardiovascular diagnostic procedures, surgery and other treatments; benefits paid for cardiovascular medical services; acute coronary care; use of drugs to manage cardiovascular conditions; and costs of acute care.

In collaboration with the NHF, the Centre maintains registers on the national use of cardiac surgery and coronary angioplasty procedures, including indications and acute complications. The Centre produces regular reports based on aggregated data submitted by all relevant hospital units. The scope of these registers may be expanded to include individual patient characteristics and outcomes.

The Centre is involved in discussions with surgeons, cardiologists, the National Heart Foundation and various government organisations about the feasibility of setting up a national patient-based database for cardiovascular procedures. Such a database would make available nationally consistent, risk-adjusted data for monitoring national indicators of quality and outcomes for treatment of heart, stroke and vascular disease, such as cardiac surgery and angioplasty.

The number of new cases and prevalence of acute rheumatic fever and rheumatic heart disease among the Indigenous population in the Top End of the Northern Territory, is being monitored using the register system based in Darwin (see Section 6.1). The register helps medical staff in the delivery of treatment, as well as supplying data on rates of compliance with appropriate treatment and health outcome data on the impact of intervention.

### Mortality

Trends and differentials in death rates for all major heart, stroke and vascular diseases are monitored routinely. The report *Surveillance of Cardiovascular Mortality in Australia 1985–1996* (Mathur & Gajanayake 1998) provides a detailed examination of mortality trends and differentials at the national level and for States and Territories, as well as for the Indigenous population, and urban, rural and remote categories.

### Disease costs

The Centre has worked with the AIHW's Disease Costs and Impact Study to produce estimates of the direct economic costs of coronary heart disease, stroke and other cardiovascular diseases, including the cost of care provided by hospitals, nursing homes and medical, pharmaceutical and allied professionals.

### Information

The Centre is involved in the development and monitoring of national indicators for cardiovascular health, and has responsibility for identifying and addressing gaps and deficiencies in data required for monitoring.

The demand for up-to-date information on heart, stroke and vascular disease will be met in part by producing, in hard copy and on the Internet, a bulletin which provides the latest data for each component of heart, stroke and vascular disease, from risk factors through to acute care, follow-up care and mortality.

A user-friendly source of time-series data on cardiovascular health is under development, which can be accessed through the Internet by the public, media and health professionals. The database will include national data for national indicators for heart, stroke and vascular disease, and may be extended to include international data, State and Territory data, and other important subpopulation comparisons.

## 7.2 Information management

A vast amount of data is collected on the clinical care of patients. However, long-term outcome information is not collected and few data sources are linked. Improvements in collating and providing access to health-related information are likely to result in better patient care. This section examines current approaches to improving information management in Australia, and how these relate to the management of heart, stroke and vascular disease.

The current areas of developments in information management are:

- standardised databases for data collection and management, supported by developments in record linkage and unique patient identifiers;
- exploration of the use of a portable health care card;
- the use of telemedicine for long distance health care and education, and of multimedia for education and training in remote areas; and
- the use of the Internet for medical and lay education about new developments in the treatment and prevention of disease.

Much of this applies to information management in the health system as a whole. However, these issues are important for chronic conditions such as heart, stroke and vascular disease, where patients require long-term attention. Care delivery can occur within a number of settings, by more than one clinician, highlighting the need for standardised databases in general practice and in hospitals, and the systematic linking of records across different parts of the health system.

### Data collection, management and standards

There exists a range of activities that aim to improve and standardise collection and management of data within the health system. On a national level, the Acute Care Reform Program is working to establish the necessary standards and other requirements to support the development of compatible clinical information systems and the electronic exchange of health information.

The activities of the Cardiovascular Disease Monitoring Centre were discussed in Section 7.1.

### Coding systems and data standards

Systems of classification used in monitoring various aspects of heart, stroke and vascular disease are the International Classification of Diseases (WHO 1977), the SF-36, the New York Heart Association Classification of heart failure and the ABS classifications of demographic characteristics. Some of these classification systems form part of the *National Health Data Dictionary* (AIHW 1997c) and underpin the National Health Information Model, both of which are tools used to maintain the principles outlined above. Where classifications are not already in place for a particular aspect of monitoring, it is important that National Health Information Management Group principles be adopted so that new systems can be incorporated into the *Data Dictionary* and the Model.

### Standardised databases

A number of standardised databases for heart, stroke and vascular disease already exist overseas. The United States Society of Thoracic Surgeons maintains a database that has set the standard using a nationally accepted dataset and regular reporting. Models to predict mortality risks (and morbidity) are produced annually ([www.sts.org/databases/](http://www.sts.org/databases/)). More recently, the European Cardiac Surgery Registry has been established. The North American Cardiological Societies have also agreed on a dataset and have put into place a system for data collection for invasive cardiological investigations and interventional cardiology (coronary angioplasty).

As discussed in Section 7.1, national databases for cardiovascular procedures (patient based), rheumatic heart disease among the Indigenous population, and pre-hospital emergency care are being investigated or developed.

## Record linkage

Health records in different databases can be linked through one or more identifiers. A system of record linkage between health databases would have a number of advantages to the health system, including:

- improving delivery of health care through appropriate allocation of resources, with planning based on levels of activity in various areas; and
- assisting patients, especially those with chronic conditions who are treated in a variety of settings, by enabling clinical data to be either linked, or recorded centrally and used from remote sites when necessary.

Clinical record linkage, where management of patients is involved, requires exact matching of data capable of identifying individuals, but in general the statistical analysis of results does not. Access to identifying information is necessary only for the few people doing the actual linkage and not for those doing analysis and research on the linked data.

Unique patient identifiers would greatly facilitate the development of record linkages and a national system for management of data. However, issues of privacy and security must be explored first and satisfactory safeguards found. Issues of unique patient identifiers and record linkage are being considered both nationally and within States and Territories.

- On a national level, the AIHW is conducting a National Health Record Linkage Project, to undertake developmental work for providing access to a range of health databases including the MBS and PBS, establish the technical feasibility of record linkage between these databases and define and implement demonstration linkage projects to show the value of this work.
- In New South Wales, there is a State-wide data linkage system in progress, which will allow sharing of information between inpatient, outpatient, emergency and community services. This will involve development of a unique patient identifier, requiring legislative support as well as overseeing by ethical committees, and discussions with consumer groups.
- In Victoria, a Client Index database integrates two or more systems, using a probabilistic linkage tool. It is mainly used for monitoring outcomes for future purchasing, but there is interest from hospitals for applying linkage across health care networks, especially for patients with chronic diseases who are high users of medical resources.
- In Queensland, there is a corporate data system for patient demographics. Several health districts are exploring ways to link records using existing systems. There is a State working group to oversee this area, with the aim of developing a unique patient identifier.
- In South Australia, the Open Architecture Clinical Information System is in use as a pilot system in the renal departments of four major teaching hospitals. The system collects patient data for all patients at these hospitals from the hospital computer systems. An automated patient record linkage process occurs as patient data is received, using patient demographics. Patient records from each hospital are automatically matched against all other patient records and when a match is found the records are linked.

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- The Health Department of Western Australia and the Department of Public Health at the University of Western Australia are collaborating on a data linkage project that involves establishing linkages between most health databases in the State, including morbidity and birth and death records. The episode identifiers developed by the project are now being incorporated into a number of the databases. Acceptance of the system is increasing steadily as the linkage studies are extremely valuable for planning and resource allocation. The dataset will be expanded to include greater detail of coronary angioplasty, including the number of stents implanted and patient outcome.<sup>9</sup>
- In the Northern Territory, a system of record linkage covering acute inpatient care and community health is being developed.
- The Australian Capital Territory is in the process of developing a unique patient identifier.

It will be crucial to the success of standardised data systems that the Commonwealth, States and Territories work together in the development of consistent systems of record linkage and data standards. The formation and acceptance of a small group to act as 'honest brokers' in dealing with information capable of identifying individuals is vital to the success of any attempt to link together health data from a variety of sources. On a national level, in the first instance, such a group could be positioned within an institution such as the AIHW.

### Electronic medical records

The health sector is lagging behind many other sectors in the use of electronic medical records. Although accounting information is computerised, patient records generally are not, either in hospitals or private practices. The current impediments to the uptake of the use of electronic medical records include the slow uptake of computers in general practice, the lack of technical infrastructure to provide a secure virtual network for communication and a lack of national standards. Electronic medical records would improve care of patients as they are more easily read, allow ready exchange of patient information (eg to improve continuity of care), facilitate more complete record keeping and prompt clinicians to provide treatment in accordance with evidence-based guidelines by providing condition-specific checklists of options for diagnosis and treatment.

These issues are particularly important for management of heart, stroke and vascular disease because of its prevalence in the population (so that suboptimal medical care can affect many people). Continuity of care and exchange of information between providers are important. There are also acute emergencies when rapid access to accurate information about the patient is vital.

Adoption of electronic patient records throughout the health care system requires unique patient identifiers to ensure that records relate to the correct person and that information from different sources is correctly linked, user-friendly software that is consistent with optimal patient care, and dedication of resources to the transition from paper to computerised records. This in turn would require development work on unique patient identifiers (dealing with the issues of confidentiality and security), development and testing of software and implementation of electronic record systems where possible.

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<sup>9</sup> More information about the Western Australian experience can be found on the Internet, at <http://www.publichealth.uwa.edu.au/hsr/index.htm>.

### Information management in general practice

There is not yet available a widely accepted electronic record system to manage information within general practice. Only about 10 per cent of practices in Australia currently use computers for record keeping, research or providing access to information (compared with 30 per cent in New Zealand and 90 per cent in the United Kingdom). Since 1991, the United Kingdom Government has contributed hardware, software and 70 per cent of the salary for a Practice Manager to ensure that records are successfully entered into a database and maintained. An initial step towards full computerisation in Australia could be taken through the Practice Improvement Section. Such a system might provide closer links with the MBS and PBS, and enable monitoring of side effects and even compliance.

### Health care cards

Once a system of linkage of fundamental data is established, the concept of unique patient identifiers and electronic medical records could be extended into health care cards, which would be patient-held electronic medical records. The report into health information management and telemedicine by the House of Representatives Standing Committee on Family and Community Affairs (1997) found that such cards would provide a more effective means of exchanging information and would address unreliability and fragmentation of health information and management of data. An Information Technology and Telecommunications Committee is being established to further the recommendations of this report. However, as with unique patient identifiers and record linkage, there are important issues of privacy and security to be addressed before any such system could be considered.

Heart, stroke and vascular disease in Australia would be an appropriate field in which to test such a system due to the magnitude of the problem and the variety of settings of care involved, as well as the wide geographic spread of the population.

In Victoria, 'smartcards' are being trialed as part of the Coordinated Care Trial of the Southern Health Care Network. This trial is piloting a model for delivery of services and funding for people with complex and chronic health needs, and is testing the appropriateness of patient-held cards in gathering data on events and sharing information across health care settings and services.

### Telemedicine/telehealth

Telemedicine or telehealth uses the Telecom Integrated Services Digital Network (ISDN) to transfer audio, video or graphic data. Over the last decade, the technology of videoconferencing has been used for rural and remote areas with limited or no access to specialised health services. Such projects also aim to address the problem of professional isolation felt by clinicians working in these areas. Professional education is another use of the technology, with telemedicine being used in a number of areas to teach and supervise registrars and medical students in rural placements.

Telemedicine is still in the developmental stage in Australia, with a total of 250 sites providing videoconferencing facilities. In the cardiovascular area, a telemedicine system set up by Concord Repatriation Hospital in Sydney provides high quality ECG transmissions via cellular telephone.

The National Rural Health Alliance has strongly supported proposals that Telstra's community obligations be upgraded to include data transfer services such as facsimile, email and Internet to rural and remote populations, thereby improving

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access to health information in these areas. A pilot study in progress in the Australian Capital Territory will connect 250 homes to a network that will include general telephone services as well as pay TV and high speed Internet and through which video services can be utilised. The network has the band width necessary to support improved telecommunications services including telemedicine initiatives.

### Multimedia

An important use of multimedia is in distance education, especially in rural and remote areas. In particular, there is a need for:

- support for the development of medical multimedia laboratories with advice from appropriate areas to produce suitable training material; and
- training materials specific for use with Indigenous Australians which are localised to individual groups within the Indigenous population.

### Other developments in distance education

Most distance education is still print based but there are developments in a number of areas that are likely to have a significant impact in the future. The Internet is a cost-effective mode of sharing information which is being used increasingly by health professionals and the public. Internet sites are widely used for delivering information about the treatment and prevention of disease. In a number of areas, the Internet is now being used more systematically in medical and non-medical distance education.

The use of high-band-width satellite communication for interactive medical education is well established in Australia. This has been funded in part by industry, with some Commonwealth support. Other countries such as Israel with its GILAT system, have extended the capabilities with lectures being beamed into subscribers' homes.

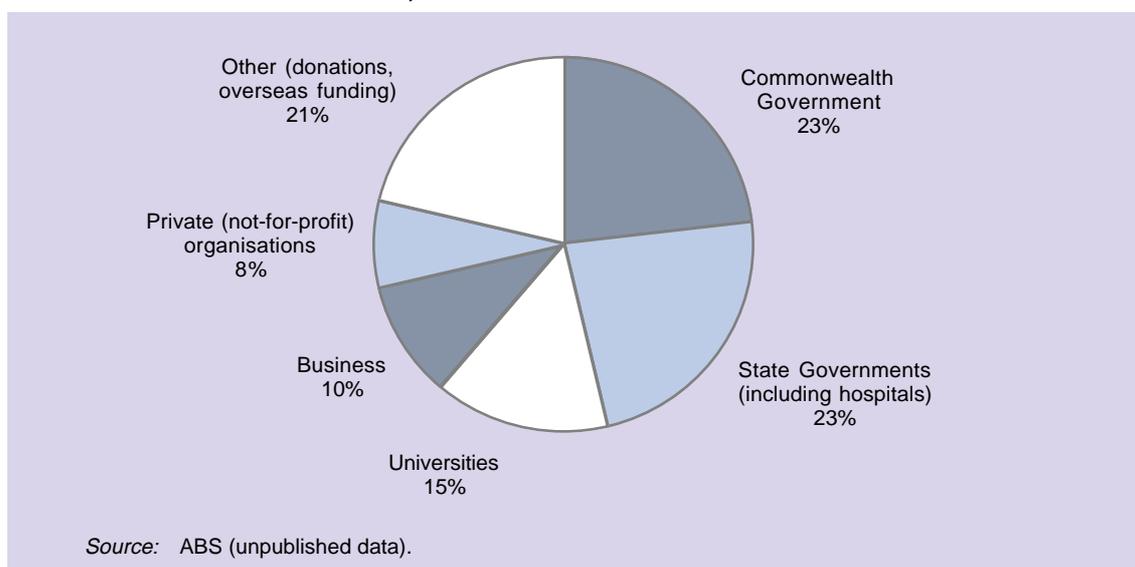
## 7.3 Research

Specific strategies for improving cardiovascular health should be underpinned by evidence based on appropriate research. Australia has international standing for its biomedical research, the area of heart, stroke and vascular disease being at the forefront of these achievements. It has also been recognised that significant research has been undertaken linking social environment issues to health status. This research contributes to the evidence base on heart, stroke and vascular disease. This section examines the current approach to research funding in Australia and considers how research could be better used to improve cardiovascular health.

## Overall research funding

The ABS Research and Experimental Development Survey recorded \$45 million expenditure on research into heart, stroke and vascular disease in Australia in 1994–95. The Commonwealth Government and State and Territory Governments provided 46 per cent of this funding (see Figure 7.1). Research into heart, stroke and vascular disease represented 11 per cent of total clinical research. Expenditure for research into heart, stroke and vascular disease was also recorded in other ABS categories, such as preventive medicine research, nutrition research, general public health research and pharmaceutical research.

**Figure 7.1: Sources of funding for clinical research into heart, stroke and vascular disease in Australia, 1994–95**



## National Health and Medical Research Council

The NHMRC consolidates the often independent functions of research funding and developing advice within a single organisation. Applications for research funding are accepted from all research areas and all disciplines, from biomedical research to clinical, health services and public health research.

Currently, approximately 19 per cent (\$30.1 million) of government funding allocated through the NHMRC goes directly to research into heart, stroke and vascular disease (see Table 7.1). This includes 314 grants for specific projects and block grants for cardiovascular research at the Baker Medical Research Institute and the Howard Florey Institute for Experimental Physiology and Medicine.

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**Table 7.1: NHMRC funding for research in NHPAs — actual expenditure and percentage of total expenditure**

Year	Injury		Mental health		Cardiovascular		Cancer		Diabetes		Total \$m
	\$m	%	\$m	%	\$m	%	\$m	%	\$m	%	
1995	2.00	1.5	17.89	13.6	24.86	19.0	13.74	10.5	3.06	2.3	131.15
1996	2.37	1.5	10.69	14.3	26.73	18.4	16.13	11.1	3.07	2.1	145.20
1997	2.35	1.6	22.95	15.2	29.70	19.7	17.57	11.7	3.61	2.4	150.75
1998	4.08	2.6	25.40	16.4	30.10	19.4	21.60	13.9	4.20	2.7	154.70

*Note:* These figures are based on NHMRC and RADGAC funding and also include pro-rata expenditure estimates of relevant research done in NHMRC-funded research institutes where appropriate.

*Source:* Office of NHMRC.

Research for stroke continues to be relatively poorly funded (Stroke Australia Taskforce 1997). Although stroke only attracted about 1 per cent of NHMRC funding as a category, the percentage of successful applicants was as high as for other groups. This suggests that more investigators need to be attracted into this area if progress is to be made (Stroke Australia Taskforce 1997).

### Non-government research

A number of non-government organisations provide significant support for cardiovascular research in Australia, primarily using public funds. Relatively 'specific' cardiovascular research institutes include the Baker Medical Research Institute, Victor Chang Research Institute, Howard Florey Institute (largely endocrinology) and the Heart Research Institute, Sydney. These institutions have international reputations for their work.

The *National Heart Foundation* primarily supports investigator-driven basic biomedical research, largely on a project grant-in-aid basis. Research that supports and complements the NHF's strategic directions includes clinical research, public health, epidemiological and behavioural research, with particular emphasis on working with socio-economically disadvantaged and Indigenous populations in developing effective interventions to improve health in their communities. The NHF also fosters the development of young cardiovascular health professionals through research fellowships, scholarships and travel grants for undergraduates, graduates and recent postgraduates. The total amount of project funding from the NHF in 1998 was approximately \$5.8 million.

An example of the quality of local clinical research was the Long Term Intervention with Pravastatin in Ischaemic Disease (LIPID) trial, a large-scale study conducted under the auspices of the NHF with industry funding (described in Chapter 4). The study is considered the most substantial body of data concerning the benefits of cholesterol lowering in patients with established coronary heart disease, and should influence and improve medical practice throughout the world.

The LIPID trial was conducted by a management committee and investigators independent of the sponsor (Bristol Myers Squibb) and coordinated by the NHMRC's Clinical Trials Centre located at the University of Sydney. It was

Australia's largest clinical trial, with a budget now in excess of \$30 million, and highlights the opportunity of attracting substantial industry funding from multinational companies to support clinical research endeavours.

The *Stroke Society of Australasia* is a professional organisation with medical, nursing and allied health professional members. The Society provides a forum for issues relating to the practical management and research into stroke through its annual scientific meeting and its subcommittee, the Acute Stroke Trials Network. The Society collaborates with the National Stroke Foundation and its research arm, the National Stroke Research Institute (NSRI), to foster stroke research in basic and clinical areas.

The majority of research grants from the *National Stroke Foundation* are allocated to the following categories — epidemiological studies, neuro-imaging studies and clinical trials of therapy and a small proportion to behavioural and social research.

The *National Stroke Research Institute* is located at the Austin and Repatriation Medical Centre in Melbourne. The research program ranges from basic sciences, neuro-imaging, clinical trials through to epidemiology. The NSRI is in the process of establishing a network of collaborating centres in Australia, the first of which is at the Royal Melbourne Hospital.

The *Cardiac Society of Australia and New Zealand* provides one-year research scholarships to full-time students who are members of the Society. The aim is to support members who wish to pursue a career in cardiovascular research.

The *High Blood Pressure Research Council of Australia* provides a forum for discussion and dissemination of information on research into blood pressure and related diseases. The Council, through the Foundation for High Blood Pressure Research, has provided Fellowships for Australian and international researchers and is actively involved in Australia-wide trials involving blood pressure. For example, the Australian National Blood Pressure Trial-2 (ANBP-2), described below, is coordinated through the Executive of the Council.

The *Brain Foundation* provides funding grants for research into stroke on a State-by-State basis. Allocation of grants follows guidelines established by the Foundation's governing body in each State and is overseen by a scientific advisory board.

## Private industry partnerships

As illustrated in Figure 7.1, 10 per cent of clinical research into heart, stroke and vascular disease in 1994–95 was funded through business. The LIPID trial, described above, was conducted under the auspices of the NHF with funding from Bristol Myers Squibb.

The ANBP-2 study is another important example of a new funding partnership. It is jointly funded by the pharmaceutical industry (Merck, Sharp and Dohme Aust Pty Ltd) and the Commonwealth through provision of drug treatment via the PBS system, subsidies for patient visits to general practitioners under the MBS and NHMRC support for data monitoring. ANBP-2 is a major clinical trial investigating the effectiveness of an ACE inhibitor compared with diuretic-based treatment in the prevention of cardiovascular morbidity and mortality in older hypertensive subjects. ANBP-2 constitutes a paradigm for future funding of important large-scale trials of pharmacological therapies which might be demonstrated to be cost-effective.

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PROGRESS is a multicentre international study jointly funded by industry (Servier Laboratories), the NHMRC and the Health Research Council of New Zealand. The study is investigating the effect of lowering of blood pressure in preventing secondary stroke in normotensive and hypertensive patients who have had a stroke (Bousser et al 1996).

The LIPID trial, ANBP-2 and PROGRESS provide models for indirect support of large-scale trials that address important clinical questions.

### Issues for research into heart, stroke and vascular disease

Funding dedicated to ongoing or new research programs by non-government organisations is unpredictable, because it is reliant on community donations to relevant organisations or, in the case of the Cardiac Society of Australia and New Zealand, surplus funds from attendance at their Annual Scientific meeting.

In practical terms, the limited extent of funding is reflected in the fact that the major organisations that assess grants for cardiovascular research (NHMRC and NHF) can now provide funding for only approximately 25 per cent of applications despite the ranking of most as worthy of funding.

Most research is supported on a project grant-in-aid basis. A major deficiency of this process is that often project grants are incompletely funded and there may be insufficient support for infrastructure costs. In many cases, salaries for biomedical research workers are also substantially below their counterparts in other research fields including clinicians with similar background training. Investment in research can achieve substantial long-term gains and infrastructure support and salary levels must be addressed to support appropriate levels of research endeavour.

### Possible directions for research into heart, stroke and vascular disease

Basic and applied research, in areas such as those highlighted below, is critical to the prevention and treatment of heart, stroke and vascular disease.

- *Basic research.* Research is required into genotypic abnormalities predisposing to disease; molecular and cellular mechanisms leading to disease; and factors that transform stable disease into acute processes (ie heart attack and stroke).
- *Other risk factors for heart, stroke and vascular disease.* Research is required to explain the significant proportion of heart, stroke and vascular disease that cannot be explained by known risk factors.
- *Clinical research to improve outcomes in patients with established heart, stroke or vascular disease, or to retard or prevent its development in 'at-risk' individuals.* Well structured clinical trials, evaluating effectiveness of innovative approaches to reducing mortality and morbidity in patients with established disease, should result in improved management programs and lower long-term morbidity.
- *Behavioural research.* Inadequate attention has been paid to behavioural aspects (and their possible modification) relating to lifestyle factors including compliance.

- *Social sciences.* New research is required to develop greater understanding of cultural, social and economic determinants of health and illness (the issue of socio-economic determinants is discussed in Chapter 6).
- *Cost/benefit research.* Research is needed to fully evaluate the effectiveness and efficiency of interventions aimed at improving cardiovascular health to investigate whether any increased health outcomes attributable to a specific intervention justify any increased costs of its use over existing technologies.
- *Indigenous research.* Applied research is needed to address the significantly higher rates of heart, stroke and vascular disease in the Indigenous population, compared to the non-Indigenous population. Social and behavioural research is needed on both prevention programs and primary health care in Indigenous populations, as evidence-based best practice is required for future policy development.

