Underfunding of Stroke Research
A Europe-Wide Problem

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Background and Purpose—Previous studies in the United States and the United Kingdom have shown that stroke research is underfunded compared with coronary heart disease (CHD) and cancer research despite the high clinical and financial burden of stroke. We aimed to determine whether underfunding of stroke research is a Europe-wide problem.

Methods—Data for the financial year 2000 to 2001 were collected from 9 different European countries. Information on stroke, CHD, and cancer research funding awarded by disease-specific charities and nondisease-specific charity or government-funded organizations was obtained from annual reports, web sites, and by direct communication with organizations.

Results—There was marked and consistent underfunding of stroke research in all the countries studied. Stroke funding as a percentage of the total funding for stroke, CHD, and cancer was uniformly low, ranging from 2% to 11%. Funding for stroke was less than funding for cancer, usually by a factor of ≥10. In every country except Turkey, funding for stroke research was less than that for CHD.

Conclusions—This study confirms that stroke research is grossly underfunded, compared with CHD and cancer, throughout Europe. Similar data have been obtained from the United States suggesting that relative underfunding of stroke research is likely to be a worldwide phenomenon. (Stroke. 2004;35:2368-2371.)

Key Words: coronary heart disease ▪ health policy ▪ neoplasms ▪ public policy ▪ stroke

Each year, there are approximately 1 million strokes in the European Union, making it by far the most common neurological disorder. Approximately 25% of men and 20% of women can expect to experience a stroke if they live to be 85 years old, and stroke is the second most common cause of death worldwide. However, mortality data underestimate the true burden of stroke because in contrast to coronary heart disease (CHD) and cancer, the major burden of stroke is chronic disability rather than death. Brain diseases, of which stroke comprises a large proportion, cause 23% of healthy years lost and 60% of years of life lived with disability in Europe. About one third of stroke survivors are functionally dependent at 1 year, and stroke is the commonest cause of neurological disability in the developed world. Stroke also causes secondary medical problems including dementia, depression, epilepsy, falls, and fractures. In the United Kingdom, the costs of stroke are estimated to be nearly twice those of CHD, accounting for ~6% of total national health service and social services expenditures. The total incidence of stroke is projected to increase considerably during the next 2 decades because of the rapid increase in the elderly population, and it is predicted that stroke will account for 6.2% of the total burden of illness in 2020.

Previous studies have suggested that stroke research is underfunded compared with heart disease and cancer in the United States and the United Kingdom despite the high human and financial costs of stroke. In the United Kingdom study, for example, charitable research funding for stroke from disease-specific associations was <5% of that for heart disease and <2% of that for cancer. This might not be a

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major problem if stroke research in other parts of the world was better funded given that the results would be available to the wider international community. However, anecdotal reports have suggested that stroke research is equally poorly provided for in other parts of the developed world.

The aim of the current study was to determine whether the low level of research funding for stroke relative to CHD and cancer reported previously in the United Kingdom and the United States is a Europe-wide problem. There are methodological difficulties in determining exact levels of research funding for specific diseases. For example, definitions of what constitutes stroke research are broad and subjective, and many grants are not allocated on a disease-specific basis. However, by concentrating on grants from disease-specific organizations (eg, Stroke Association, British Heart Foundation, etc, in the United Kingdom) and other national and government agencies for which the number and titles of grants are published on the Internet or in annual reports, it is possible to obtain useful data. Comparisons are only semi-quantitative at best. However, it was clear from previous UK and US studies that the differences between funding for stroke research and funding for CHD and cancer were so large that the influence of measurement error was relatively unimportant.

Methods

Leading researchers in the field of stroke from 12 European countries affiliated with the European Federation of Neurological Societies were contacted in person regarding the study, and 9 agreed to collaborate. A designated researcher, a physician or allied professional working in the stroke field, was identified for each country to collect data on funding.

A definition of what constitutes stroke research is difficult to formulate. Therefore, researchers made a judgment about whether research was specifically relevant to stroke, heart disease, or cancer research areas. The emphasis was primarily on clinical research, which is usually identifiable as related mainly to a specific disease area, as opposed to basic science research, which could be relevant to a wide range of pathological processes.

To estimate the overall research funding in a given country for stroke, CHD, and cancer, all major sources of funding for these diseases were identified. Only nationally based organizations were considered. International organizations such as the European Union and World Health Organization were not included. Each researcher was given a proforma detailing the type of information they were to collect. First, they were asked to identify any research funds derived from several categories of funding agencies.

Disease-Specific Medical Charities

Disease-specific medical charities raise money from the general public and provide funding for specific diseases (eg, British Heart Foundation in the United Kingdom and American Heart Association in the United States).

Disease-Specific Governmental Agencies

Disease-specific governmental agencies are government-funded agencies set up to fund specific diseases (eg, National Institute of Neurological Disorders and Stroke in the United States).

Nondisease-Specific Charities

Nondisease-specific charities fund research into any branch of medicine. In the United Kingdom, these include the Wellcome Trust, Action Research, Research into Aging, etc.

Nondisease-Specific Governmental Agencies

Nondisease-specific governmental agencies are government-funded agencies such as the Medical Research Council (MRC) in the United Kingdom and the National Institutes of Health in the United States. Research funding provided by the pharmaceutical industry is generally difficult to obtain, therefore, these data were not collected.

After funding sources were identified, researchers were asked to obtain the number of project or program grants and the total cost of these grants (in Euros) from each source for stroke, CHD, and cancer. If the organization also funded other research posts (eg, research fellows, senior fellows, and professors) in addition to those on individual project or program grants, these were also recorded.

Data collection covered the financial year 2000 to 2001 (for example, in the United Kingdom, the financial year runs from April 6 to April 5). All comparisons of funding levels for stroke relative to CHD and cancer were performed within country so that differences in the availability of data between countries or in size of research funds did not undermine the conclusions.

Results

Data were obtained from 9 countries. The breakdown of funding for stroke, CHD, and cancer for each country is available from the authors (www.stroke.ox.ac.uk/funding).

Ease of access to data varied considerably between different organizations within countries and between similar organizations in different countries. Some organizations, such as MRC in the United Kingdom, have a database of grants awarded each year that can be searched on the Internet. Many other organizations published annual reports that gave some disease-specific information and sometimes listed the titles of funded projects.

Many researchers reported difficulties in obtaining data. In the Netherlands, 1 organization was unwilling to provide budgetary information, and in 2 other cases, detailed budgetary information in terms of funding per project was not given in the annual report of the organization. Researchers from Norway and the Netherlands reported that in some organizations, it was difficult to determine whether money had been allocated specifically to stroke or heart disease as opposed to vascular disease research in general. For all countries, the figures obtained were felt to be representative of the proportion of funds allocated to each specialty rather than indicative of the total amount of funding because complete data were not available. In Turkey, the universities are the main source of research funding, so data were obtained from 2 universities that were considered to be representative of the whole.

Despite these shortcomings, a fairly consistent picture emerged across all 9 countries studied. The Figure shows the funding for stroke, CHD, and cancer as a percentage of the total funding for all 3 research areas combined. For all countries, the percentage of the total funding available for stroke research was small (range 2% to 11%). The majority of countries allocated the most resources to cancer research with the exception of Estonia and Austria, where CHD was the most generously funded. Stroke funding, as a percentage of the funding for cancer, ranged from a minimum of 2% (Norway and the Netherlands) to a maximum of 17% (Switzerland; Table). In every country other than Turkey, funding for stroke research was less than that for CHD. The funding for stroke as a percentage of that for CHD ranged from a minimum of 2% (Austria) to 138% (Turkey), with the next...
highest being Switzerland at 58%. In each country, the absolute research spending on stroke was poor. A similar picture emerged for the numbers of grants and posts for research in stroke compared with heart disease and cancer (Table), with the United Kingdom showing particularly low numbers (7 stroke posts compared with 455 for heart disease and 2618 for cancer).

### Discussion

This study confirms that stroke research funding across Europe is poor compared with CHD and cancer. This low stroke research funding occurs despite health care costs that are at least as high and probably higher for stroke. Data were obtained from a selection of European countries rather than the whole of Europe, but there is no reason to suppose that the situation is qualitatively different elsewhere.

Our study could be criticized on a number of counts. First, although researchers were issued with identical pro formas detailing the type of information they were to collect, systems of research funding varied from country to country, as did the ease of access to data, the number of institutions sampled, and the total amount of research money available. To allow for between-country differences, all comparisons of stroke funding compared with funding for CHD and cancer were made within country. Second, we did not include nonclinical research. This was because many basic science projects were potentially relevant to many clinical areas and could not be classified as only, for example, stroke related. Third, the decision as to what constituted stroke, CHD, or cancer research in clinical projects was subjective, but most were clearly targeted to a given clinical problem. Finally, we feel that despite these reservations, the disparity between funding levels was so extreme and the consistency between countries so striking that the results cannot be dismissed.

There are several possible reasons why stroke research may not have received greater financial support. Historically, stroke was felt by many to be a largely untreatable condition. Indeed, the development of treatments for stroke had been hampered by the lack of research in the area, and clinical interest was further limited by the lack of investigations available to physicians. This led to a nihilistic attitude toward patients whose care was often undertaken by generalists, who had no particular interest in stroke, in general medical wards. The care of stroke patients was in stark contrast to patients with CHD disease, who were treated as high-priority cases requiring immediate assessment and management in specialist units, usually by cardiologists or at least with cardiological input. Patients with cancer were similarly treated in units by specialist medical and nursing staff.

The nihilism associated with stroke meant that interested physicians with the drive and initiative to develop research were not usually attracted to stroke. This problem has, to some extent, become self-perpetuating in that young researchers need older established scientists to train them. For many years, it has been much easier for young doctors interested in academic medicine to advance their careers in specialties such as CHD, for which there is a large infrastructure to support them. Thus, the lack of academic clinicians with an interest in stroke becomes self-perpetuating. It is clear that stroke charities support far fewer research posts than cancer and heart charities. The small number of researchers in stroke means that the number of applications for stroke research grants compared with similar grants for other clinical areas is likely to be small. This explains in part the low funding awarded to stroke by nondisease-specific research funding bodies (ie, it is not necessarily caused by active discrimination against stroke research in favor of specialties.

### Table: Relative No. of Grants, Expenditure in Euros, and No. of Posts Dedicated to Stroke Compared With CHD, Cancer, and to the Total for Each Country

<table>
<thead>
<tr>
<th>Country</th>
<th>Stroke vs CHD</th>
<th>Stroke vs Cancer</th>
<th>Stroke vs Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grants Spending Ratio Posts</td>
<td>Grants Spending Ratio Posts</td>
<td>Grants Spending Ratio Posts</td>
</tr>
<tr>
<td>Austria</td>
<td>4/12 0.02</td>
<td>4/22 0.11</td>
<td>4/38 0.02</td>
</tr>
<tr>
<td>Belarus</td>
<td>8/14 0.38</td>
<td>8/43 0.06</td>
<td>8/65 0.05</td>
</tr>
<tr>
<td>Estonia</td>
<td>4/9 0.10</td>
<td>4/7 0.17</td>
<td>4/20 0.06</td>
</tr>
<tr>
<td>Norway</td>
<td>0.11</td>
<td>4/39</td>
<td>0.02</td>
</tr>
<tr>
<td>Netherlands</td>
<td>11/23 0.16</td>
<td>11/9 0.02</td>
<td>11/41 0.02</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0.53</td>
<td>0.17</td>
<td>0.11</td>
</tr>
<tr>
<td>Turkey</td>
<td>2/4 1.38</td>
<td>2/32 0.08</td>
<td>2/38 0.07</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.07</td>
<td>7/455</td>
<td>0.02</td>
</tr>
<tr>
<td>Poland</td>
<td>26/76 0.34</td>
<td>26/311 0.09</td>
<td>26/413 0.07</td>
</tr>
</tbody>
</table>
that are perceived to be more deserving, but rather, it may result from a lack of research applications in stroke).

Stroke charities get fewer donations than heart disease or cancer charities, but the reasons for this are unclear. It may be that similar nihilistic attitudes to stroke have existed in the lay population as in the medical sphere. The misperception of stroke as a disease of the elderly may also play a part. Ageism may also influence decisions regarding allocation of funding within nondisease-specific organizations, although it is difficult to imagine that this is a major factor in the current political climate. Some areas of research apply in general to vascular disease, and there is overlap between stroke and other more generously funded areas of research, but rapid advances in the field of stroke will require specific stroke funding. For instance, although CHD and stroke share common risk factors, the relative influence of given factors are different for the 2 diseases such that results cannot necessarily be extrapolated from one to the other.

A further issue that has hampered stroke research is that until recently, it was perceived as being a difficult area to study. Stroke is a very heterogeneous disorder comprising a number of different syndromes with different etiologies. However, many of the simple clinical questions in stroke (eg, what are the risks and benefits of simple clinical interventions in the care of acute stroke, eg, feeding policy, treatment of pyrexia, treatment of hyperglycemia?) have been amenable to study for many years but have not been answered because of a lack of manpower and funding. These questions are beginning to be addressed by ongoing studies and collaborations. One such important collaboration, the Stroke Unit Trialists’ Collaboration, has already shown that specialist stroke care saves lives and prevents disability.12

Recently, stroke research and brain research in general has been facilitated by development of sophisticated imaging techniques that can provide structural (computed tomography/MRI), chemical (magnetic resonance spectroscopy), metabolic (positron-emission tomography [PET]/single photon emission–computed tomography [SPECT]) and functional (functional MRI, PET, SPECT) information. This has allowed study of acute stroke syndromes, the ischemic penumbra, metabolic changes, response to thrombolysis, and the mechanisms of stroke recovery. There is enormous scope to exploit these new techniques further, for example, in conjunction with genetic information or new stroke treatments such as neuroprotectants, and this will require greatly increased resources for stroke research.

In conclusion, the clinical burden and cost of stroke are at least as great as those for CHD and cancer and are projected to increase during the coming decades. The current study suggests that European stroke research is grossly underfunded in line with earlier studies in the United States and the United Kingdom, and thus underfunding of stroke research is likely to occur worldwide. If the current low level of spending on stroke research continues, the potentially preventable long-term sequelae of stroke for patients and society will result in an increasing burden of stroke during the coming decades attributable to demographic change.

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References

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