Research Policy

Glimpses of the National Institutes of Health I: funding and structure

RICHARD SMITH

"The National Institutes of Health are the most brilliant social invention of the 20th century anywhere."

LEWIS THOMAS

The first thing that strikes a visitor to the campus of the National Institutes of Health (NIH) in Bethesda, a suburb of Washington, is its vast size. The institutes, which began in a one room laboratory on Staten Island 101 years ago, now cover 300 acres and have their own underground station (fig 1). The campus contains 50 buildings including the National Library of Medicine, the world's largest reference centre devoted to a single subject, a 540 bed research hospital, and 1420 laboratories. NIH employs 14 000 people at Bethesda and its field stations; 2300 have doctoral degrees and 1000 are physicians. And yet most of the research funded by the institutes is not done on the campus at all: NIH spent only about 11% of its 1985 budget of \$5121m on directed research, that which tends to be done on the campus.¹ More than 70% was spent on grants to outside researchers, some of it going to overseas researchers—including British ones.

At the end of 1987 I spent a week in Washington talking to people at NIH, the National Science Foundation (a government backed body that also funds scientific research, including some that is medical), and the Institute of Medicine (an organisation with a broad membership that is to medicine roughly what the National Academy of Sciences is to science). I have also talked to American researchers. My aim was to get a feel for the successes and failures of the American way of funding and organising medical research and see what lessons there might be for Britain. Here I look at the structure of NIH and its annual highly political and public battle for funds; several of the researchers that I spoke to in Britain thought that if Britain had something more like the American system then medical research might do better than at present.

Organisation

Overall the pattern of research funding and organisation is similar in Britain and the United States. Most medical research is done in universities and hospitals, but it is also done in institutes that may be

FIG 1—The campus of the National Institutes of Health at Bethesda, Maryland.

funded by government, industry, charities, or foundations. About half of the funding comes from the government, two thirds of it through NIH (fig 2). Most of NIH's money goes on what the Americans call "investigator initiated" research, and the officers of NIH are proud that it is a "bottom up" organisation. They were horrified when a junior British minister came and suggested to them last year that the time had come for research to be more "top down." NIH currently has considerable independence from government, as does the Medical Research Council, but, despite the enormous budget of NIH, protests about underfunding are common. There is also talk of privatising NIH.²

NIH contains 12 institutes as well as four divisions and the National Library of Medicine (fig 3). Figure 4 shows the relative size of the different institutes. NIH is part of the Public Health Service,

FIG 2—Funding of medical research in the United States by source, 1976-86.

FIG 3—Structure of the National Institutes of Health.

which in its turn is part of the Department of Health and Human Services. The institutes have their own budgets and directors, and NIH is to some extent a phantom organisation. Quite apart from NIH is the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA), which oversees three institutes—the National Institute of Alcohol Abuse and Alcoholism (NIAAA), the National Institute of Drug Abuse (NIDA), and the National Institute of Mental Health (NIMH).

Privatising NIH

In the United States, as in Britain, the proportion of medical research that is government supported is declining, while the proportion funded by industry, charities, and foundations is increasing (fig 2). For instance, the Howard Hughes Medical Institute increased its expenditure on biomedical research from \$53m in 1983 to \$168m in 1987, while the Robert Wood Johnson Foundation in 1986 spent \$53m on developing and testing new ways of providing health care services and \$22m on evaluating and improving health care.

It must partly have been these trends that encouraged the United States government to suggest just before Christmas that the laboratories of NIH might be privatised and converted to a free standing research institute and university.² The aim would be, said

government officials, "to permit more collaboration with the biotechnology industry, to increase salaries for the best scientists at the institutes, and to free them from bureaucratic constraints that may threaten the 'scientific pre-eminence' of the agency." A previous director of NIH, Dr Donald S Fredrickson, responded to the idea by saying that such changes "could destroy the integrity of an operation that is working well." He also said that the United States would then no longer have an "action arm" to tackle research problems like AIDS.

Whether this proposal will come to pass will obviously depend a lot on who wins November's presidential election, but one motivation for the government in suggesting privatisation was probably to avoid the annual conflicts over the budget of NIH. These cause great headaches to the executive, which finds it hard to constrain expenditure on medical research as much as it would like. The United States government might well prefer a system such as operates in Britain.

Ritual dance of the budget

There is an elaborate mechanism for determining the budget of NIH, and the main differences from the British system is that the American process is much more public and much more political: elected politicians and members of the public have a greater say in the size of the budget and some say in how the money will be spent. Both houses of congress—the Senate and the House of Representatives—are important in the system; each has both authorisation and appropriation committees. Authorisation committees pass bills every three years allowing NIH to continue and saying what it will do in general terms. Although authorisation committees sometimes end government bodies, these committees have not until now been as important to NIH as the appropriation committees, which each year fix the budget of NIH.

At any one time the institutes are dealing with three budgets—the one they are spending, the one they are steering through the executive and legislature, and the one they are planning to submit. The process of preparing a budget begins at the bottom, with researchers making proposals for future research expenditure. The institutes are strongly committed to the idea that ultimately scientists must decide what should be done. Just like the Medical Research Council in Britain NIH see themselves as representing scientists and as being the institutional embodiment of the research community.

In preparing their budgets the institutes look at what research

FIG 4—Budget in 1986 of the 11 institutes of the National Institutes of Health.

they are supporting and consider, with the advice of the scientists they support, what they might be doing in addition. They are naturally interested to get as much money as possible and so are concerned to put their "best foot forward" (as the jargon has it) in proposing a budget. Thus if they think that there is much interest in a particular area they will emphasise it in their budget proposals. For example, there is much public concern in the United States about children of alcoholics, which conveniently coincides with the genetics of alcohol problems being a hot research topic. The National Institute of Alcohol Abuse and Alcoholism might thus choose to emphasise this in its budget proposals. Some researchers whom I spoke to thought that the research institutes were not all that skilled at making these political decisions on what to emphasise in their budget proposals.

The institutes submit their budget proposals to the office of the director of the NIH, and there they are knitted together and modified. They are then passed up through the bureaucratic layers of the Public Health Service and the Department of Health and Human Services. These organisations will modify the proposals, almost always downwards. Next the budget is submitted to the President's Office of Management and Budget, the much feared OMB, which—like the British Treasury—is one of the most powerful parts of government and is much more used to saying no than yes. It will cut the budget and then pass it to Congress, where it will be considered in parallel in both the Senate and the House of Representatives.

Bring in the film stars

The budget is said to be "dead on arrival" when it reaches congress, which means that it is at its lowest level. Congress sets about building it up through a series of public hearings. The director of NIH and the directors of the institutes give evidence and play an elaborate game of pretending to defend the budget proposed by the president (because they are government employees). In reality they are naturally interested in boosting their budgets, and the previously prompted congressmen will ask questions that will give them a chance to let their real thoughts come through. The members of the congressional committees, and particularly the chairmen, know the research community well and are interested in getting it as big a budget as possible, although many of them are also interested in cutting the overall federal budget.

These hearings become especially colourful when public testimony is taken and the special interest groups give evidence. Sufferers of the various illnesses and film stars are paraded before the committees and the media are manipulated all in an attempt to boost funds for research into particular conditions. (Dr Katherine Bick, deputy director for extramural research at NIH, explained

FIG 5—Funding of medical research in the United States by source, 1976-86, at constant 1976 prices.

FIG 6—Percentage increase in expenditure on total research and development, medical research and development, and total health costs in the United States, 1977-85.

how the joke is that up and coming film stars have got to get themselves a disease before they are all taken up: the film stars, too, get publicity from the hearings.)

Eventually the two houses of congress will reach their individual decisions, and a compromise bill will be passed. The president then signs the bill and has the power to veto all or some of it. This happens rarely. The money is then passed to NIH, but each institute has its own budget. The director of NIH is not free to move money from one institute to another.

FIG 7—Number of applications to National Institutes of Health for grants, number approved, and number awarded, 1976-85.

Why so many institutes?

Sometimes congress will earmark money for, say, a cancer institute in West Virginia, or for more work on a particular subject, or for a new institute. A 1985 act, for instance, authorised the National Institute of Arthritis and Musculoskeletal and Skin Diseases, and pressure is now building up for a new institute on hearing research. And the institute for alcohol problems was started because a senator had a wife with an alcohol problem.

NIH has registered pressures for new institutes, and even went so far as to commission an independent study from the Institute of Medicine that identified criteria for when a new institute should be started; the National Institute of Arthritis and Musculoskeletal and Skin Diseases did not meet most of these criteria. The pressure for more institutes contrasts with the pressure in Britain to bring research councils together: nobody is arguing for splitting up the MRC but some are arguing for amalgamating the five research councils. The main argument for such a move is that many innovations seem to result from cross disciplinary collaboration. In the United States nobody seems to be arguing for fusing the many institutes. The difference in approach may be explained by size: for instance, the National Cancer Institute has a budget larger than that of all the British research councils.

Restrictions and benefits

That congress places unwelcome restrictions on them is seen by some American researchers as a liability of their system—but the benefit is, they believe, that health research tends to get generously funded. Everybody is for medical research, it's just a question of how much they are for it.

Yet in real terms the NIH budget has not risen much in the past 10 years (fig 5) and spending on research and development in health has not risen as fast as either overall expenditure on health or on all research (fig 6). This relative failure of health research may be explained partly by American calls for reindustrialisation (which necessitates more investment in research into physical sciences), partly by "star wars" research, and partly by the fact that much of what is included in total research is not research but rather activities like the testing of B1 bombers.

Complaints about lack of funds are not heard as regularly and as loudly as they are at the MRC, but NIH is increasingly unable to fund grants that have been approved (fig 7). The biennial report of the advisory council of the National Heart, Lung, and Blood Institute is outspoken on the issue³:

"... a major problem [is] grossly inadequate research funds. Because of insufficient funding, too many gifted basic science and clinical investigators are being turned away ... too many promising ideas remain untried. Too many potential opportunities to improve the health of the people of the United States and the world are being missed. The biomedical research budget must be less restrictive. Our future depends on it."

Later the report describes two public meetings held by the institute:

"The overriding concern was for the decline in the number of grants compared to the number of applications favourably recommended for funding. More research training support was also felt to be needed. Speakers expressed concern about the number of talented investigators, trained at great expense, who are unable to obtain research funds and are shifting vocations."

Meetings held in Oxford or Edinburgh have heard identical complaints, and just as in health care the gap between what doctors can do and what can be afforded is growing all over the world so is the gap between what researchers could do and what can be afforded. This might seem like the cue for more investigation of how best to spend limited resources, but there is little more of that at NIH than there is at the MRC.

Trying to preserve money for new ideas

Another problem of the American system, which is shared by the British system, is that budgets are not known very far in advance,

which makes planning difficult. Furthermore, as the budget is no longer increasing fast there is less and less room for manoeuvre because at the beginning of the year so much money is already committed. Worries arose that the number of new awards might eventually have to be reduced, and so a "stabilisation" policy was proposed, whereby NIH would always be given the money to fund about 5000 new "investigator initiated" grant applications each year. This policy was adopted because supporting investigator initiated research has been for a long time NIH's "number one priority."

Stabilisation continued successfully from 1981, when it started, until 1985, although there were anxieties that NIH was sacrificing activities like grants for training and equipment to the sacred cow of new investigator initiated research. In 1985, however, congress voted that because the proportion of grant applications being funded and the amount of grants were falling the number of new grants should be increased to 6526. The next year the president's office said that the extra money appropriated should be used for forward funding of projects that would last for several years and that NIH return to funding just 5000 new projects each year. This proposal was declared illegal, and eventually a compromise was reached.

This rather complex story (which I have simplified) illustrates both the difficulties of planning well ahead, which most researchers think important for doing the best research, and the way in which American budgets for research are likely to be increasingly constrained, particularly if strenuous efforts are made to cut the huge federal budget deficit.

Conclusion and lessons for Britain

When you look closely at NIH it is not quite the Shangri La that many British researchers imagine it to be. Certainly it has a budget that is astronomical compared with that of the MRC, but it is not increasing much in real terms. Thus an increasing number of scientifically approved projects cannot be funded, and protests are heard about the underfunding of research.

Several researchers whom I met in Britain looked enviously at NIH and thought that British medical research might benefit from a much more political and open system of funding. The MRC fights its corner behind closed doors in Whitehall, and, the feeling seems to be, does not do well. An orchestrated campaign that put disease victims and well known personalities on to television screens and into the newspapers and the House of Commons might winkle much more money out of the government for medical research, as well as raising the public profile of research. Professor Dennis Noble of Save British Science thought, when I spoke to him in Oxford, that this might be a way forward for British research. The present British government has, he said, changed the rules of the game, making it much more political, and scientists rather than simply complaining should learn to play the game the new way.

One problem with fighting for funds in the American way is that it is very unBritish, but a more substantial problem from the scientists' point of view is that it would probably have to be accompanied by more political control of what research was done. NIH has such generous funds by British standards that it can tolerate having foisted on it an unwanted institute, but the MRC might have more difficulty coping with a chunk of its funding being earmarked for a politician's pet project. But then it could be argued that the public having more say in setting priorities in medical research is long overdue.

The next article will look at NIH's system for funding grants and the system run by one of the institutes for finding new areas of research.

References

- 1 National Institutes of Health. *NIH data book*. Bethesda: NIH, 1986.
- 2 Pear R. Budget plan would privatise National Institutes of Health. *New York Times* 1987 December 16:1.
- 3 National Heart, Lung, and Blood Advisory Council. Biennial report. In: National Institutes of Health. *Biennial report of the director 1985-6*. Vol II. Bethesda: NIH, 1987.