

## The Rise of a Research Empire: NIH, 1930 to 1950

The spectacular growth of NIH came after two decades of careful planning by the Public Health Service.

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Few federal agencies have prospered as greatly in recent years as the National Institutes of Health, the research branch of the U.S. Public Health Service. Every year, with uncommon enthusiasm, Congress approves larger and larger expenditures for the study of human disease. Already NIH has become the hub of an enormous research effort, and its program will probably continue to expand. The agency has grown so rapidly since the end of World War II that the prewar and wartime stages in its development are now almost forgotten. It was during the 1930's that NIH began laying the groundwork for its current research program. Before the end of World War II federal public health officials had formulated the objectives, worked out the basic organizational pattern, and gained the legislative authority for a great postwar medical research effort. Their far-sighted policy, carefully calculated to advance the cause of federally sponsored medical research, made it possible for NIH to become the giant that it is today.

### Creation of NIH

By 1930 the Public Health Service had achieved a proud record in medical research. Its original research laboratory, established by Joseph J. Kinyoun

in 1887, contributed significantly to the success of the fight against cholera in the late 19th century. After the turn of the century the bureau's Hygienic Laboratory, an outgrowth of Kinyoun's pioneer facility, won recognition for developing a series of improved vaccines and antitoxin serums whose systematic use helped to bring the dread infectious diseases of the early 20th century under control. Within three decades smallpox and diphtheria practically disappeared. Typhoid fever became much less of a public health problem. In a great cooperative effort medical science was gradually conquering these diseases (1).

As the danger posed by infectious illnesses declined, top-echelon public health officers came to realize that new medical research objectives should be formulated. Accordingly, during the late 1920's a new research policy began to crystallize in the Public Health Service. Acute infectious diseases each year caused fewer deaths, but the toll taken by the so-called chronic diseases—especially cancer and heart disease—was increasing. Creation of the National Institute of Health in 1930 was one of the early indications that the Public Health Service had begun to modify its research policy. Intended specifically to supersede the Hygienic Laboratory and to carry out the bureau's reoriented research plans, this new organization

became both a means of emphasizing the chronic diseases and a vehicle for the expansion of federally sponsored medical research. Thirty years ago, however, the Public Health Service received only a small amount of money for research. In fiscal year 1931 NIH operated on an appropriation of \$43,000 (2).

Research on the problem of cancer was already a well-established part of the Public Health Service program. In 1922 PHS investigators had set up a special Cancer Investigations Laboratory at Harvard Medical School, and they had conducted experiments throughout the 1920's. Moreover, the Hygienic Laboratory in Washington had periodically undertaken cancer studies. But these investigations were small-scale. In 1930 the Surgeon General, H. S. Cumming, announced (3) that extension of the work on cancer was needed. He also announced (3) that the Public Health Service hoped to study heart disease, "one of the major causes of premature death." Within two years, federally financed cancer research had begun to expand and NIH had initiated a pilot study of rheumatic heart disease.

During the Hoover Administration there was another significant change in PHS research objectives. Increasingly, NIH staff members thought in terms of basic studies designed to obtain "fundamental knowledge concerning the chemical conditions which control the life, growth, and multiplication" of normal and abnormal cells (4). This trend toward basic research paralleled the increasing emphasis on chronic diseases. Of course, studies of infectious diseases continued. In 1931 the Public Health Service established its Rocky Mountain Spotted Fever Laboratory in Hamilton, Montana, and there initiated the research which subsequently produced an effective vaccine for this indigenous disease. Investigations of tuberculosis, venereal disease, and childhood illnesses were continued and expanded.

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Nevertheless, by 1932 the National Institute of Health had definitely laid out a program of increased emphasis on the chronic diseases. Lack of funds proved a severe handicap, and L. R. Thompson, then director of NIH, made the search for additional research financing his personal concern. He was able to obtain funds through the Social Security Act of 1935.

### Expansion of

#### Federal Medical Research

In the second year of the New Deal, Thompson and others had arranged for the President's Science Advisory Board to undertake a special study of medical research in the Public Health Service. The NIH leaders hoped that a recommendation for expansion would result. Pushed gently by Thompson, Karl T. Compton, chairman of the Science Advisory Board, designated a subcommittee consisting of Thomas J. Parran, Jr., Milton J. Rosenau, and Simon Flexner, all friends of the Public Health Service, to make the study. Getting Parran and Rosenau appointed to the Science Advisory Board in the first place had been a major but unpublished PHS objective which was achieved at the cost of some bitterness (5, 6).

In 1934 the National Academy of Sciences was already miffed at President Roosevelt for having established the Science Advisory Board without the advice and consent of the Academy (7). When Roosevelt decided to expand the board and to appoint Parran and Rosenau (neither of whom held membership in the NAS), a heated controversy developed, and as a consequence the Science Advisory Board was less effective than it might otherwise have been. It expired in 1935. But for as long as the Board lasted, the presence of Parran and Rosenau was of considerable benefit to the Public Health Service.

The special subcommittee, comprised of Parran, Rosenau, and Flexner, recommended increased research in cancer, heart disease, tuberculosis, malaria, venereal disease, and dental problems. It also suggested (8) that "funds for the scientific work of the Public Health Service . . . be increased by the sum of \$2,500,000 over and above the allotment for 1934-35" and that the disbursement of funds be left "to the

judgment of the Surgeon General with the approval of the National Advisory Health Council." This was a powerful endorsement of medical research in the Public Health Service, and it was carefully phrased so as to recommend maximum flexibility for NIH. If Congress approved, NIH would be free to channel new funds into research in the chronic diseases.

Thompson and his colleagues organized a letter-writing campaign to generate public and Congressional support for their cause (9). They pointed out that the prevention of disease tended to increase the economic security of the general population. When the Social Security Act became law, in 1935, Title VI authorized the expenditure of up to \$2 million annually for the "investigation of disease and problems of sanitation" (10).

Although officials of the National Institute of Health were gratified, they remained keenly aware that Congress still had to appropriate the money. They turned to the press, hoping to keep the pressure on Congress through publicity. The director's office immediately announced (11): "A program of attack on disease along some 70 lines has been planned by the U.S. Public Health Service, to be put into effect if and when funds for scientific research became available as authorized by the social security legislation." The problems slated for study had been "on the doorstep" of the Public Health Service for "some time," the statement continued. "Lack of funds has made it impossible to go ahead with them so far."

Congress consistently refused to appropriate the maximum amount authorized by the Social Security Act, but NIH did get additional funds for research. From \$375,000 in fiscal 1936, annual appropriations under Title VI increased to a maximum of \$1.64 million in 1940 (they decreased during World War II) (12). Thus, a key piece of New Deal social legislation allowed significant expansion of federally sponsored medical research and indirectly produced a new concentration on the chronic diseases. Congress also approved larger direct appropriations for NIH. By 1940 medical research in the Public Health Service had been securely linked to the New Deal social welfare program, and, in addition to Title VI funds, the National Institute of Health had an operating budget of more than \$707,000 (13).

#### Reorganizing Cancer Research

The Public Health Service had traditionally thought in terms of intramural research—that is, research conducted by its own experts and carried out primarily in PHS laboratories. As late as 1934, bureau officials had become disturbed at a suggestion made by Henry Wallace that the government should limit its own research programs and award grants-in-aid to university scientists. Immediately the director of NIH took action to defend the type of research work done by NIH, which, he said (5), "would not be duplicated by grants-in-aid to universities." But the Public Health Service's preference for intramural programs began to weaken in 1937, with the creation of the National Cancer Institute.

There had been a steady expansion of cancer research during the first 6 years of the 1930's, but the Public Health Service continued to call for more money for cancer studies; its interest in the chronic diseases had become pronounced. In 1936, when President Roosevelt appointed Thomas Parran to the post of Surgeon General, the emphasis on chronic illnesses became intense. "The acute infectious diseases," Parran stated in 1937, "have declined rapidly under the impact of public health effort." But there had been a concomitant increase "in many of the diseases of adult life, particularly the chronic diseases." Public health services should shift emphasis, he declared (14), to the "prevention and treatment of the chronic diseases." Such a shift was already well under way. The National Cancer Institute Act of 1937, sponsored by Congressman Warren G. Magnuson and Senator Homer T. Bone, accelerated the change and indicated congressional approval of the new Public Health Service research policy.

Organized as a division of NIH, the National Cancer Institute became a prototype of the many national institutes to follow. It had funds for intramural research. It was authorized to award grants-in-aid and fellowships to able researchers in institutions outside the Public Health Service. It had authority to establish a trainee program to increase the ability of physicians to diagnose cancer. It was even directed to establish a National Advisory Cancer Council to aid in the selection of grantees and trainees (15). From the

beginning the Cancer Institute was a success. Its grants program foreshadowed today's large extramural research setup. Receiving about \$400,000 annually, the institute stimulated cancer research before World War II and demonstrated the organizational advantages of a system of disease-oriented research agencies.

While it stepped up the study of chronic illnesses, the Public Health Service maintained a vigorous program of research in the field of infectious and contagious diseases. Its total research program became noticeably broader. One of the most valuable developments to grow out of federal medical research in the 1930's was an improved typhus vaccine; this vaccine was largely responsible for the notable fact that not a single American fighting man died of typhus during World War II (16). The influence of fluorides in drinking water also came under investigation. At first the objective was to find ways to reduce excessive natural fluoridation, the cause of mottled tooth enamel, but before the end of the decade PHS scientists had concluded that dental decay could be reduced by controlled use of fluorides in public water supplies (17, p. 14).

By the end of the 1930's congressional eagerness to support NIH had become quite apparent. In 1938 Congress again endorsed the PHS research program by authorizing construction of new and larger NIH laboratory facilities in suburban Washington. In the mid-1930's Thompson had obtained jurisdiction over a choice acreage in Bethesda, Maryland—part of a private estate donated to the federal government. A few years later, when the time came to enlarge NIH, this site was available. Public Health researchers moved into their new laboratories shortly before World War II. With plenty of land for future expansion, NIH was admirably situated to become a truly national research center in the postwar years.

### Research in Wartime

During the early 1940's the Public Health Service dedicated almost all of its research capacity to the war effort. It started to prepare for wartime research in 1940, and in the same year it began to experience a shortage of scientifically trained personnel (17,

p. 1; 18). Late in 1941, when the Committee on Medical Research began to function in the Office of Scientific Research and Development, the Public Health Service really moved into the wartime research program. In the rush to solve specific problems, such as the development of blood substitutes and the synthesis of antimalarial drugs, basic medical studies suffered. Yet the National Cancer Institute continued to operate, awarding grants and conducting research throughout the war. At least one significant advance in cancer research technique was recorded during the war years (19, p. xiv).

In the course of its wartime functions the Public Health Service had an opportunity to observe a large and successful extramural research program in operation. The Committee on Medical Research operated exclusively by awarding research contracts to universities, medical schools, and independent laboratories. The fact that these institutions were scattered across the country and conducted research in their own facilities did not retard the wartime research effort. The arrangement functioned quite smoothly and produced results. The operation of the Committee on Medical Research—in fact, the operation of the entire Office of Scientific Research and Development—provided an example that the Public Health Service could not afford to ignore as planning for the postwar period got under way. The National Cancer Institute had been a beginning, but now federal health officials, especially the new director of NIH, R. E. Dyer, became enthusiastic about the possibilities of extramural research. "Governmental funds for research should be available for grants-in-aid to scientific institutions," the Public Health Service proclaimed in 1944, "to ensure continuity of research and to enlist cooperation in investigations requiring a variety of professional skills (19, p. xii). Yet the federal public health agency lacked authority to award grants-in-aid in support of general medical research. It could make grants only for cancer research.

Before the end of the war the Public Health Service had taken steps to remedy this situation, and in the process had obtained the last legal prerequisite for postwar success. It persuaded Congress to pass Public Law 410, the Public Health Service Act of 1944. Written to consolidate and revise existing public

health legislation, this act attracted relatively little attention at the time. Yet it was an extremely important piece of legislation. Among other things it empowered the Surgeon General to "make grants in aid to universities, hospitals, laboratories, and other public or private institutions, and to individuals" (20); NIH at last had the legislative basis for its postwar program.

### Establishing a Postwar Program

The Public Health Service wasted no time in attempting to initiate a general grants program. It made preliminary plans to award grants during the latter half of 1944, but the Bureau of the Budget vetoed the proposal (21). Although a few grants were finally awarded in mid-1945, the Bureau of the Budget stubbornly refused to open the public purse for purposes of medical research. It was only when the Committee on Medical Research ceased operations, in December 1945, that the PHS finally got sufficient funds for a general extramural research program. Forty-four wartime research contracts, transferred to Public Health jurisdiction to insure their continuance, provided the impetus for the large grants program now administered by NIH (22).

The Public Health Service had long sensed the potential importance of these wartime research contracts as a means of expanding its own program. In fact, it was the director of NIH who originally suggested the transfer of the contracts. In August 1944 Dyer wrote to A. N. Richards, chairman of the Committee on Medical Research, proposing that the committee's medical research contracts be continued under the aegis of the Public Health Service and that they be coordinated with the public health program. In view of the importance of these medical studies, Dyer suggested, there would be little difficulty in persuading the Budget Bureau or Congress to approve the transfer (23). Vannevar Bush, director of the Office of Scientific Research and Development, responded favorably to Dyer's suggestion (24). For some time, however, Bush had been hoping to transfer medical research as well as certain aspects of military research to a postwar national research foundation (25). When it became clear that establishment of such a foundation would be delayed, the CMR contracts went to the Public

Health Service, where they undergirded the emerging extramural research program.

Shortly after the war, also under authority of the Public Health Service Act of 1944, NIH began granting research fellowships. The object of this new program was "to encourage the development and to further the training of competent young researchers in the medical and allied fields of investigation" (26). Since the National Cancer Institute had been awarding cancer research fellowships for more than 5 years, precedent for such a program existed, and the need was apparent: there was an acute and well-recognized shortage of competent medical researchers. As early as 1940 one highly placed PHS official expressed the opinion that only a few of the cancer investigators in the country merited financial assistance (27). In the end, the Public Health Service was prepared not only to stimulate medical research but to increase the number of well-trained medical research specialists as well.

In 1946 the Surgeon General created the Research Grants Office in NIH to coordinate the rapidly growing program of extramural medical research. By December 1947 the Public Health Service had awarded 1115 grants, for a total of \$11,508,841 (28). In a carefully considered organizational move the Grants Office began establishing study sections, composed mostly of civilian consultants, to give technical advice and to review applications for grants in specialized fields. As the program grew, the Grants Office set up more study sections, which served both as checks on the Public Health Service and as a means of drawing top-flight medical researchers into the NIH program in an advisory capacity. The study sections generated both participation and approval. Within a short time the grants and fellowships program had become extremely popular, and applications flowed in by the hundreds.

As the federal government enlarged its medical research effort, leaders of the Public Health Service drew on their past organizational experience. After almost 10 years of operation the National Cancer Institute was still functioning smoothly, providing a framework for both intramural and extramural cancer research. As circumstances warranted, therefore, the Surgeon General recommended authorization of

new disease-oriented institutes. The National Institute of Mental Health became a part of the NIH complex in 1946. The National Heart Institute and the National Dental Research Institute came into existence in 1948. In each case, enabling legislation established advisory councils and provided authority for establishment of a large grants and fellowship program (29). The National Institute of Health continued to supervise these various programs. To prevent confusion NIH pluralized its name in 1948, and since then has been known as the National Institutes of Health.

The number of disease-oriented institutes continued to increase, for Congress, always eager to earmark funds for specific purposes, liked the idea of delimited research organizations. By 1951 there were seven institutes, microbiology, arthritis and metabolic diseases, and neurological diseases and blindness having joined the list. In fiscal 1951 the various institutes awarded research grants totaling \$16,374,128 and operated on a budget of more than \$60 million.

The Public Health Service was hardly surprised by this rapid growth. Its goal for more than 20 years had been to expand federally sponsored medical research. "New programs should emerge from the blueprint stage," Parran had announced in 1947 (30), "and all peacetime health services promise to gather increased momentum. As the country's health workers speed their attack on vital problems, particularly those related to chronic disease of old age, wide public support may be anticipated. Never before has there been such keen and widespread interest in health matters throughout the land."

The Public Health Service did not escape criticism. It came under special attack for inequitable distribution of research funds. Westerners charged that the East received a disproportionate share of available support. "The time has arrived," one critic wrote in 1948 (31), "when the West should shake off the stunting dominance of the northeastern seaboard in scientific matters, insisting on autonomy and a just share of public funds for its scientific development." Competent observers pointed out other weaknesses in the burgeoning NIH operation. As a result, the Public Health Service was forced to devote more time and attention to matters such as distribution of research funds, research coordination, and project con-

tinuity. Accounting procedures proved particularly troublesome. Not having fully anticipated the large financial support its program would receive, NIH tried to get by with outmoded methods of fiscal control. Keeping track of its multifarious grants became an acute problem as federal support mushroomed.

### **An Autonomous Agency for Medical Research**

In the final months of World War II, Vannevar Bush, Senator Harley Kilgore, and others proposed that a National Science Foundation be created to support and coordinate American scientific research, including medical research. Although the proposal received almost universal support, the Public Health Service looked upon it with some apprehension; NIH officials in particular had reservations about the wisdom of assigning medical research to a new scientific agency. Testifying at Senate hearings in 1945, Dyer explained (32, p. 515) that the Public Health Service already had "all of the authority in reference to health and medical research that is contemplated for the proposed foundation." He also pointed out (32, p. 514) that he had as much right to be "concerned with preserving the scientific integrity and independence of [his] organization [NIH] as any university administrator or director of a private foundation." Although the Public Health Service did not oppose the concept of a National Science Foundation, it was clearly anxious to protect its own well-established research interests.

Most medical administrators and researchers outside of the government, while favoring federal support for medical research, would have preferred to set up a new and completely autonomous agency to coordinate the national program of research in medicine. The Palmer Committee, appointed to make recommendations concerning medical research as a part of the Bush Report of 1945, concluded (33) that "the Federal agency concerned with medical research should be created *de novo* and be independent of all existing agencies." This was contrary to the view of Bush himself, who believed that medical research should be included in the proposed national science foundation. After some hard talking he got the Palmer Committee to modify its

position (34). At a meeting in Pittsburgh in October 1945, the deans of American medical schools were also persuaded to go along with the Bush approach, but they indicated (35) that serious deviation from the original Magnuson bill to establish NSF (S. 1285), or a lengthy delay in passage of the bill, would mean withdrawal of their support and a campaign to secure a separate medical foundation. In the end the Palmer Committee and the medical schools had their way. An agency devoted exclusively to medical research—a revamped NIH—did evolve. By the time Congress finally authorized establishment of the National Science Foundation, in 1950, the extramural program of NIH was so well known and so successful that the new foundation did not undertake the support of disease-oriented research. Instead, it subsidized basic research in the chemical and biological sciences, thus contributing indirectly to medical research.

## Conclusion

During the 1930's and the 1940's the Public Health Service experimented freely and prepared the way for its accelerated postwar growth. Before President Hoover left the White House, the PHS had decided to put greater research emphasis on the chronic diseases and had exhibited increasing interest in basic medical studies. By the end of the 1930's it had worked out the organizational pattern for its later period of growth. During the war years public health officials became firmly convinced of the value of extramural research and took steps to gain the authority needed to initiate a broad

grants and fellowship program. Dramatic wartime medical achievements undoubtedly advanced the cause of federal support for medical research. An all-out attempt to reduce the occurrence and consequences of dread diseases proved to have extraordinary political appeal. But the Public Health Service itself, vigorous and flexible enough to capitalize on each opportunity, was largely responsible for the growth of NIH. The expansion of federally sponsored medical research was a goal the PHS had been working toward since 1930 at least. Without a proven organizational structure, without the experience gained by NIH before and during World War II, the great postwar program of federal support for medical research might have faltered in its initial stages. Instead, it matured, by a relatively orderly process, into a popular and effective scientific program.

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