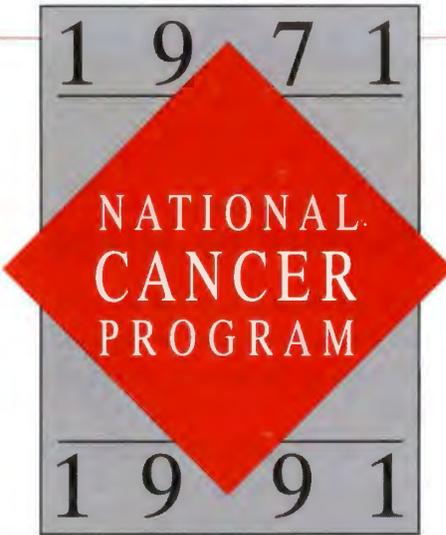


PB-9112-026759



## **THE IMPACT OF THE NATIONAL CANCER ACT**

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The National Cancer Act of 1971, the landmark legislation that expanded and intensified cancer research and control in the United States, was signed into law December 23, 1971. In recognition of the 20th anniversary of the Act, the Journal of the National Cancer Institute asked individuals who have had key roles since 1971 in the administration and oversight of the National Cancer Program to state what they thought the impact of the Act has been.

Following are the statements of National Cancer Institute directors, National Cancer Advisory Board chairmen, President's Cancer Panel chairmen, and others who were instrumental in creating the legislation. These others include former President Richard M. Nixon; Mary Lasker, president of the Albert and Mary Lasker Foundation; Senator Edward M. Kennedy, who chaired in 1971 and still chairs the Senate Labor and Human Resources Committee; Paul G. Rogers, who was chairman in 1971 of the House of Representatives Subcommittee on Health and the Environment and is now a partner in the Washington, D.C., law firm of Hogan and Hartson; and A. Hamblin Letton, M.D., who was president of the American Cancer Society in 1971.



Statement of  
**Richard M. Nixon**

When I signed the National Cancer Act two days before Christmas in 1971, I told those present, "I hope in the years ahead we will look back on this action today as the most significant action taken during my Administration." This was said even in view of the historic international changes and initiatives in war and peace that had taken place that very year.

Looking back after 20 years, I still hold that view, for the same reasons. More Americans die each year from cancer than were killed in all four years of World War II, and my family, like the vast majority of families, has been touched directly and indirectly by its ravages.

The progress made as a result of the National Cancer Act has done much to ameliorate suffering and death from what we now know is not a single disease, susceptible of a single cure, but a Hydra-headed monster. While the death rate from cancer has moderately increased, the survival rate of those diagnosed and treated has increased dramatically.

Most striking is that the survival rate for children with cancer has increased from 10% in 1970 to more than 50% today. Among all cancer patients in 1970, only 40% could hope to survive for five years after treatment; today more than 50% will survive. Some of the greatest advances have come in prevention and early diagnosis and treatment—as well as in basic research into the causes and mechanisms of cancer.

We had high hopes, however, when we launched this initiative 20 years ago, that we would soon find a complete cure. The significant progress that has been made continues to feed those hopes. The day is near when basic cancer research will achieve a dramatic breakthrough.

I believe American scientists and doctors are the best in the world. We win more Nobel Prizes than any other country. But we have no monopoly on wisdom. Great medical discoveries are not limited by national boundaries or differences. We are waging the war against cancer not just for ourselves alone but for all mankind.

Eight years from now we will be celebrating the beginning of a new year, the beginning of a new century, and the beginning of a new millennium. It is a day which comes once in a thousand years. The 20th century has been a century of great victories in war and peace, of great scientific discoveries and technological advances. Before the century ends, the conquest of cancer could be the greatest victory of all.

Richard M. Nixon  
U.S. President in 1971

Statement of  
**Frank J. Rauscher, Jr.**

Although we still have far to go in reaching our ultimate goal, in my view, major lasting accomplishments have been achieved through the National Cancer Act and the National Cancer Program created by that Act.

Public and media awareness has been greatly enhanced concerning cause and prevention and the importance of early detection. Great strides have been made in the evolution and awareness of treatment strategies, particularly combination therapies, that can cure or abate many of the multiplicity of diseases we call cancer.

In these 20 years, we have come to appreciate that cancers are essentially extrinsically induced diseases, not the lot assigned to humans by fate. Cancer occurs, for the most part, because of something we do, eat, drink or smoke and, to some extent, because of where we work and live. Therefore, by modification of



lifestyle, including better diet and nutrition, we have some control over our own longevity and well-being.

The cancer control mandate of the National Cancer Act was controversial. It was also absolutely pivotal to Congressional and public confidence in the ability and motivation of the scientific and clinical communities not only to seek new information but also to apply it for public benefit. Prior to November 1971, the only mandate of any of the institutes of the National Institutes of Health was the support and conduct of competitive, meritorious peer-reviewed research. After 1971, we had to get our hands into that research; we had to monitor it. Expansion of the mandate made it possible for us to do so. It also made possible the expansion of a system of cancer centers (not just the comprehensive centers) and community outreach programs to afford 85% of Americans quality care within 100 miles of their homes.

The National Cancer Act has also enhanced national and international motivation and cooperation. In our own country, public voluntary and commercial organizations have become better able to mobilize their monetary and intellectual resources towards the control of cancer. Within months of the Act, bilateral agreements were signed and implemented between the United States and governments and scientists of the Soviet Union, France, and Japan. These relationships continue to be productive.

In addition to recognizing the effects of the National Cancer Act on cancer, I believe it important to recognize the very real and documentable contributions of "cancer sciences" to improvements in the understanding, and beginnings in the control, of diseases other than cancer. AIDS and hematologic, autoimmune, and neurologic maladies and transplantation technologies are prominent in this category.

Finally, the National Cancer Institute, through the Cancer Act, was able to continue and expand its viral oncology program begun in the mid 1960's. The identification of oncogenes and antagonists may well be one of the most important legacies of the program for cancer and other diseases.

I, along with many others, share the belief that the National Cancer Act of 1971 provided the stimulus and means to plan and conduct the most important research and control program, for any disease, in the biomedical history of any nation.

Frank J. Rauscher, Jr., Ph.D.  
Director, National Cancer Institute  
1972-1976

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*Statement of*  
**Arthur C. Upton**

To me, the National Cancer Act's most important result has been prodigious growth in our knowledge of cancer, acquired through expansion of the study of the disease at all levels of biological organization. The ultimate conquest of cancer will depend on advances in our understanding such as have been shown to be achievable by the impressive progress of the past two decades.

As director of the National Cancer Institute, I was often called upon to explain why the "War on Cancer" had not progressed as far or as fast as other large national efforts such as the Manhattan Project and the Apollo Program. In replying to questions of this type, I used to point out that the latter two programs differed fundamentally from the National Cancer Program in being essentially engineering efforts; that is, in both the Manhattan Project and the Apollo Program, the relevant science had already advanced far enough to enable the desired missions to be conceived, planned, and scheduled in detail.

With respect to cancer, on the other hand, the relevant science had not yet developed far enough to enable a comparable mission strategy. Similar progress in the War on Cancer, therefore, was dependent on further research, the precise nature and extent of which could not be predicted without more adequate understanding of the fundamental biological processes involved.

Thanks to the National Cancer Act and the energies, talents, and resources it has helped to mobilize, significant progress has been made during the past 20 years in developing a knowledge base capable of being translated into effective strategies for the control of cancer. Past research contains the seeds of promising new approaches for the detection, diagnosis, treatment, and prevention of the disease, approaches which should produce a rich harvest in years to come.

I regard the National Cancer Act as having significantly advanced us toward the goal for which it was enacted. It has also greatly strengthened biomedical science in general, enlarging our understanding of vital processes in ways that will ultimately provide many beneficial contributions to human well-being.

Arthur C. Upton, M.D.  
Director, National Cancer Institute  
1977-1979

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*Statement of*  
**Vincent T. DeVita, Jr.**

The National Cancer Act was a unique model in the history of the U.S. Government's support of biomedical research. For the first time, it provided financial resources, coupled with administrative flexibility and authority, and harnessed them for a frontal attack that had as its goal the eradication of a major disease. The Act created a National Cancer Program, not just an expansion of the National Cancer Institute, which indicated intent to broaden the mission of one of the health institutes. It converted the NCI from an end in itself, to a means to an end.

The Act's flexibility allowed the Institute to spark the current biologic revolution by investing massively in research in the field of molecular biology. At a time in the 1980's, for example, when the NCI's budget was about 25% of the budget of the National Institutes of Health, NCI was supporting 50% of the molecular biology research in the United States. The payoff from this investment is apparent to everyone. It is also now being felt at the clinical level with the development of techniques in molecular genetics that promise to revolutionize our approaches to both cancer treatment and prevention.

As we at NCI contended in our testimony to Congress in the early 1980's, the Institute was supporting a great deal of basic research in prevention; it was called molecular biology.

On a more immediate level, in 1971 the resources provided by the Cancer Act allowed the Clinical Trials and the Cancer Centers Programs of NCI to expand, and, by improving on technology existing at the time, led to marked changes in the treatment of cancer. Successful treatment programs resulted for such major killers as colorectal and breast cancer. Although slow to be felt at a national level, because of the complicated nature of the translation of these advances into our medical system, the impact of these clinical studies on national mortality is now also apparent.

The Act called for the NCI to establish "in so far as feasible" a network of resources to apply the results of research to reduce incidence, morbidity, and mortality from cancer. It was feasible. Although it took a decade to establish the structure, today this network is out there and is the major means for the implementation of new advances in biology supported by the cancer program. Without the initial push provided by the National Cancer Act, and without the existent network, decades would have been lost in the transfer of technology.

The hope that all this could occur by 1976, an attractive end point to lay advocates of the Cancer Act, was too optimistic, and everyone knew that. But now, 20 years after passage of the legislation, the fondest hopes and desires of the architects of the National Cancer Act are well within our reach.



Finally, the model of the Cancer Act and the application of resources for "special initiatives" has served as a model for approaching other problems, such as the AIDS epidemic.

Vincent T. DeVita, Jr., M.D.  
Director, National Cancer Institute  
1980-1988

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*Statement of*

## **Samuel Broder**

The impact of the National Cancer Act has been truly global in scope. The Act fostered extraordinary basic science, training opportunities, and rapid translations into clinical practice. But more than all of these accomplishments, the Act has also been instrumental in the creation of the entirely new biotechnology industry in the United States. The biotechnology industry contributes to international health while at the same time conferring to the United States economic competitiveness as a nation.

Unquestionably, the National Cancer Program is a great biomedical research enterprise. The special authorities provided by the National Cancer Act have proven their value. The Act has encouraged development of important research programs across the United States and has supported the research of many outstanding American scientists. The National Cancer Institute can count 30 Nobel laureates among its grantees.

All of what we do is in the service of reducing the suffering and death from cancer, which despite our progress remains a compelling problem. This year there will be about 1,100,000 Americans diagnosed as having cancer—and this figure doesn't include those with certain early stage cancers. Experts estimate that about 514,000 people will die of the disease this year. However, there are about seven million Americans who have a history of cancer who are alive today, and several million who have survived five or more years—a definition of a "cure" for many cancers.

The basic research supported by the National Cancer Act is leading to a unified theory of cancer. This research is being done in universities and centers of excellence in virtually every part of the country. There have been fundamental discoveries about oncogenes and tumor suppressor genes, and these discoveries have led to an increasing understanding of phenomena such as metastasis, the deadly spread of cancer throughout the body, as well as to new preventive, diagnostic, and treatment strategies.

In 1971, could anyone—scientist or layman alike—have dreamed that in his or her lifetime we would actually be able to replace defective or missing genes and repair the damage of terrible illnesses? Would anyone have thought that we could custom treat a patient's cancer by modifying elements from his or her own immune system?

Yet, this year NCI-supported scientists have continued to develop pre-clinical and clinical applications in new gene technology and now, almost faster than one can count, new ideas in gene therapy for many illnesses are being discussed in practical terms. Many of the new treatments offer patients an improved quality of life, as well as a better chance at living. With breast cancer, for instance, treatment has advanced toward better diagnosis, less invasive surgery, breast reconstruction, and often, increased survival.

For colorectal cancer and bladder cancer, we can now frequently prevent colostomies and preserve organs that help define an individual's autonomy and independence. For cancer of the larynx, we can often save the voice box and preserve the ability to speak. We are thus preserving that person's identity in a real way.

We should never underestimate these gains and the difference they make to cancer patients, even

when survival per se is not the benchmark. Yet, we should always temper our celebration of progress by the awareness of how much needs still to be done, by the awareness that so many people are still suffering and dying. And we must take to heart criticisms that we need to do more to translate the fruits of basic research in ways that reduce the incidence and death-rate of cancer.

We have achieved success in reducing the cancer mortality rate in those under age 65. There has been less progress in reducing the death rate from the common solid tumors in patients aged 65 and over. Our minority groups still suffer far more cancer incidence and mortality, and for some minority groups our cancer statistics are actually getting worse. Ironically, as knowledge about prevention, diagnosis, and treatment improves, the groups without access to the improvements may appear to suffer even more.

All nations to one extent or another express their values in the kinds of scientific enterprises they support. Our nation, the greatest on earth, is expressing the highest values in its support of research to alleviate the death and suffering from cancer. I believe that it is worth noting that one of the first milestones of the National Cancer Act was a Presidential order designating that a military facility in Frederick, Maryland, be re-deployed as an arm of the National Cancer Institute—a metamorphosis from sword to plowshare. As we now look to the future and the exciting challenges still before us, our commitment, forged in that legislation 20 years ago and symbolized by that metamorphosis, must not waiver.

Samuel Broder, M.D.  
Director, National Cancer Institute  
1989-Present

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*Statement of*

## **Jonathan E. Rhoads**

The 1971 Cancer Act was the concrete embodiment of a national concern that more needed to be done to control cancer. Those who brought this widely felt concern to a focus and to concrete legislative action included Mary Lasker; Ann Landers; Elmer Bobst; Benno Schmidt, Sr.; Dr. Sidney Farber; Dr. R. Lee Clark; Senator Ralph Yarborough, who organized the legislation to set up the Advisory Panel to the Senate; Senator Edward Kennedy and other Congressional leaders; and, of course, President Richard Nixon. Needless to say, there were many others who played an important role in this development.

What the Act did was to convert the former National Cancer Advisory Council—which really was limited to advising the director of the National Cancer Institute on the extramural/grant program—to the National Cancer Advisory Board, which was empowered to advise him on all phases of the work of the Institute, the grant program, the contract program, and the intramural program. It further provided a three-person council reporting directly to the President of the United States [the President's Cancer Panel] and constituting a direct link between the Institute and its Advisory Board and the White House.

Furthermore, the Act provided that the budget prepared by the NCI Director be passed forward in its entirety to the President of the United States. Formerly, the budget had gone through four or five levels of review, each of which was empowered to whittle it down so that the President might never see what the director of the Institute felt was required to fulfill the mission.

In addition, the Cancer Act emphasized the importance of comprehensive clinical cancer centers, which would be complete in the sense that they would have high potential for education and very high potential for research; yet they would provide a full spectrum of care for cancer patients. The model centers numbered three: Memorial Sloan-Kettering Cancer Center in New York City, The University of Texas M.D. Anderson Cancer Center in Houston, Texas, and the Roswell Park Memorial Institute in Buffalo, New

York. The Act dictated that this number be increased to at least 15 at a rapid rate, recognized that this would require capital grants for building, as well as for operating expenses, and provided that these centers should have extramural as well as intramural programs.

The Act also provided for an International Cancer Research Data Bank on all aspects of cancer research and treatment.

What it did not provide was a separate status for the National Cancer Institute, completely independent of the Director of the National Institutes of Health—a status such as that enjoyed by the Atomic Energy Commission and certain other governmental instrumentalities. It also did not provide independence from the regulatory activities of the Food and Drug Administration. The financial impact of the Act has been to increase government spending for the National Cancer Program from nearly \$200,000,000 a year to nearly \$2,000,000,000 a year. There were many who feared that the vast sums being expended would be frittered away in endless trials of new drugs approached on a hit-or-miss basis. Through the wisdom of the directors of the Institute and many members of their staff, the National Cancer Advisory Board, and the President's Cancer Panel, the bulk of this money was channeled into research aimed at understanding oncogenesis and the basic mechanisms of cell growth, division, metastasis, etc. Applied research was not neglected, but it was not allowed to consume a disproportionate amount of the available funds.

While it is only fair to say that much of the progress in two previously fatal diseases, Hodgkin's disease and leukemia, had been achieved just prior to the Act and had generated much of the enthusiasm for it, further progress in both Hodgkin's disease and in many types of leukemia has continued with gratifying results. We are, however, still far from total control in this group of diseases.

Enormous progress has been made with the platinum-based chemotherapeutic agents which have revolutionized medical experience in the treatment of testicular malignancies. Whereas in the past a few such cases were curable, now many, and perhaps most, are susceptible to long-term remission or cure in response to current regimens.

There have been other gains in a variety of malignant conditions. Improvements in diagnosis have led to better results from the treatment of breast carcinoma and carcinoma of the large bowel. Much more accurate diagnosis of internal cancers has been achieved through computerized tomographic scanning and nuclear magnetic resonance imaging. The relationship between exposure to ultraviolet radiation and development of skin cancer, including melanoma, has become increasingly manifest and has led to preventive steps.

In the field of prevention, the role of asbestos in the etiology of mesotheliomas has been elucidated and its role as a co-factor in lung cancer, along with smoking, has been made evident. The role of tobacco, particularly cigarette smoking, has been clarified, data have been assembled showing that passive smoking, too, is dangerous, and a great body of public law has been enacted to diminish exposure to tobacco smoke. The benefit of these actions is beginning to register as a reduction in incidence rates of lung cancer in males.

Probably more important than these concrete accomplishments, of which only a few have been mentioned, has been the great gain in understanding of what transpires within the cell. Here again, some of the crucial pieces of knowledge were assembled before 1971, notably, the structure of DNA and its role in reproduction. The enormous amount of information added after, and as a consequence of, the Cancer Act, however, makes this brilliant discovery even more vitally meaningful.

Oncogenes, suppressor genes, and a whole new vocabulary of genetics have been discovered. The ways in which this information will be applied have not yet been fully revealed, but there is every reason to believe that these discoveries collectively hold many of the keys to the cancer problem.

Key discoveries are usually the contributions of one or a few investigators, but the support of a huge

army of investigators has been made possible by the National Cancer Act and the subsequent Authorization Acts and Appropriation Acts. Furthermore, these monies have permitted the training of many gifted young scientists and have attracted their talents to the National Cancer Program. Beyond that, the Act has gone far in disseminating practical information to the public, information individuals can use, in part, to safeguard themselves. Effective dissemination has been the centerpiece of a revolution of popular interest in health research relating to cancer, which makes success in this field widely appreciated and warmly acknowledged.

In all these many ways, the National Cancer Act has created a milieu which stimulates scientists and laymen alike to strive for ways to ameliorate, and hopefully to prevent or to cure, this most feared group of diseases.

Jonathan E. Rhoads, M.D.  
Chairman, National Cancer Advisory Board  
1972-1979

*Statement of*

## **Henry C. Pitot**

Although impugned by many during the last two decades, the National Cancer Act has resulted in dramatic changes in our knowledge of and attitudes toward the control of cancer. Our basic understanding of the cancer process has been markedly clarified by the discovery of oncogenes and tumor suppressor genes. We have likewise greatly enhanced our understanding of the mechanisms of genetic changes occurring in cancer, both somatic alterations and heritable, germline changes.

Our understanding of the pathways of cancer development has enormously increased our potential for cancer prevention and some types of cancer therapy, especially immunotherapy. We now have a much clearer picture of the human cancer problem worldwide than we ever did before. Furthermore, the support of the National Cancer Program has led to a dramatic improvement in the accuracy of epidemiologic studies, both in this country and abroad. The applications of these discoveries in basic science and in human epidemiology have been extensive. Today, unlike 20 years ago, our knowledge of the epidemiologic aspects of cancer, the genetic mechanisms of its development, and its multiple stages has made it possible to expect realistically the prevention of more than two-thirds of all human cancer.

We are able to detect very small numbers of cancer cells within the body. Revolutionary diagnostic instrumentation in the form of computerized tomographic scans and nuclear magnetic resonance studies allow direct examination of internal anatomy. The prognosis of many cancers can today be determined by means of molecular biologic techniques pioneered during the last 20 years in the National Cancer Program.

Cancer therapy, while not moving as rapidly as our knowledge in other areas, has been extremely successful in the treatment of cancer in children through combinations of drug regimens. Such techniques have also achieved dramatic success in certain adult cancers, such as testicular cancer and Hodgkin's disease. In addition, patients with the more common cancers of the breast, colon, lung, and others have been given many years of life through such drug regimens.

The dramatic increase in knowledge of the immunologic mechanisms involved in the interaction of cancer and the host promise equally dramatic advances in therapy in the future. The ability to convert cancer cells back to normal cells, a discovery made during the last two decades, also offers considerable promise as a future therapeutic method.

Finally, the vast improvement in techniques for the rehabilitation of the cancer patient during the last two decades has led to a dramatic enhancement of quality of life.

The National Cancer Program has resulted in an exponential increase in knowledge and application in almost all areas of the cancer problem. We must continue to build on these gains so that this disease may truly be controlled and eliminated as a hazard to our citizens.

Henry C. Pitot, M.D., Ph.D.  
Chairman, National Cancer Advisory Board  
1979-1982

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Statement of  
**David Korn**

The two decades that have elapsed since the enactment of the National Cancer Act bear witness to a remarkable and gratifying record of scientific accomplishment. It is to the everlasting credit of the architects of the National Cancer Program that the substantial increases of funds that flowed to the National Cancer Institute were used in large measure to initiate and sustain a broad program of basic research in the foundational biomedical disciplines: biochemistry, molecular and cell biology, immunology, virology, and genetics.

This strategy led to the recruitment of a stellar array of scientific talent into programs of research supported by cancer funding, and it established cancer biology as a legitimate and attractive target of scientific opportunity. The results of this investment program have been truly sparkling. Scientists have probed deeply into nature's most secret places and generated remarkable insights into the fundamental mechanisms that determine cell growth and tissue differentiation and assure the orderly behavior of diverse cell populations. From these accomplishments have flowed new understandings and provocative clues about some of the specific abnormalities that may affect these processes and regulatory networks and thereby contribute to the development of neoplasia. It is arguable that this rich harvest of scientific achievement was importantly facilitated by the independent authorities granted to the National Cancer Institute by the National Cancer Act, and particularly through the creation of the National Cancer Advisory Board and the President's Cancer Panel. The independence and stature of the NCAB are unique among the advisory councils of the National Institutes of Health, and the beneficial application of the authorities vested in the Cancer Panel has been demonstrated on repeated occasions—most recently, for example, in the conception of the Outstanding Investigator Award Program and in the revision of cancer therapy evaluation and approval protocols by the Food and Drug Administration.

It is also important to recognize that in the years following the establishment of the National Cancer Program, dramatic increases in funding flowed not only to the NCI but to all of the other Institutes of the NIH as well: Truly, the National Cancer Act initiated a tidal wave of research funding that raised all of the ships in the Bethesda harbor.

In looking ahead, there are a few storm clouds that must be appreciated. Recent years have witnessed an increasing intensity of effort to politicize the National Cancer Program and to promote targeted funding and the perhaps premature launching of expensive new programs of yet unproved validity. Targeting of basic research funding is a particularly dangerous and fundamentally unwise strategy that too often leads to the suboptimal expenditure of precious and limited resources.

The history of biomedical research is replete with examples that prove this point: One need only look back to the investments in basic virology and pharmacology under the auspices of the National Cancer Program to understand why it was that the NCI was so superbly poised to lead the federal response to the AIDS epidemic. These investments enabled the rapid identification of the causative HIV virus and the



demonstration of efficacy for a class of drugs (dideoxynucleosides), of which AZT and ddI are the only two AIDS-effective drugs that have yet been approved by the FDA.

Neither of those accomplishments resulted from targeted AIDS funding. No matter what the popular target of the moment, the allocation of funds for support of scientific initiatives on the basis of criteria that are more political than scientific is always unwise and must always be resisted.

If the results of the next two decades are anywhere near so spectacular as those of the last 20 years, our nation should indeed be grateful for an extraordinary return on its generous investments in scientific research through the NCI and its sister Institutes of the NIH.

David Korn, M.D.  
Chairman, National Cancer Advisory Board  
1984-1990

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*Statement of*  
**Paul Calabresi**

For the past 20 years, our nation has devoted unprecedented resources and directed a concerted effort toward the conquest of cancer. The passage of the National Cancer Act, in 1971, signaled the beginning of an escalated war on this dreadful disease, which remains the second leading killer in our country. After two decades of intensified battle, considerable progress has been made, but the struggle continues. Thus, at this time, it is more appropriate that we temper our celebrations with cautious optimism by observing the landmarks and re-dedicating our efforts until final victory is achieved.

During the past two decades, we have learned much about prevention and begun to apply these concepts in the areas of exposure to tobacco products, ultraviolet light, industrial agents, diet, and viruses. Chemoprevention is receiving increasing attention and several promising clinical trials have been initiated with this new approach. We have also reaffirmed the value of early detection and careful staging, as precursors to successful, aggressive multimodal therapy. Furthermore, we have demonstrated that even advanced disseminated neoplasms, such as leukemias, lymphomas, and testicular cancer, can be cured with impressive frequency.

More recently, biologic response modifiers, including interferons, immunotherapy, hematopoietic growth factors and other advances in supportive care, such as bone marrow transplantation, have extended the scope of cancer therapy into a new dimension, which allows us to enhance the defenses of the host and more safely intensify the administration of cytotoxic agents with curative intent.

Perhaps one of the most significant accomplishments of the National Cancer Act has been to transfer expeditiously new scientific discoveries from the research laboratory to the clinical setting. This has occurred by the implementation of a number of important initiatives, whose essential elements we must never allow to be compromised. First, a substantial increase in funding for cancer research, accompanied by a desirable reduction of bureaucratic obstacles, generated an immediate enthusiasm and revitalization of the field. This advantage resulted in a much needed increase in physicians and scientists dedicated to clinical and investigative oncology.

Another notable contribution was the establishment of additional comprehensive cancer centers, which have grown from three in 1971 to 28 in 1991; these, coupled with specialized clinical and research centers, the Clinical Cooperative Groups and the Community Clinical Oncology Program (CCOP), have greatly expanded the number of patients who can derive rapid benefit from experimental therapeutic advances. Finally, the development of a national Cancer Information Service (CIS), supported by an

extensive computer database, designated Physician Data Query (PDQ), provides more than a half million callers a year with information regarding current treatments and availability of specialized care in clinical oncology.

Nevertheless, there are some who may be discouraged by what they perceive as an inordinately slow rate of progress. With continuing reductions in mortality from cardiovascular disease, it is predicted that cancer will be the number one killer in the United States by the turn of the century. Those of us who cared for patients at a time when the diagnosis of most cancers was synonymous with death, however, greatly rejoice in seeing our out-patient clinics filled with an increasing number of healthy survivors. Today, more than 50% of patients with cancer are cured.

Yet, we have learned that the enemy is far more fierce and wily than we had assumed. The problem of cancer cell heterogeneity has revealed the intrinsic complexity of tumors, and the fundamental advances in molecular genetics have identified the deep-seated nature of the lesion. On the positive side, these findings give us better insight into the pathogenesis of the disease and allow us to focus on new preventive strategies and therapeutic targets.

The exhilarating explosion of knowledge that has occurred during the past two decades was fueled by the funding provided through the National Cancer Act, and it sets the stage for the prospect of exciting clinical advances in the future. We cannot afford to weaken our resolve. Rather we must continue to attract and support bright young basic scientists and clinical investigators who will maintain the momentum and translate fundamental knowledge effectively to the patient afflicted with cancer.

In 1991, as we mark these milestones towards the millennium, we sincerely hope that we will see the day when it will no longer be necessary to have further commemorations of the National Cancer Act of 1971.

Paul Calabresi, M.D.  
Chairman, National Cancer Advisory Board,  
1991-Present

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*Statement of*

## **Benno C. Schmidt**

The National Cancer Act has had the effect through the years of increasing the budget of the National Cancer Institute from \$181.0 million in 1970 to \$1.713 billion in 1991. At the same time, and equally importantly, the budget of the National Institutes of Health as a whole has increased incrementally from \$1.050 billion in 1970 to \$8.154 billion in 1991. The bulk of these funds has been spent in support of fundamental basic research, research which has provided the foundation for a new biomedical revolution.

We are in the early stages of that revolution today, and progress in biomedical research has reached a point where there can be little, if any, doubt that this revolution will be viewed in history as one of America's greatest contributions to civilization in this century.

Unlike the last biomedical revolution, the discovery and use of antibiotics, the present revolution is far more broadly based and destined to be far more extensive in its reach. As a result of 20 years of the highest quality fundamental basic research, we are now beginning for the first time to deal with diseases on the basis of a fundamental understanding of life at the cellular, molecular, and even atomic levels. As we better understand the diseases that make up today's medical agenda, we can develop far more satisfactory approaches to prevention, amelioration, or cure.

We have already seen vast consequences of the new biomedical revolution in the area of recombinant



DNA. Erythropoietin, granulocyte and granulocyte-macrophage colony-stimulating factors, Factor 8, and TPA are but a few examples of products that are revolutionizing our approach to a number of diseases, and this area is still in its infancy. There is also vast promise in our new understanding of the immune system and in our ability to enhance or suppress immune responses.

We are also beginning to see vast openings in areas of code blocking and genetic targeting, and rational drug design has entered the commercial phase in an important way. As our knowledge progresses, so too will medical technology.

This biomedical revolution is quintessentially American, and it was originally based largely upon funding by the federal government of the basic research. The level of understanding, however, has now reached the point that hundreds of millions of dollars of private sector money are going into the conversion of this knowledge into pharmaceutical products. Biomedical science is one remaining area of high technology in which America is still the undisputed leader.

Benno C. Schmidt  
Chairman, President's Cancer Panel  
1972-1979

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*Statement of*

## **Joshua Lederberg**

It is both gratifying and daunting to look back over the past two decades of enhanced cancer research. During the deliberations of the Yarborough panel, and legislative hearings on the National Cancer Act, I was a strong supporter. At the same time, I cautioned that the cancer problem was one of the most difficult we had ever determined to challenge, and we should make no glib promises about how quickly a crusade would reach its goals. I particularly warned that we simply did not know enough to make a well-founded direct attack: Large advances were needed in many cognate fields before we could take for granted that a purely technological effort (like the race to the moon) could succeed merely from large financial and political commitments. Even in space technology we have learned to be more humble.

In 1971 I wrote: "The greatest promise, of course, comes from the great leaps in basic biological knowledge of the last decade, many of them in the related areas of DNA and viruses. These have so far given only a few answers centrally connected with human cancer, but we are now able to formulate sensible questions about the nature of the cancer cell and the origin of its deadly differences from the normal."

I would still stand behind those words, even with the chastening thought that they remain almost too true today, that the promise is a ways from fulfillment. But their validity can scarcely be challenged, and I have no doubt that even in the next few years, if not months, revolutionary new concepts will be finding their practical realization on a number of fronts.

Can we guess how the National Cancer Program could be still more effective? Does it need more focus, more organized management? I would say to the contrary! Despite early premonitions, the National Cancer Institute has conducted its support of research with a breadth of insight that has encouraged an enormous range of creative discovery. Its fallout can be seen in fields far removed from cancer—from AIDS to biotechnology. Nevertheless, in almost all federally funded agencies, we have seen a progressively heavier hand on the oversight of individual research projects, too much emphasis on megabuck superprojects, and a risk-averse mentality on the part of investigators: They do not dare to expose their most creative ideas for fear of being criticized "for not having proven [in advance] that they can achieve their goals," (to quote a pink sheet I received some years ago).

Perhaps it is too much to expect that a government-funded program, with all the pressures of political accountability and demands for egalitarian access, can perfectly manage such aspects of personal creativity. It does not do that badly, provided that other institutions can pick up the slack; sadly, there is a rather dim prognosis for their health in the proximate future.

Apart from the direct costs and consequences of that deterioration, the quality of cancer research at this most exciting juncture will depend even more on the insight and effective policy direction of its leaders. I know they share these concerns, and they will deserve widespread assistance in eliciting the necessary political support to sustain the highest quality of science, and to support the morale of its workers, in a very difficult time.

Joshua Lederberg, Ph.D.  
Chairman, President's Cancer Panel  
1979-1981

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*Statement of*

## **Harold P. Freeman**

Americans can be proud of the progress that has been made since the signing of the National Cancer Act and the declaration of the war against cancer in 1971. Dramatically increased cure rates in childhood cancers, Hodgkin's disease, and the leukemias, along with significant breakthroughs in achieving an understanding of the fundamental molecular changes which explain carcinogenesis, are some of the measures of this progress.

In 1900 only one out of five patients survived cancer. Today one out of two survives. A progressively increasing survival rate is the goal, with the long-term hope of eliminating cancer as a major health problem in the coming decades. As we continue the war, it is essential that we intensify our research energy. Sufficient intensity will, hopefully, lead to the discovery of the fundamental causes of cancer and a knowledge of all the changes which occur within the host once the process of carcinogenesis is initiated.

But even as we pause to celebrate progress, it is sobering to note that within this year one million Americans will develop cancer and one-half million will die. It is also important to note that some Americans have not substantially benefitted from the great scientific advances which have been made. To illustrate this point, note that poor Americans have a higher cancer incidence and a 10% to 15% lower five-year survival rate than other Americans. This low survival is primarily related to late diagnosis and advanced disease at the time of initial treatment.

Currently there are an estimated 34 million poor Americans overlapping 37 million uninsured. Thus, one out of four Americans is poor, uninsured, or both.

A legitimate question arises as to whether we have properly conducted the war against cancer in all respects. A consideration of the above suggests that the guns and ammunition used in fighting the war against cancer have not been aimed to protect those who are at the highest risk for developing and dying from the disease.

In 1983, the war against cancer took on a new approach when the National Cancer Institute set a goal to diminish the mortality rate from cancer by 50% by the year 2000. The achievement of such a goal requires, among other things, the dramatic narrowing or elimination of the gap in cancer incidence and survival between the socioeconomically disadvantaged and other Americans. To accomplish this feat by the year 2000, we must conduct a new kind of war against cancer—a guerilla war to tear down the economic and cultural barriers to prevention, early detection, and treatment. This hand-to-hand combat must be carried

out in the neighborhoods of America where people live and die. Therefore, the designated battlegrounds for waging such a guerilla war should include geographically and culturally delineated areas of high cancer incidence and mortality. Such areas should be targeted with an intense approach to providing culturally relevant education, control of tobacco use, appropriate access to early diagnosis and treatment, and an improved social-support network.

Since access to early diagnosis and treatment are key components of the fight, the National Cancer Institute is not empowered to conduct this war alone. A successful ground war against cancer requires that the Congress and the Executive Branch of government have the unwavering political will to win this war and that the American people, through lifestyle changes, become foot soldiers in this fight for their own lives.

Harold P. Freeman, M.D.  
Chairman, President's Cancer Panel  
1991-Present

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*Statement of*  
**Edward M. Kennedy**

I commend the Journal of the National Cancer Institute for this publication honoring the 20th anniversary of the passage of the National Cancer Act.

That legislation, signed into law in 1971, and the amendments that followed, have led to unprecedented growth in the understanding of cancer at the cellular level and extraordinary improvements in prevention, care, and treatment.

Before the National Cancer Act, there were no community clinical cancer programs, no national cancer information services for physicians and patients, and no community prevention and control programs. There were fewer cancer researchers and much smaller clinical trials. Only a few comprehensive cancer centers existed and access to specialized care was limited.

The expansion of basic research supported by the National Cancer Institute has provided insights into cellular processes that were hardly envisioned two decades ago. Clinical research and epidemiology have broadened our understanding of the causes of cancer and given us vital means to prevent it.

Many people are alive and well today as a result of cancer research. Too many others, however, still do not have access to the knowledge and resources that have become available in the past 20 years. We need a much greater national effort to bring the benefits of the War on Cancer to all Americans.

When the Act was passed in 1971, cancer was the disease that Americans most feared. Despite new health issues and concerns, it is still the number one fear today. The War on Cancer is far from won. This is no time to lose our momentum or sound retreat.

I commend the Journal of the National Cancer Institute for its own contributions to this important effort, and I send my best wishes for continued success in the future.

Senator Edward M. Kennedy  
Chairman, Senate Committee on Labor and Human Resources  
1971 and Present

Statement of  
**Paul G. Rogers**

The National Cancer Act has accomplished many of our hoped-for goals. The national effort to fight cancer has expanded and advanced through the basic and clinical research programs which have been supported by increased funding, now over \$1.7 billion.

The Comprehensive Cancer Centers network has helped to spread the results of scientific knowledge on cancer treatment to the various regions of our nation. We still need to have a closer communication between our cancer centers and community hospitals.

Importantly, the idea which was proposed to remove the National Cancer Institute from the National Institutes of Health and make it an independent agency was rejected strongly by the House of Representatives. Had this idea been accepted, I think it would have eventually resulted in the breakup of the National Institutes of Health, the world's greatest research institution.

Most important of all, the legislation and the national effort that has followed have given the American people hope.

Paul G. Rogers  
Chairman of House Subcommittee on  
Health and the Environment, 1971

Statement of  
**Mary Lasker**

I welcome the opportunity to share with you my thoughts regarding our National Cancer Program over the past 20 years, for they have been years of great progress, optimism, and hope. In 1971, when the National Cancer Act was enacted, this nation dedicated itself to conquering the greatest "killer andcrippler" of our time—cancer. I have marveled at the advances and contributions that have been made to mankind as a result of this one single piece of legislation.

Our investment in medical and cancer research has placed the United States at the forefront of a worldwide medical research effort; improved our competitiveness internationally; spawned the biotechnology industry, which will reach revenues of over \$40 billion by the year 2000; and provided the foundation upon which research progress in many other diseases, such as cystic fibrosis and AIDS, has been built.

The advances of our National Cancer Program go far beyond economic issues. Survival rates from cancer have improved from 38% to over 50%. Advances in chemotherapy have enabled children who 20 years ago would have died to survive and raise families of their own. Cures have been found for many forms of cancer: childhood leukemia, testicular cancer, Hodgkin's disease, and lymphoma.

As we look ahead, we must open our eyes to the gaps in our efforts and direct our energies to conquering them. We must push ahead in our efforts to develop successful cancer vaccines for the prevention and treatments for the cure of cancer.

Medical research is a gift—a legacy that we leave for the next generation. The beauty of our National Cancer Program is that we have all lived to see its gifts—the seven million Americans whose lives have been saved. We must all get involved in meeting the remaining challenges to eradicate this dread disease and save the lives of our citizens.

Mary Lasker, President  
Albert and Mary Lasker Foundation

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*Statement of*  
**A. Hamblin Letton**

Thanks to the expansion of cancer research made possible by the National Cancer Act, there has been an explosion of basic science knowledge and technology.

It was not only the government that was mobilized by the Act's declaration of war on cancer. The general public took on the disease as well. Perhaps nowhere has that public dedication to the fight been better demonstrated than by the work and the people of the American Cancer Society—whose millions of volunteers have reached countless other millions with life-saving public education programs on cancer prevention and early detection, and which has become the nation's largest non-governmental funder of cancer research.

We are on the verge of an entire new way of dealing with cancer—a molecular way. Scientists are using biological markers, a space-age understanding of the immune system, and molecular biology techniques to predict, diagnose, and treat cancers better than we could have dreamt possible in 1971.

Progress made in specific cancers is remarkable. Death rates are now much lower in testicular and colon cancers and leukemia, Hodgkin's disease, and osteogenic sarcoma, among others.

We have seen significant gains in diagnostic ability, perhaps surpassing the impressive therapeutic gains. Cancer prevention through early detection technology, such as mammography, holds spectacular promise.

The last 20 years have brought many advances. Organizations such as the American Cancer Society can be proud of the better therapies and the deeper understanding of cancer. The process of doing research and translating those research findings to prevention programs and to patient care is a step-by-step procedure, and we must work to see that those steps are taken.

The American Cancer Society and its over two million volunteers are very appreciative of President Nixon and the Congress for the National Cancer Act, which caused the United States to be the first and only nation to make the conquest of cancer or any other disease a priority. This was a great Christmas present to America and the world that December 23, 1971.

In the 20 years since then, we have achieved so many advances that we stand at a critical point. If we keep up the momentum, we can expect the 90's to be dizzying in seeing these advances applied therapeutically in our hospitals and treatment facilities. We are all here to see that the torch stays lit, that the gains of the past 20 years are not lost from failure to apply them. We are all here for the future.

A. Hamblin Letton, M.D.  
1971 President, American Cancer Society

