NCI

FACT BOOK

National
Cancer
Institute

1992

NATIONAL INSTITUTES
OF HEALTH

NCI

FACT BOOK

National
Cancer
Institute

1992

U.S. DEPARTMENT
OF HEALTH AND
HUMAN SERVICES

Public Health
Service

National
Institutes of
Health

The information set forth in this publication is compiled and amended annually by the financial management staff of the National Cancer Institute and is intended primarily for use by members of the Institute, principal advisory groups to the Institute and others involved in the administration and management of the National Cancer Program. Questions regarding any of the information contained herein may be directed to the Financial Manager, National Cancer Institute, 9000 Rockville Pike, Bethesda, Maryland, 20892.

TABLE OF CONTENTS

Significant Initiatives in 1992

Division of Cancer Biology, Diagnosis and Centers

The development of recombinant toxins as anti-cancer agents represents an exciting new therapeutic approach to cancer and other diseases.

Recombinant bacterial toxins, which lack the portion of the toxin molecule that binds to cells, can be coupled to monoclonal antibodies, growth factors, or other molecules that can target the toxin to a specific cell type. The transferrin growth factor alpha (TGFα) can effectively target and bind to cancer cells that express the epidermal growth factor receptor (EGFR). TGFα has been conjugated to a portion of the *Pseudomonas* exotoxin molecule to form TGFα-PE40. A clinical trial has been initiated in which TGFα-PE40 will be administered into the urinary bladder as local therapy to patients with bladder cancer. Another modified toxin molecule, CD4-PE40, has been constructed in which the portion of the CD4 molecule that binds to the AIDS virus has been combined with PE40. In *in vitro* studies, CD4-PE40 has been shown to be effective in killing T cells infected with HIV; and in combination with AZT, has shown an even more powerful effect than either agent given alone. A phase I clinical trial at NIH has recently begun with CD4-PE40 being administered intravenously to patients with AIDS.

Gene therapy is yielding promising results in the treatment of an inherited immunodeficiency disease; similar approaches are being developed for the treatment of AIDS.

On September 14, 1990, the first authorized use of gene transfer to treat human disease was performed. The patient was a four year old girl with an inherited immunodeficiency disease caused by a deficiency of the gene that encodes the enzyme adenosine deaminase (ADA). Normal functional ADA genes were inserted into the girl's own peripheral blood T cells, expanded in tissue culture, and the gene corrected T cells were returned intravenously to the patient. This girl and a second patient have been treated every 5-7 weeks and both are showing signs of enhanced immunological reactivity. The first child has undergone extensive tests which indicate that her immune function approaches normal levels. Similar cellular reconstitution protocols are being developed to treat patients with AIDS in the coming year.

The oncogene bcl-2 encodes a novel type of protein that protects cells against programmed cell death.

The phenomenon of programmed cell death is of great current interest because it has been found to be important in such diverse processes as immune killing of tumors or virus-infected cells and elimination of self-reactive cells during immune system development. One of the genes important in resistance to programmed cell death has now been shown to be the oncogene bcl-2. The bcl-2 protein prolongs the life of cells in which it is expressed. Bcl-2 was

discovered as the gene on chromosome 18 that is involved in a chromosomal translocation in follicular lymphoma, the most common human lymphoma. It has now been shown to be expressed in the mitochondria of cells. Its exact function remains unknown, but over expression leads to malignant transformation.

Specialized Programs of Research Excellence (SPORE)
The NCI has successfully implemented Specialized Programs of Research Excellence (SPOREs) in breast cancer, prostate cancer, and lung cancer. These three cancer sites contribute to highest overall mortality rates for men and women. SPOREs employ a completely new grant mechanism (P50) for the NCI and are a completely new approach to focusing the innovative energies of the biomedical research community on translational research objectives--that is, movement of laboratory research findings into research settings involving patients and populations that are likely to have the most immediate effect possible in reducing cancer incidence, mortality, and morbidity. These initiatives, although started in FY 1991, satisfy many of the imperatives delineated in the Congressional Appropriations language for FY 1992.

Cancer Centers
The NCI Cancer Centers Program has implemented four initiatives that demonstrate how a cancer centers network provides an effective, responsive way to meet the high priority needs of the Nation: (1) A research supplement initiative was implemented which resulted in the funding of innovative ideas in 7 of the highest priority areas defined by Congress: 23 awards were made in breast cancer research, 14 in ovarian cancer research, 6 in cervical cancer research, 10 in prostate cancer research, 8 in gene therapy research, 7 in vaccine research, and 4 in AIDS-related cancer research; (2) A supplement initiative was implemented after collaborative discussion with the National Institute of Allergy and Infectious Diseases and the Office of AIDS research at NIH that will result in the establishment of AIDS-related cancer tissue resources and greater scientific linkage between AIDS research and cancer research in nine cancer centers located in areas of the Nation with the highest incidence and mortality to AIDS; (3) A new initiative was implemented that resulted in the funding of 12 cancer center planning grants in underserved areas of the Nation in order to enhance the geographic diversity of the program and extend the benefits of research to a broader population base; (4) 10 cancer centers have been linked to specific regions of the Nation (i.e., the Pacific Region, the Northwest Region, the Southwest Region, the Central/Plains Region, and the Eastern Region) and Native American populations (i.e., American Samoans, Native Hawaiians, Alaskan Natives, and American Indians) in these regions in order to establish and sustain training and research opportunities for Native Americans that will have an impact on reducing cancer incidence and mortality in these populations.

New Programs in Cancer Education and Training
The NCI has implemented a new training program designed to train clinical research scientists to ensure that the translational research opportunities of the future will be investigated by well-trained physicians who can collaborate, freely and knowledgeably, with a high-quality basic cancer research establishment. In addition, the cancer education grant mechanism (R25) has been used to achieve a number of important objectives of concern to Congress and the American people. One initiative encourages institutions to develop curriculum for nurses and physicians that will emphasize state-of-the-art awareness of key

quality-of-life issues in pain management, rehabilitation, and psychosocial services. Another initiative encourages institutions to include in the training and continuing education of cancer physicians and other health care professionals curriculum in cancer prevention and associated areas that are likely to have a major public health impact. A third initiative provides cancer centers greater opportunity to develop educational outreach programs for health care professionals that will impart state-of-the-art knowledge and technology to local communities served by the center.

Detection of RAS Mutations for the Evaluation of Patients at High Risk for Colorectal Cancer

Mutations in the *ras* gene are present in 40-50% of colorectal tumors. NCI-supported researchers have exploited the frequency of *ras* mutations in colorectal tumors to demonstrate the power of molecular techniques for detecting cancer. *ras* mutations were detected by polymerase chain reaction (PCR) analysis of DNA isolated from the stool of eight of nine patients known to have colorectal tumors containing those mutations. The sensitivity of the PCR assay suggested that it might be effectively used to evaluate patients at very high risk for colorectal cancer and possibly to monitor response to therapy in patients whose primary tumor was shown to contain a *ras* mutation.

New Prospects for the Development of Cancer Vaccines

The critical step in the development of an immune response is detection of an antigen by a T lymphocyte. It has been known for a decade that the T cell recognizes not an intact antigenic protein, but a specific peptide fragment, derived from the antigen by enzymatic degradation within an antigen-presenting cell. Immunogenic fragments are then bound to a cell-surface major histocompatibility complex (MHC) molecule and the T cell is activated by the peptide-MHC complex. This level of understanding of the importance of the peptide-MHC complex has been attained mostly with indirect evidence. Each antigen- presenting cell displays a very diverse collection of peptides and available technology has been inadequate for identification of natural antigenic peptides. This previously limited the ability of researchers to identify T-cell defined tumor antigens. However, a series of outstanding developments in immunology, molecular biology and peptide chemistry have recently combined to permit isolation and characterization of active peptide fragments that lead to cell-mediated tumor-specific immune responses. The methods developed and the results obtained suggest more direct approaches to the development of effective vaccines against tumors than were previously possible.

Prevention of Tumor Cell Invasion and Metastasis

A major obstacle to successful cancer therapy is metastasis, the invasion of cancer cells from their primary tumor site into adjacent tissue and blood vessels and the subsequent spread of the cancer into distant organs throughout the body. NCI-supported scientists have made exciting new discoveries about the molecular mechanisms responsible for this process and are using this knowledge to develop new strategies to inhibit and prevent cancer metastasis.

TIMP-2, a newly identified protein that inhibits the enzyme responsible for the destruction of the basement membrane, has been shown in experimental studies to block both tumor cell invasion and metastasis formation. It also blocks angiogenesis or the formation of new blood vessels required for tumor expansion. TIMP-2 is undergoing preclinical testing in preparation for clinical trials for treatment of prostate and breast cancer. New data suggest that TIMP-2

offers excellent potential for gene therapy. When the gene for TIMP-2 is inserted into human tumor cells such that they "overexpress" the TIMP-2 protein, these tumor cells exhibit markedly reduced tumorigenicity and metastatic potential. The injection of TIMP-2 into a tumor population might reduce the metastatic potential of that tumor, arresting its further development and spread.

NM23, the first in a family of metastasis suppressor genes, also offers exciting possibilities for gene therapy. In cancer cells, mutation or loss of NM23 is associated with a disordered state that favors malignant progression. Loss of NM23 in breast cancer is associated with a highly significant reduction in patient survival. When NM23 is introduced (transfected) into human breast cancer cells these "transfected" cells form significantly fewer metastases to the regional lymph nodes and lungs than do control cells. In addition, these NM23 transfectants were much more susceptible to the killing effects of the chemotherapeutic drug cisplatin. Intensive efforts are underway to pursue these advances further, to identify the biological regulators of NM23 expression and the biochemical pathway for NM23 suppression of metastatic potential. The identification of drugs that mimic the action of NM23, or that can enhance the expression of NM23 in tumor cells offers an entirely new therapeutic strategy.

Particularly exciting is the development of CAI (carboxy amino imidazole), a new drug that inhibits metastasis by blocking the formation of "autocrine motility factors" produced by tumor cells to promote their movement through surrounding tissue and blood vessels. Laboratory studies have shown the ability of CAI to markedly inhibit the growth of many types of tumor cells. Oral administration of CAI to animals arrests or inhibits both primary tumor and metastasis growth. CAI has now entered clinical testing.

Division of Cancer Treatment

Human Gene Therapy

In May 1989, in an attempt to "activate" TIL cells so that they become even more effective in killing tumor cells, scientists from NCI and National Heart, Lung and Blood Institute (NHLBI) began the first clinical trial in which a foreign gene transfected into a human cell was given to a patient. This preliminary study involved the transduction of the neomycin resistance gene (neo) into TIL cells in order to monitor their traffic throughout the body and, thus, help scientists better understand how these cells work in cancer therapy. This landmark study, the first approved study to introduce foreign genes into humans, showed that retroviral gene insertion is feasible and safe.

The first gene therapy trial designed to infuse tumor infiltrating lymphocytes (TIL) containing the inserted human gene for tumor necrosis factor (TNF) into patients with advanced melanoma began in January 1991. The TNF gene was selected for this trial because it has shown dramatic cancer cell-killing potential in mice. To maximize the cancer cell-killing potential of TNF and to minimize the anticipated toxic effects of TNF in humans, scientists are targeting these transfected TILs in a tumor specific manner, thus sparing normal cells from TNF toxicity.

This human gene therapy trial is designed both to determine the safety of administering TNF to humans and improve TIL/IL-2 therapy. The implications of this study are far-reaching; this new approach may eventually have applications to the treatment of a variety of cancers and may provide new avenues for the treatment of a variety of disease caused by the inactivity or lack of certain genes, i.e., sickle cell anemia, cystic fibrosis, and alpha-1-antitrypsinase

deficiency, among others. More recently, a second gene therapy trial has begun in cancer patients using gene modified tumor as a cancer "vaccine" to immunize patients with advanced cancers against their own tumors. In addition, a recently approved trial in breast cancer patients will study the transfer of the neo gene into hematopoietic stem cells of breast cancer patients undergoing high dose chemotherapy with autologous bone marrow transplant. This study will be followed in early 1993 by attempts to transfer the multidrug resistance 1 (mdr1) gene into hematopoietic stem cells of breast cancer patients, to enable the delivery of high-dose chemotherapy with less toxicity.

Clinical Drug Resistance

One of the major roadblocks for chemotherapeutic agents is the development of clinical resistance, i.e., the acquired ability of a neoplastic cell to become insensitive to the effects of chemotherapeutic agents through a variety of adaptive mechanisms. The antimetabolite class of antineoplastic agents represents one of the most commonly used group of agents for the treatment of a variety of human tumors including the leukemias, the lymphomas, and carcinoma of the breast, gastrointestinal, and upper aero-digestive systems. These agents produce their cytotoxic effects by inhibiting certain critical intracellular target enzymes. Recent studies have indicated that an important mechanism by which malignant cells become insensitive to these agents is by an acute amplification of these target enzymes. A critical mechanism in the regulation of this acute induction appears to be the efficiency with which the messenger RNA encoding for the enzymes is translated. The level of the target enzyme central to 5 FU therapy, thymidylate synthase, appears to be regulated by a unique autoregulatory pathway wherein the protein end product can control the efficiency of its own translation. Recent studies have suggested that the use of interferon, particularly gamma-interferon, can interdict the acute induction of thymidylate synthase and thus render malignant cells sensitive to the effects of the fluoropyrimidines. These observations have been applied to the treatment of patients with advanced gastrointestinal malignancies using the combination of 5 FU, leucovorin, and alpha-interferon. The preliminary results of these trials have been sufficiently encouraging to prompt the testing of this regimen in the adjuvant setting for patients with colon carcinoma.

Tumor Suppressor Genes

We have identified in human lung cancer a consistent pattern of somatic mutations targeted to a limited number of tumor suppressor genes. For example, we have found that the retinoblastoma gene (a paradigm for tumor suppressor genes) is inactivated in at least 95 percent of all small cell lung cancer samples, while in non-small cell lung tumors the retinoblastoma gene is inactivated in approximately 10 percent of samples tested. In small cell lung cancer we have observed inactivation of the retinoblastoma gene resulting from large structural deletions of DNA with absent mRNA production and by subtle point mutations resulting in dysfunctional protein products. Another tumor suppressor gene, the p53 gene, is also a target for frequent somatic mutations in both small cell lung cancer and non-small cell carcinomas. Experiments in progress have shown that the re-introduction of the retinoblastoma gene into lung cancer cell lines results in suppression of tumorigenicity in nude mice assays, a finding consistent to that previously reported in similar experiments with retinoblastoma tumor cell lines. Re-introduction of the p-53 gene has even more dramatic effects with a consistent suppression of cell growth *in vitro*. In collaboration with the Pulmonary Branch, NHLBI, we are constructing a series of

retroviral vectors containing either the retinoblastoma gene or the p53 gene to directly test tumor suppression *in vivo*.

Nitroxides as Protectors Against Oxidative Stress

The term "oxidative stress" has emerged to encompass a broad variety of stresses, some which have obvious implications for health care. Many modalities used in cancer treatment including x-rays, and some chemotherapy drugs, exert their cytotoxicity via production of oxygen related free radicals thereby imposing added burden to normal detoxification systems. A variety of toxic oxygen-related species including superoxide, hydrogen peroxide, and hydroxyl radical can be produced and when left unchecked these free radical species can undoubtedly damage cells and tissues. Free radicals and toxic oxygen-related species have been implicated in ischemia/reperfusion injury and have long been thought to be important in neutrophil-mediated toxicity of foreign pathogens. There is obvious interest in devising additional approaches, apart from inherent intracellular detoxication systems, to protect cells, tissues, animals, and humans against oxidative stress. We have identified a set of stable nitroxides that possess superoxide dismutase-like activity and have the advantage of being low molecular weight, cell membrane permeable, metal independent, and are capable of completely protecting mammalian cells against cytotoxicity from superoxide generated by hypoxanthine/xanthine oxidase and cytotoxicity from hydrogen peroxide exposure, although they exhibit no catalase-like activity. Further, we have recently demonstrated that nitroxides afford protection against ionizing radiation for both *in vitro* and *in vivo* systems. We have also shown that nitroxides protect against radiation-induced alopecia in mammals. Since these agents can detoxify superoxide, hydrogen peroxide, and prevent reduction of hydrogen peroxide to the highly toxic hydroxyl radical, they may ultimately have application in protection from biologic damage caused by post-ischemic reperfusion injury associated with re-opening of arteries after heart attacks or strokes, as well as lessening the life threatening toxic effects of exposure to elevated oxygen concentration as is sometimes necessary while providing life support during acute care. The Radiation Biology Section of the Radiation Oncology Branch is currently conducting studies to further understand the mechanism(s) of nitroxide protection with the aim of bringing appropriate compounds to clinical trials.

Interleukin-2 and R24

The Clinical Research Branch has continued the study of the murine monoclonal antibody R24, in combination with IL-2. The IL-2 regimen was adapted from a treatment approach developed in the Biological Response Modifiers Program. Patients received IL-2 twice weekly at high doses for the first 3 weeks of treatment. IL-2 doses then were reduced to a lower outpatient dose and R24 was also given twice weekly for four doses. Of 36 sequentially treated patients, 30 were eligible for tumor measurement. Ten partial responses were seen in 22 patients who had never received prior chemotherapy, but only 1 partial response was seen in 8 patients who had received prior chemotherapy. In the responders and non-responders, there was essentially complete overlap in measured peripheral blood NK activity. Following the R24/IL-2 administration, however, short-term bursts of circulating interferon-γ were seen in some patients who later responded. These immune monitoring observations, together with other *in vitro* correlates, are being studied for insights into possible mechanisms of response or resistance. Another group of patients is currently being studied without the concomitant use of cyclophosphamide, also employed as an immune modulator. Follow-on trials are being readied using the same regimen with

other monoclonal antibodies which may participate in similar mechanisms of action with IL-2.

T-cell Antigen Receptor

The Immunotherapy Laboratory, Clinical Research Branch, has begun to explore the mechanisms of immune suppression induced by tumor as a way of explaining the low responses in immunotherapy protocols. The data demonstrate that lymphocytes obtained from mice bearing subcutaneous tumor (MC-38 colon adenocarcinoma) have a greatly decreased anti-tumor effect (therapeutic) *in vivo*, which is paralleled by a decreased lytic function. All other functions (lymphokine production, cellular proliferation) seem to be normal. These findings led to the examination of the T-cell antigen receptor (TCR) to test whether changes in this structure, and therefore in the process of signal transduction, might be responsible for the alterations in T-cell function. Marked changes have been observed in the TCR, namely a complete loss of the ζ chain, which alters the signal transduction process. This alteration in the TCR appears to be induced by the tumor cells, or a tumor-derived product rather than by "suppressor" cells. These findings could offer insight into mechanisms for suppression of the human immune response and its role in the response of patients with cancer to immunotherapy.

Studies to improve chemotherapeutic disease and recovery

Thrombocytopenia is a frequent side effect of chemotherapy of malignant disease and commonly limits attempts at escalation of dosage. The Clinical Research Branch combined IL-1α with high dose carboplatin in patients with advanced malignancies to determine if IL-1α could ameliorate carboplatin-induced thrombocytopenia. IL-1α treatment significantly accelerated platelet recovery and limited the duration of thrombocytopenia compared to control patients treated with carboplatin alone. This study demonstrates the potential utility of IL-1α as a hematopoietic agent.

The Taxanes

Taxol, and related compounds, represent one of the most important developments in therapeutics in recent years. Taxol, as a single agent, has now been extensively studied in several settings. It is clear that approximately one third of ovarian and one half of breast cancer patients may objectively respond to Taxol. In combination with other cytotoxics (such as platinum, cyclophosphamide, or doxorubicin), the clinical activity may be even greater. Moreover, there is developing data to suggest that Taxol may be active in other disease settings as well. The Cooperative Research and Development Agreement (CRADA) with Bristol Myers-Squibb has been exceedingly successful. A major compassionate distribution program for refractory ovarian and breast cancer patients has been instituted and more than 2,000 women so treated. The FDA will evaluate the Taxol ovarian application in November 1992, and the drug could be commercially available relatively soon. In addition, Bristol Myers-Squibb expects to have an alternate source of the drug in commercial production some time in 1993, through semi-synthetic conversion of precursor molecules found in the needles of other species of Taxus growing in Europe and Asia. Moreover, a CRADA with Rhone-Poulenc to study Taxotere has been successfully concluded. Overall, considerable progress has been made in providing access to these drugs, sponsoring important clinical investigation, and solving supply problems.

Hormone-Refractory Prostate Cancer

This disease has been refractory to conventional chemotherapy. Recent advances in tumor cell biology provide new tools to investigate the biology of prostate carcinoma cells. We have taken the tack that such an investigation would lead to the identification of new targets for drug development with greater specificity. The first agent of this type has been suramin. This drug blocks autocrine and paracrine growth stimulation by PDGF and FGF. Since FGF has been implicated in regulation of prostate cancer growth, we initiated a trial of this drug in the treatment of prostate cancer. We found a response rate of approximately 30 percent. This initial observation has been duplicated in trials at other institutions and the response rates run between 30-50 percent. Encouraged by this observation, we initiated a wider investigation into prostate cancer biology. Prostate cancer cells express abundant normal cellular *src*. We have found that the benzoquinone ansamycin *src* kinases inhibitors herbimycin A, macbecin II and geldanmycin rapidly kill prostate cancer cells at concentrations 100 to 1,000 fold less than required to kill most other mammalian cells. These drugs have now passed DN2A and drug formulation and preclinical toxicology are planned. Phenylacetate is the end metabolite of phenylalanine and is very active in triggering terminal differentiation of prostate cancer cells. An IND for this agent has been filed.

AIDS in Children

Children are among the most rapidly growing of populations with HIV infection. Although AIDS in children has similarities to the disease in adults, it also has many differences. Of particular importance is the impact of HIV on the developing nervous system and the immune systems. Indeed, the course of infection is much more accelerated in the pediatric population, with nearly 80 percent of HIV-infected children developing symptoms within their first 2 years of life (in contrast to the 8-10 year incubation period in adults). The Pediatric Branch is studying the virological, immunological and other factors that contribute to this more accelerated course of the disease. Building on the principles learned from the care and treatment of children with cancer, the Pediatric Branch is also attempting to develop more effective treatment strategies. For example, having demonstrated the benefits of monotherapy with either azidothymidine (AZT) and dideoxyinosine (ddI) in treating children with symptomatic HIV infection, the Pediatric Branch is conducting a study using combination therapy with these agents. Combination regimens have proven to be an important reason for the therapeutic advances that have occurred in children with cancer. The preliminary data suggests that such combination regimens may be more successful than single agent therapy. The Pediatric Branch plans to build on these observations by combining drugs that work on different portions of the life cycle of HIV to achieve an even greater therapeutic index.

Division of Cancer Etiology

Dietary Mutagens

A number of chemicals known as heterocyclic aromatic amines (HAAs) have been purified from cooked ground beef, a major protein in the western diet. All but one, PhIP, characterized to date, are very potent mutagens in a bacterial assay system known as the Ames test. PhIP is a relatively weak mutagen, but it is present in ten-fold greater concentrations in cooked beef than any other HAA, and is the most potent HAA mutagenicity study utilizing mammalian cells rather than bacteria.

Thus far only three of the HAAs, referred to as IQ, MeIQ and MeIQx, have been evaluated in long-term rodent bioassays, and all three have been found to induce a variety of tumors including tumors of the liver and gastrointestinal system. The toxic effects of this group of chemicals are thought to be based on their metabolism to reactive forms which can react with DNA to form complexes known as adducts. Synthesis of several reactive metabolites of IQ have now been accomplished. Synthesis and characterization of the major DNA-IQ adducts and examination of DNA-IQ adducts in rodents and non-human primates is underway. The role of specific cytochrome P-450s in the metabolic activation of IQ is being evaluated. One such adduct was synthesized and shown to be formed *in vitro* when either of the two metabolites reacted with DNA. Cynomolgus monkeys receiving daily oral doses of IQ at 20 mg/kg and 10 mg/kg have been diagnosed with liver tumors. The tumors appeared approximately 3 years following exposure, a latent period similar to that of diethylnitrosamine, the most effective liver carcinogen ever tested in non-human primates. Studies in non-human primates on the carcinogenic effects of 8-meIQx and PhIp are also underway but neither has as yet included tumors, possibly because they have not been on test for a sufficiently long period of time.

Molecular studies with p53

The most common cancer-related genetic change known at the molecular level is mutation in the p53 tumor suppressor gene, which is implicated in lung, breast, colon, liver and many other cancers. These p53 mutations can lead to losing normal tumor suppressor functions of p53 and to gaining functions as an oncogene. Recent research findings have linked environmental exposure to a carcinogenic mold product known as aflatoxin B to specific alteration in condon 249 of the p53 gene. This observation provides strong evidence for a molecular mechanism for chemical carcinogenesis and raises the exciting prospect that mutational analysis may uncover the molecular "fingerprints" left by other environmental carcinogens. Accumulating evidence indicates that the p53 mutational spectrum differs among various cancers, and analysis of these mutations is providing clues to the etiology of diverse tumors and to the function of specific regions of p53.

Studies on the Li-Fraumeni Syndrome

Only about 100 families around the world are known to have the rare genetic disorder known as the Li-Fraumeni Syndrome, but they serve to highlight the point that cancer is in some cases an inherited disease. Members of these families are highly susceptible to several tumors, especially breast cancer, often developing the malignancies before they are 30 years old. Recently NCI scientists and their collaborators at Massachusetts General Hospital in Boston reported that the gene defect underlying the LFS is a mutation in the p53 gene, and that the gene defect is present in the germ cells which means it can be passed from one generation to another. This was an important breakthrough because it will make it possible to identify precisely which members of LFS families carry the gene defect and are thus at high risk of getting cancer. These individuals could then be the subject of individual monitoring in order to detect cancer early on, when they are most curable. To date, at least 7 component cancers of the syndrome have been identified on the basis of their excess occurrence in Li-Fraumeni families: breast cancer, soft-tissue sarcoma, osteosarcoma, acute leukemia, brain tumors, adrenocortical carcinoma, and gonadal germ-cell tumors. Recent studies have detected germline p53 mutations in several additional Li-Fraumeni families as well as in a few cancer patients

without the clinical features of the syndrome; The latter might have new mutations or mutations with low penetration. On the other hand, germ line p53 mutations have not been detectable in some families with classical Li-Fraumeni syndrome, raising the possibility of genetic heterogeneity.

Human Papillomaviruses and Cancer Risk

The papillomaviruses are small DNA-containing viruses which are associated with benign warts and papillomas in a variety of higher vertebrates, including man. There are now 60 human papillomaviruses (HPVs) which have been identified. Approximately 18 of these have been associated with lesions of the human genital tract; several of these have been associated with genital warts which rarely progress to carcinoma. Others have been associated with cervical dysplasia and other pre-neoplastic lesions which may progress to malignancy. HPVs have also been linked to human cervical carcinoma and other anogenital carcinomas including cancer of the penis, vulvar carcinoma, and perianal carcinoma. Recently many major advances have been made in understanding the molecular biology of the HPVs. The viral genes which are expressed in cervical cancer tissues have been identified and shown to be at least in part responsible for the malignant characteristics of the cells. Two viral genes, designated E6 and E7, are now recognized to be transforming genes of the HPVs. The E7 protein has been shown to form stable complexes with a cellular protein, the product of the retinoblastoma (RB) gene. The RB gene is missing or inactivated in a variety of human cancers, leading researchers to believe that the RB protein normally acts to regulate cell growth. By binding to the RB protein, E7 may alter the activity of RB, thereby allowing cells to grow in an uncontrolled fashion. Evidence now exists that the E6 gene product also complexes with the p53 cellular protein that, as described above, is also involved in regulating cell growth. The identification of the viral genes which contribute directly to the deregulated growth of the cancer cell and the identification of the cellular protein with which they interact should provide insight for the screening and development of antiviral agents.

Studies of Cancer in Women

NCI epidemiologists are pursuing a wide variety of analytical studies designed to elucidate the relationship of exposures and host factors to cancer outcomes specific to women. The approaches utilized in these studies have been both retrospective and prospective in nature, with many of the studies utilizing laboratory probes to better define exposures. Cancers unique to women are the focus of these studies, and include malignancies of the breast, ovary, cervix, endometrium, and vaginal/vulva. In a large study of breast cancer in relation to oral contraceptives and other exposures, a black-white comparison component has been added which will assess the excess rate of breast cancer among black women at premenopausal ages. After 2 years of baseline data has been analyzed, biological specimens will be collected and selected biochemical measurements performed. Other NCI studies are evaluating radiotherapy for breast cancer as a primary risk factor for second primary breast cancer occurring in the contralateral breast. If such a risk exists, the dependence of the risk on dose and age at exposure will be evaluated. Individual dosimetry determinations are being made; the record abstraction is underway. NCI epidemiologists are also assessing the role of pesticides and other agricultural exposures, as well as cooking practices, in determining a woman's risk for breast cancer.

Division of Cancer Prevention and Control

Preventing Breast Cancer with Tamoxifen

The Breast Cancer Prevention Trial was implemented in the Community Clinical Oncology Program (CCOP) network in FY 1992. The study is testing the ability of tamoxifen, an anti-estrogen medication used in post-surgical treatment of early stage breast cancer, to prevent the development of breast cancer in women at increased risk for developing the disease. Based on results from treatment clinical trials, scientists estimate that tamoxifen has the potential to reduce the incidence rate of breast cancer in high-risk women by at least 30 percent. Approximately 16,000 women at increased risk for breast cancer due to age, family history, and personal history (i.e., age at first birth, age at menarche, and previous breast biopsies) will be randomized to receive tamoxifen (20 mg/day) or placebo for an initial period of 5 years.

While tamoxifen acts as an anti-estrogen in breast tissue by blocking effects of natural estrogens on the breast cells, it has estrogen-like actions at other sites in the body that resemble the effects of estrogen replacement therapy in postmenopausal women. Tamoxifen lowers serum cholesterol, mainly LDL cholesterol, and may slow bone loss associated with osteoporosis. Thus, while the study focuses on decreasing incidence of breast cancer as the major endpoint, cardiovascular effects, alterations in bone/mineral metabolism, occurrence of second primary cancers, and impact on quality of life will also be assessed. The total trial will last ten years.

Polyp Prevention Trial

This initiative is one of the NCI's first large trials involving dietary modification. In this trial, diets will be modified to a low-fat, high-fiber and high fruit and vegetable dietary pattern in an effort to prevent the recurrence of adenomatous polyps of the colon. The multi-center randomized trial involving 2,000 men and women also will investigate the relationships between dietary intervention and intermediate endpoints and between those endpoints and subsequent neoplasia.

Minorities, the Underserved, and Cancer

NCI has established major initiatives to address the cancer needs of U.S. minorities, low-income groups, and other medically underserved populations who are identified in the report of the Secretary's Task Force on Black and Minority Health in 1983 and emphasized as part of the Healthy People 2000 Objectives. Supported by recent data on cancer, programs have been initiated for Black Americans, Native American (American Indians/Alaskan Natives and Native Hawaiians), and Hispanic populations as well as low-income, inner-city, and other medically underserved populations.

The National Black Leadership Initiative on Cancer (NBLIC) is a continuing activity that was implemented by the NCI in late 1987. The purpose of this health education initiative is to mobilize Black Americans (professional and lay) to develop coalitions that promote NCI's cancer prevention and control goals and stimulate the involvement of the Black American community in this effort. The NBLIC has created a network of concerned and active Black American leaders throughout the country to help organize, implement, and support cancer prevention programs at the national and local level.

The National Hispanic Leadership Initiative on Cancer (NHLIC), modeled after the NBLIC, will address cancer control barriers including risk factors and cancer control service utilization aspects of Hispanic communities. NHLIC will impact an estimated 16 million Hispanics (80 percent of the U.S. Hispanic population) during the first 5 years. The mobilization of community leaders will promote the utilization of culturally sensitive cancer prevention and control programs.

The Appalachia Leadership Initiative on Cancer (ALIC) is targeted to all persons, particularly those who are medically underserved residing in the region of the United States known as Appalachia. This health education initiative will mobilize the leaders (professional and lay) of Appalachia to develop coalitions to promote NCI's cancer prevention and control goals and stimulate the involvement of all Appalachian communities in this effort. Among the ALIC's priorities are the promotion of smoking cessation, dietary modification, and early detection screening and treatment.

Science Enrichment Program

The Science Enrichment Program (SEP), originally a two-year pilot project, was developed to encourage underrepresented minority and underserved youth as well as individuals from low-income backgrounds to pursue professional careers in science research fields. The pilot national SEP was conducted during FY 1990 and 1991 at local colleges in the Washington metropolitan area. Over 250 nationally selected students (incoming tenth graders) participated. As a result of this highly successful program NCI decentralized the SEP to include joint sponsorship by a number of the Institutes of the National Institutes of Health. During FY 1992, four "regional" SEPs were funded at the following institutions: University of Massachusetts at Amherst; University of Kentucky at Lexington; University of Southern California in Los Angeles; and the American Indian Science and Engineering Society in Boulder, Colorado. These institutions received 2 year awards to fund 30 to 50 students from minority and medically underserved populations in summer programs for 1992 and 1993.

The American Stop Smoking Intervention Study (ASSIST)

ASSIST represents a collaborative effort between the NCI, the American Cancer Society, State and local health departments, and other organizations to develop comprehensive tobacco control programs. The purpose of ASSIST is to demonstrate that the wide-spread, coordinated application of the best available strategies to prevent and control tobacco use through community-based coalitions will significantly accelerate the current downward trend in smoking and tobacco use, thereby reducing the number and rate of tobacco-related cancers in the United States. ASSIST is expected to help up to 4.5 million smokers. Currently, 17 sites are being funded.

Screening Trial for Prostate, Lung, Colorectal, and Ovarian Cancers (PLCO)

This is a 16 year randomized trial in which 37,000 men will be screened for 4 years for prostate, lung, and colorectal cancers and 37,000 women will be screened for the same period of time for lung, colorectal, and ovarian cancers. Equal numbers of men and women will be followed with routine medical care as controls. There will be a 10 year follow-up of study subjects and controls to determine the effects of screening for those four sites on mortality. Genetic marker studies of diagnostic biopsy specimens relating genetic aberrations to these cancers will be conducted. In addition, planning is underway for an associated biorepository. Such a bank would provide an opportunity to test promising serum molecular markers for their value in predicting these cancers.

Community Clinical Oncology Program (CCOP)
The CCOP has established a network of cancer specialists, surgeons, and primary care physicians with access to cured cancer patients and their families and other individuals at increased risk of developing cancer. The network includes physicians practicing in community settings as well as those in university hospitals and medical schools across the country. It is through this network that several large-scale chemoprevention trials are being implemented to study the effectiveness of various agents to prevent cancer. The Tamoxifen Chemoprevention Trial was implemented in the CCOP clinical trials network in FY 1992.

Minority-based Community Clinical Oncology Program
The MBCCOP, which is modeled after the CCOP, was initiated in 1990 to provide minority cancer patients with access to state-of-the-art cancer treatment and control technologies. Ten MBCCOPs involving over 270 physicians are currently enrolling patients onto cancer prevention, control and treatment clinical trials.

Division of Extramural Activities

Cancer Centers and Cancer Control in Minority Populations
Through the Comprehensive Minority Biomedical Program (CMBP) and the Cancer Center Minority Enhancement Awards (MEAs), the National Cancer Institute seeks to expand minority involvement in cancer control research. MEAs are awarded competitively as supplements to funded NCI Cancer Centers for the purpose of facilitating the participation of minority groups in cancer control research. By broadening the operational base of cancer centers, MEAs allow expansion of center-based cancer control efforts in prevention, early detection, screening, pre-treatment evaluation, treatment, continuing care and rehabilitation, as well as stimulating the increased involvement of those primary care providers who serve minority populations.

The Minority Health Professional Training Initiative (MHPTI)
The overall intent of the first phase of the MHPTI is to provide a range of career development mechanisms for clinicians and cancer researchers, primarily at minority health professional institutions interested in increasing or enhancing their programs in oncology. The first phase of this Initiative began in 1991 with the award of four grants following the publication of three NCI Requests for Applications (RFAs)-- the Minority Oncology Leadership Award (K07), the Clinical Investigator Award for Research on Special Populations (K08) and the Minority School Faculty Development Award (K14)-- each describing a specific modification of the NIH Clinical Investigator Award. The second phase of MHPTI will focus on institutional enhancement at those schools that have traditionally made the major contribution to the production of minority health professionals.

Research Supplements for Underrepresented Minorities
Through the NIH-wide supplemental program entitled "Initiatives for Underrepresented Minorities in Biomedical Research", CMBP has considerably expanded its support to minority individuals who are pursuing careers in the biomedical research sciences. This program, which began as an extension of the NCI Minority Investigator Supplement Program, now includes supplements for Minority High School Students, Minority Undergraduate Students, Minority Graduate Research Assistants and Minority Individuals in Postdoctoral Training. While this mechanism provides support indirectly to minority scientists and students by way of funded grantees, the ultimate intent of these awards is to

influence a greater number of minority individuals to develop their research capabilities and pursue independent careers as cancer research investigators.

Co-funding
For the purpose of encouraging undergraduate and graduate students to pursue training related to cancer research, CMBP co-funds, with the Minority Access to Research Careers (MARC) Program of National Institute of General Medical Sciences, pre-doctoral fellowships to minority students and Honors Undergraduate Training Grants to minority institutions. Similarly, through co-funding with the Minority Biomedical Research Support program, NCI provides support for specific cancer-related projects at participating minority institutions.

Other NCI Training Opportunities
The Summer Training Supplement is an extension of the MARC program and provides increased training opportunities for MARC scholars by way of short-term intramural laboratory training at the NCI.

Support for Meeting Attendance
CMBP continues to encourage participation of minority students and researchers in annual professional scientific meetings by providing travel support to such organizations as the American Association for Cancer Research and the Electron Microscope Society of America.

Cancer Information Dissemination
As the result of a joint venture initiated with the NCI Office of Cancer Communications, the CMBP currently supports contracts that enable implementation of model strategies for the dissemination of cancer information to Black populations by utilizing minority academic institutions, in particular the Historically Black Colleges and Universities.

Office of the Director

Health Communication Internship/Fellowship Program
To increase the number of persons trained in cancer communications, this program provides a variety of training experiences for graduate-level students in health communications. Fellows are located in various parts of the Office of Cancer Communications and the International Cancer Information Center, where they work with staff members on health education projects or science writing.

Cancer Information Service
The Office of Cancer Communications supports a nationwide network of offices known as the Cancer Information Service (CIS). The CIS serves as the NCI's primary mechanism to disseminate accurate up-to-date information to the American public at the community level. As OCC field offices, the CIS provides information on cancer and local resources through its toll free phone service and conducts community outreach activities. Over 500,000 calls are received each year. In addition, the CIS serves as a catalyst for the adoption and adaptation of NCI education programs. Under a new program structure to be implemented in 1993 the CIS will serve the entire continental United States, Alaska, Hawaii, and Puerto Rico. The CIS offices are funded through a contract mechanism with NCI designated cancer centers and community hospitals.

International Cancer Information Center
To increase the dissemination of critical cancer information to physicians and health professionals involved in cancer care, the International Cancer

Information Center (ICIC) developed two services that make cancer information from PDQ available quickly and easily through fax (CancerFax®) or electronic mail (CancerNet™). Through these services, all PDQ cancer information statements, supportive care statements and cancer screening guidelines are available to interested health professionals anywhere in the world. To facilitate the communication with Spanish-speaking health professionals and patients, CancerFax® has been translated and is now available in Spanish as well as English.

The ICIC is also utilizing the Small Business Innovative Research (SBIR) program to explore the feasibility of using new technologies to disseminate NCI's computerized databases, PDQ and CANCERLIT. Recent contract awards are aimed at developing: 1) a portable medical record that will contain both patient data and patient-specific information from PDQ and CANCERLIT; and 2) voice-recognition and pen-based, wireless, front-end access to the NCI databases.

ICIC has signed a letter of intent to initiate a Collaborative Research and Development Agreement (CRADA) to develop and market an Integrated Oncology Workstation. The clinical workstation is an integral part of a clinical information system for the practicing physicians which automates medical records management and provides easy access to information resources for the support of medical care decision making and clinical trials management.

Public Information Dissemination

As part of its legislated mission, the National Cancer Institute actively supports cancer information dissemination activities. NCI works to ensure that the public, as well as the primary-care physician, is afforded easy access to up-to-date information regarding cancer prevention, detection and diagnosis, and treatment measures.

The NCI's information dissemination efforts include behavior modification studies, e.g. smoking and breast screening, as well as activities specifically directed towards professional and public audiences. The PDQ system is a database containing treatment recommendations and summary information on all active clinical trials supported by NCI. A directory of physicians and organizations that provide cancer care is also included in the PDQ system.

The Cancer Information Service (CIS), known to the public as 1-800-4-CANCER, is staffed by health professionals equipped to respond to public inquiries regarding cancer; often the PDQ system will be consulted. Over one-half of the callers receive a publication or other written material as a result of this service. Heightened public interest in new cancer treatment (i.e. gene vaccine therapy, taxol), results in a flood of calls to this toll free number.

The CIS consists of a nationwide network of 22 regional offices, 18 of which receive direct NCI funding. In addition to providing direct response to the public, the field offices support NCI's major outreach activities and conduct cancer education programs to meet specific local and regional needs.

In addition to individual mailings of pamphlets/brochures by the local network offices, the NCI widely distributes bulk volumes of pamphlets/brochures to hospitals, supermarkets, physician organizations, etc., for subsequent distribution to the public.

		Pamphlets/Brochures Distributed		
	CIS Inquiries	Publication Ordering Calls	Total Literature Distributed	PDQ Searches
FY 1992	550,000	143,000	24,000,000	30,000

Scientific Information Dissemination

The ICIC continues to promote the use of PDQ to the widest audiences possible. The ICIC developed two services that make the cancer information from PDQ available quickly and easily through fax (CancerFax®) or electronic mail (CancerNet™). These two services make all PDQ treatment, supportive care, and cancer screening guidelines available to interested health professionals anywhere in the world. To facilitate communication with Spanish speaking health professionals and patients, (CancerFax®) has been recently translated and is now available in Spanish as well as English. The ICIC continues to increase the number of distributors and methods of access (online, CD-ROM, PDQ 'C', and MUMPS) to PDQ and the NCI's literature database CANCERLIT. *The Journal of the National Cancer Institute*, the NCI's peer-reviewed scientific periodical publication, provides information regarding clinical and basic research advances to cancer professionals worldwide. ICIC staff present NCI's scientific information services, including database demonstrations and seminars, at national and international medical meetings to enhance the awareness of these services.

Directory of Personnel

Director, National Cancer Institute			
	Dr. Samuel Broder	Building 31 11-A-48	301-496-5615
Deputy Director			
	Dr. Daniel C. Ihde	Building 31 11-A-48	301-496-1927
Special Assistant			
	Dr. Judith E. Karp	Building 31 11-A-27	301-496-3505
Special Assistant for Minority Affairs			
	(Vacant)	Building 31 11-A-27	301-496-3506
Program Manager, Employment Opportunity Office			
	Ms. Maxine I. Richardson	Building 31 10-A-33	301-496-6266
Director, Office of Legislation and Congressional Activities			
	Ms. Dorothy Tisevich	Building 31 11-A-23	301-496-5217
Assistant Director for Program Operations and Planning			
	Ms. Iris Schneider	Building 31 11-A-48	301-496-5534
Chief, Planning, Evaluation, and Analysis Branch			
	Ms. Cherie Nichols	Building 31 11-A-19	301-496-5515
Associate Director for Prevention			
	Dr. Peter Greenwald	Building 31 10-A-52	301-496-6616
Associate Director for Cancer Communications			
	Mr. J. Paul Van Nevel	Building 31 10-A-31	301-496-6631
Chief, Information Resources Branch			
	Ms. Nancy Brun	Building 31 10-A-30	301-496-4394
Chief, Reports and Inquiries Branch			
	Ms. Eleanor Nealon	Building 31 10-A-31	301-496-6631
Chief, Information Projects Branch			
	Dr. Sharyn Sutton	Building 31 10-A-11	301-402-3304
Associate Director for International Affairs			
	Dr. Federico Welsh	Building 31 4-B-55	301-496-4761
Associate Director for International Cancer Information Center			
	Ms. Susan M. Hubbard	Building 82 102	301-496-9096
Chief, Computer Communications Branch			
	Mr. Nicholas B. Martin	Building 82 219	301-496-8880
Chief, Scientific Publications Branch			
Managing Editor, Journal of the National Cancer Institute			
	Ms. Julianne Chappell	Building 82 235	301-496-1997

Chief, International Cancer Research Data Bank Branch			
	Dr. Gisele Sarosy	Building 82 113	301-496-7406
Associate Director for Administrative Management			
	Mr. Philip D. Amoruso	Building 31 11-A-48	301-496-5737
Deputy Associate Director for Administrative Management			
	Mr. Donald Christoferson	Building 31 11-A-48	301-496-5737
Chief, Administrative Services Branch			
	Ms. Susan Kiser	Building 31 11-A-35	301-496-5801
Chief, Financial Management Branch			
	Mr. John P. Hartinger	Building 31 11-A-16	301-496-5803
Budget Officer			
	Ms. Mary Cushing	Building 31 11-A-16	301-496-5803
Chief, Personnel Management Branch			
	Ms. Marianne Wagner	Building 31 3-A-19	301-496-3337
Chief, Research Contracts Branch			
	Mr. John P. Campbell, Jr.	Executive Plaza South 604	301-496-8628
Chief, Management Analysis Branch			
	Mr. Thomas L. Kearns	Building 31 4-A-47	301-496-6985
Chief, Grants Administration Branch			
	Mr. Leo F. Buscher, Jr.	Executive Plaza South 216	301-496-7753
Chief, Extramural Financial Data Branch			
	Mr. Stephen M. Hazen	Executive Plaza South 643	301-496-7660
Chief, Management Information Systems Branch			
	Ms. Betty Ann Sullivan	Executive Plaza North 804	301-496-1038
Director, Office of Laboratory Animal Science			
	Dr. John Donovan	Building 31 4-B-59	301-496-1866
Director, Office of Technology Development			
	Dr. Thomas D. Mays	Building 31 4-A-51	301-496-0477
Associate Director for Frederick Cancer Research and Development Center			
Frederick Cancer Research and Development Center, Frederick Maryland			
	(Vacant)	Building 427 9	301-846-5096
General Manager/Project Officer			
	Dr. Cedric W. Long	Building 427 1	301-846-1108
Deputy General Manager			
	Mr. Richard Carter	Building 427 2	301-846-1106
Director, Division of Cancer Etiology			
	Dr. Richard H. Adamson	Building 31 11-A-03	301-496-6618
Administrative Officer			
	Mr. Mark F. Kochevar	Building 31 11-A-11	301-496-6556

Director, Division of Cancer Biology, Diagnosis, and Centers			
	Dr. Alan S. Rabson	Building 31 3-A-03	301-496-4345
Administrative Officer			
	Mr. Lawrence D. Willhite	Building 31 3-A-05	301-496-3381
Director, Division of Cancer Treatment			
	Dr. Bruce A. Chabner	Building 31 3-A-48	301-496-4291
Administrative Officer			
	Mr. Lawrence J. Ray	Building 31 3-A-48	301-496-2775
Director, Division of Extramural Activities			
	Mrs. Barbara S. Bynum	Building 31 10-A-03	301-496-5147
Administrative Officer			
	(Vacant)	Building 31 10-A-10	301-496-5915
Director, Division of Cancer Prevention and Control			
	Dr. Peter Greenwald	Building 31 10-A-52	301-496-6616
Administrative Officer			
	Mr. Nicholas Olimpio	Building 31 10-A-50	301-496-9606

Director's Biography
Dr. Samuel Broder

Dr. Samuel Broder was named Director of the National Cancer Institute by President Reagan on December 22, 1988 and sworn in on January 10, 1989. Dr. Broder is a medical oncologist whose major research interest is clinical immunology, with special attention to the relationship between immune abnormalities and neoplastic diseases. He is a career officer in the United States Public Health Service.

Before becoming Director, Dr. Broder had been, since 1981, Associate Director for the Clinical Oncology Program in NCI's Division of Cancer Treatment. He came to NCI as a clinical associate in the Metabolism Branch of the Division of Cancer Biology and Diagnosis in 1972. In 1975, he became an investigator in the Medicine Branch, DCT, and returned to the Metabolism Branch as a senior investigator.

Dr. Broder's research has centered on the biology of the immune system with emphasis on abnormal immunoregulation in cancer, and on the relationship between cancer and immunodeficiency states including AIDS. Dr. Broder and his co-workers identified certain types of suppressor cells which induced immune impairment in some cancer patients. He and his co-workers also identified and characterized neoplasms which arose from helper and suppressor cells. In addition to his cancer research, Dr. Broder and his co-workers have worked on drug development, taking drugs rapidly from the test tube to patients, for the treatment of AIDS and related disorders. He is the recipient of numerous scientific awards. His major focus as Director has been the need to ensure balance among the three foundation stones of the Institute: basic research, clinical trials (in prevention and therapy), and cancer centers. He has also focused on the relationship between poverty and cancer.

Dr. Broder obtained his undergraduate and medical degrees from the University of Michigan. His internship and residency were at Stanford University. He is board certified in Internal Medicine and in Medical Oncology.

Former Directors of the National Cancer Institute

Dr. Vincent T. DeVita, Jr., M.D.
January 1980 - June 1980 (Acting)
July 1980 - August 1988

Dr. DeVita joined NCI in 1963 as a Clinical Associate in the Laboratory of Chemical Pharmacology. He served NCI as head of the Solid Tumor Service, Chief of the Medicine Branch, Director of the Division of Cancer Treatment and Clinical Director prior to his appointment as Director of NCI. In September 1988, Dr. DeVita resigned as NCI director to become Physician-in Chief at Memorial Sloan-Kettering Cancer Center.

Dr. Arthur Canfield Upton, M.D.
July 1977 - December 1979

Prior to his tenure as NCI Director, Dr. Upton served as Dean of the School of Basic Health Sciences at the State University of New York at Stony Brook.

Dr. Frank Joseph Rauscher, Jr., Ph.D.
May 1972 - October 1976

Dr. Rauscher served as Scientific Director for Etiology, NCI, prior to his appointment as Director of NCI in 1972.

Dr. Carl Gwin Baker, M.D.
November 1969 - July 1970 (Acting)
July 1970 - April 1972

During his tenure with PHS, Dr. Baker served as Scientific Director for Etiology, NCI, and as Acting Director of NCI prior to his appointment as Director in July 1970.

Dr. Kenneth Milo Endicott, M.D.
July 1960 - November 1969

Dr. Endicott served as Chief of the Cancer Chemotherapy National Service Center, PHS, and as Associate Director, NIH, prior to being appointed Director, NCI in July 1960.

Dr. John Roderick Heller, M.D.
May 1948 - June 1960

Dr. Heller joined PHS in 1934 and became Chief of the Venereal Disease Division prior to his appointment as Director of NCI in 1948.

Dr. Leonard Andrew Scheele, M.D.
July 1947 - April 1948

Dr. Scheele served in various capacities during his tenure with PHS prior to his appointment as Assistant Chief and, subsequently, Director of NCI in July 1947.

Dr. Roscoe Roy Spencer, M.D.
August 1943 - July 1947

Dr. Spencer became NCI's first Assistant Chief and, subsequently, was appointed Director of the Institute in 1943.

Dr. Carl Voegtlin, Ph.D.
January 1938 - July 1943

Dr. Voegtlin served as Professor of Pharmacology and Chief of the Division of Pharmacy at the Hygienic Laboratory prior to becoming the first Director of NCI in 1938.

National Cancer Advisory Board

Appointees	Expiration of Appointment
Dr. Paul Calabresi, Chairperson *Rhode Island Hospital* *Providence, RI*	1996
Dr. Frederick F. Becker *University of Texas* *Houston, TX*	1996
Dr. Erwin P. Bettinghaus *Michigan State University* *East Lansing, MI*	1994
Dr. David G. Bragg *University of Utah* *Salt Lake City, UT*	1994
Ms. Zora K. Brown *Cancer Awareness Program* *Washington, D.C.*	1992
Dr. Kenneth Chan *Ohio State University* *Columbus, Ohio*	1996
Dr. John R. Durant *University of Alabama* *Birmingham, AL*	1992
Dr. Bernard Fisher *University of Pittsburgh* *Pittsburgh, PA*	1992
Dr. Phillip Frost *The IVAX Corporation* *Miami, FL*	1992
Mrs. Brenda L. Johnson *BrenMer Industries, Inc.* *New York, NY*	1994
Dr. Walter Lawrence, Jr. *Virginia Commonwealth University* *Richmond, VA*	1994
Mrs. Marlene A. Malek *Vincent Lombardi Cancer Center* *McLean, VA*	1996
Deborah K. Mayer, R.N., M.S.N. *MGH Institute of Health Professions* *Boston, MA*	1996
Mrs. Irene S. Pollin *Linda Pollin Foundation* *Bethesda, MD*	1992
Dr. Sydney Salmon *Arizona Cancer Center* *Tucson, AZ*	1996
Dr. Howard M. Temin *University of Wisconsin* *Madison, WI*	1994
Dr. Samuel Wells, Jr. *Washington University* *St. Louis, MO*	1994
Executive Secretary *Mrs. Barbara S. Bynum* *National Cancer Institute, NIH* *Bethesda, MD*	

Ex Officio Members

The Honorable Louis W. Sullivan, M.D. *Secretary for Health and Human Services* *Washington, D.C.*	Dr. James W. Holsinger, Jr. *Department of Veterans' Affairs* *Washington, D.C.*	Mrs. Jacqueline Jones-Smith *Consumer Product Safety Commission* *Bethesda, MD*
Dr. Bernadine Healy *Director, National Institutes of Health* *Bethesda, MD*	Dr. David A. Kessler *Food and Drug Administration* *Rockville, MD*	Dr. Kenneth Olden *National Institute of Environmental Health Sciences* *Research Triangle Park, NC*
The Honorable Lynn Martin *Secretary of Labor* *Washington, D.C.*	Dr. J. Donald Millar *National Institute for Occupational Safety and Health* *Atlanta, GA*	The Honorable Donald A. Henderson, M.D. *Office of Science and Technology Policy* *Washington, D.C.*
Dr. David J. Galas *U.S. Department of Energy* *Washington, D.C.*	The Honorable Enrique Mendez, Jr., M.D. *Department of Defense* *Washington, D.C.*	Mr. William K. Reilly *Environmental Protection Agency* *Washington, D.C.*

Alternates to Ex Officio Members

Ms. Rachael Levinson *Office of Science and Technology Policy* *Washington, D.C.*	Dr. Hugh McKinnon *Environmental Protection Agency* *Washington, D.C.*	Dr. Ralph E. Yodaiken *Department of Labor* *Washington, D.C.*
Dr. John R. Johnson *Food and Drug Administration* *Rockville, MD*	Dr. Raymond L. Sphar *Department of Veterans' Affairs* *Washington, D.C.*	Captain Bimal C. Ghosh, MC, USN *Department of the Navy* *Washington, D.C.*
Mr. Richard A. Lemen *National Institute for Occupational Safety and Health* Washington, D.C.	Dr. Andrew Ulsamer *Consumer Product Safety Commission* *Bethesda, MD*	Dr. John C. Wooley *Department of Energy* *Washington, D.C.*

Division Boards of Scientific Counselors

Division of Cancer Biology, Diagnosis and Centers	Albert H. Owens, Jr., M.D. Chairperson	1993	Margaret L. Kripke, Ph.D.	1993
			David M. Livingston, M.D.	1996
			Albert H. LuBuglio, M.D.	1994
	Barbara F. Atkinson, M.D.	1995	O. Ross McIntyre, M.D.	1994
	Eugene A. Bauer, M.D.	1992	Azorides R. Morales, M.D.	1995
	Judith L. Campbell, Ph.D.	1993	Robert L. Reddick, M.D.	1995
	Albert E. Dahlberg, M.D., Ph.D.	1996	Howard K Schachman, Ph.D.	1992
	Salter Eckhart, Ph.D.	1992	R. Babu Venkataraghavan, Ph.D.	1993
	Lois B. Epstein, M.D.	1995	Noel L. Warner, Ph.D.	1993
	Max E. Gottesman, M.D.	1996	Carolyn D. Whitfield, Ph.D.	1993
Division of Cancer Treatment	Ronald Levy, M.D. Chairperson	1993	Loretta M. Itri, M.D.	1994
			Donald W. Kufe, M.D.	1994
			Elliot C. Lasser, M.D.	1994
	Robert Baehner, M.D.	1993	Victor Ling, Ph.D.	1994
	Clara D. Bloomfield, M.D.	1995	Rodrique Mortel, M.D.	1995
	Paul P. Carbone, M.D.	1993	Allen I. Oliff, M.D.	1996
	Phillip Crews, Ph.D.	1993	Lester J. Peters, M.D.	1995
	Carlo M. Croce, M.D.	1995	Glenn D. Steele, Jr., M.D., Ph.D.	1995
	Robert W. Holden, M.D.	1994	JoAnne Stubbe, Ph.D.	1993
	William M. Hryniuk, M.D.	1992	Ralph R. Weichselbaum, M.D.	1993
Division of Cancer Etiology	G. Barry Pierce, M.D. Chairperson	1994	Stephen S. Hecht, Ph.D.	1992
			Maurice R. Hilleman, Ph.D.	1993
			Barbara S. Hulka, M.D.	1994
	Marcel A. Baluda, Ph.D.	1993	Ru Chih C. Huang, Ph.D.	1994
	Webster Cavanee, Ph.D.	1992	Abraham M. Nomura, M.D.	1992
	Donald S. Davies, Ph.D.	1995	Nancy L Oleinick, Ph.D.	1995
	James S. Felton, Ph.D.	1992	Alan P. Poland, M.D.	1995
	Lawrence J. Fischer, Ph.D.	1993	David Schottenfeld, M.D.	1992
	Peter J. Fischinger, M.D., Ph.D.	1994	Mimi C. Yu, Ph.D.	1994
Division of Cancer Prevention and Control	M. Alfred Haynes, M.D., M.P.H., Chairperson	1993	Elaine B. Feldman, M.D.	1994
			Cutberto Garza, Ph.D.	1994
			E. Robert Greenberg, M.D.	1995
	David S. Alberts, M.D.	1994	Charles H. Hennekens, M.D., Dr., P.H.	1994
	Sr. Mary M. Ashton, MHA, MSW	1993	Rumaldo Z. Juarez, Ph.D.	1993
	Helene G. Brown	1995	Arnold D. Kaluzyn, Ph.D.	1995
	Carol N. D'Onofrio, Dr., P.H.	1993	Ross L. Prentice, Ph.D.	1993
	Harmon J. Eyre, M.D.	1993	Maryann Roper, M.D.	1994

Frederick Cancer Research and Development Center

FCRDC Advisory Committee	Edward B. Ziff, Ph.D. *Chairperson*	1992
	Carmia G. Borek, Ph.D	1993
	James R. Broach, Ph.D.	1993
	Donald R. Helinski, Ph.D.	1994
	Phyllis J. Kanki, D.V.M., D. Sci.	1993
	Alexandra M. Levine, M.D.	1993
	Frank Lilly, Ph.D.	1993
	Raymond W. Ruddon, Jr., M.D., Ph.D.	1993
	Steve R. Tannenbaum, Ph.D.	1993
Ad Hoc BSC Representatives	R. Babu Venkataraghavan, Ph.D. (DCBDC)	1993
	Marcel A. Baluda, Ph.D. (DCE)	1993
	vacant (DCPC)	
	Ralph R. Weichselbaum, M.D. (DCT)	1993
Ex Officio Member of NCAB	vacant	

President's Cancer Panel

Harold Freeman, M.D. 1994
Chairman
Department of Surgery
Harlem Hospital Center
New York, NY

Mrs. Nancy Brinker 1993
Founder and Chairperson
Susan G. Komen Foundation
Dallas, TX

Henry C. Pitot., Ph.D. 1995
McArdle Laboratory
University of Wisconsin
Madison, Wisconsin

Acting Executive Secretary
Ms. Iris J. Schneider
Assistant Director
Program Operations and Planning
National Cancer Institute
Building 31, Room 11A34
Bethesda, MD 20892

Executive Committee Members

Dr. Samuel Broder
Director

Dr. Daniel C. Ihde
Deputy Director

Mr. Philip D. Amoruso
Associate Director for Administrative Management

Dr. Richard H. Adamson
Director, Division of Cancer Etiology

Mrs. Barbara Bynum
Director, Division of Extramural Activities

Dr. Bruce A. Chabner
Director, Division of Cancer Treatment

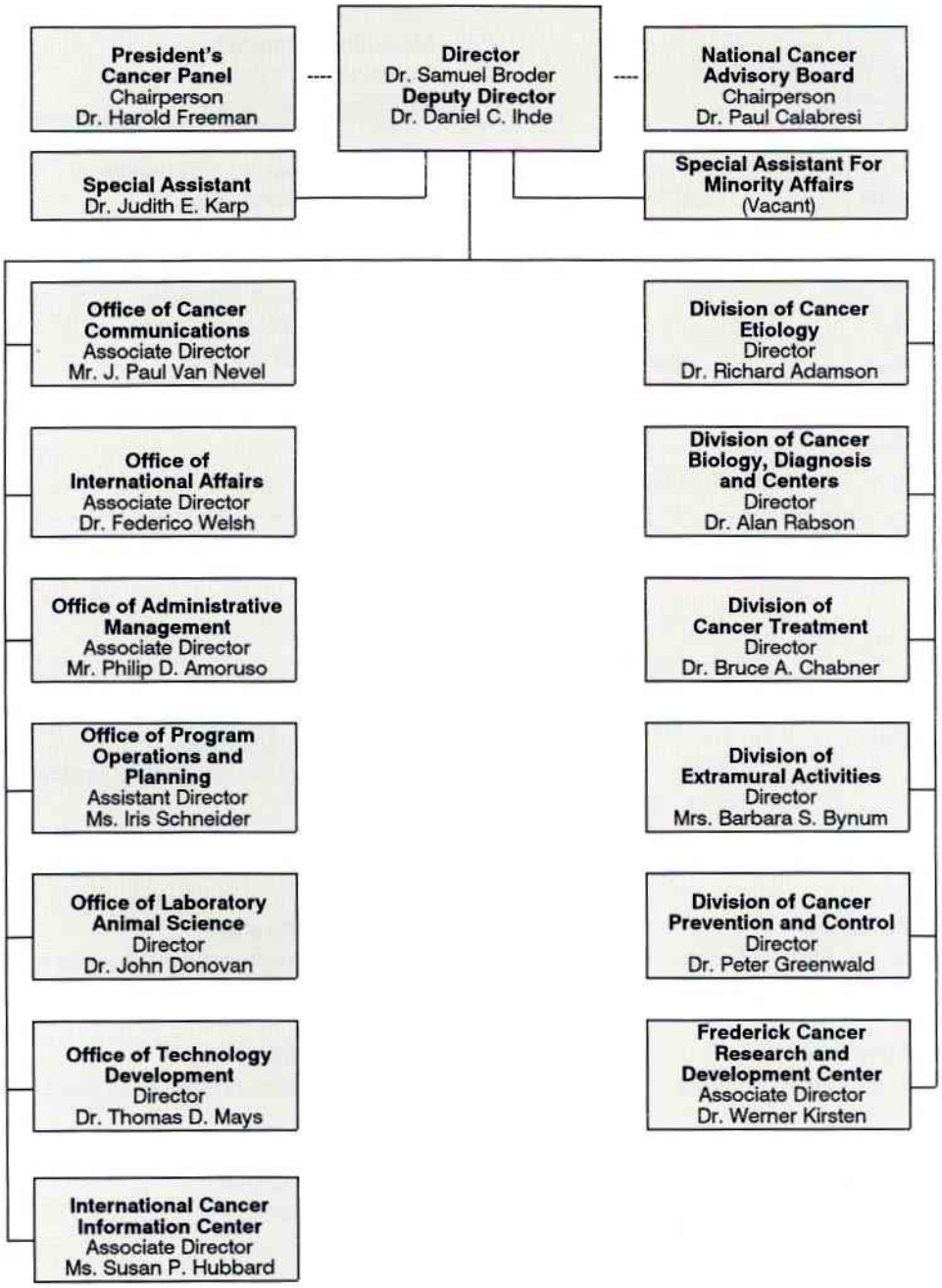
Dr. Peter Greenwald
Director, Division of Cancer Prevention and Control

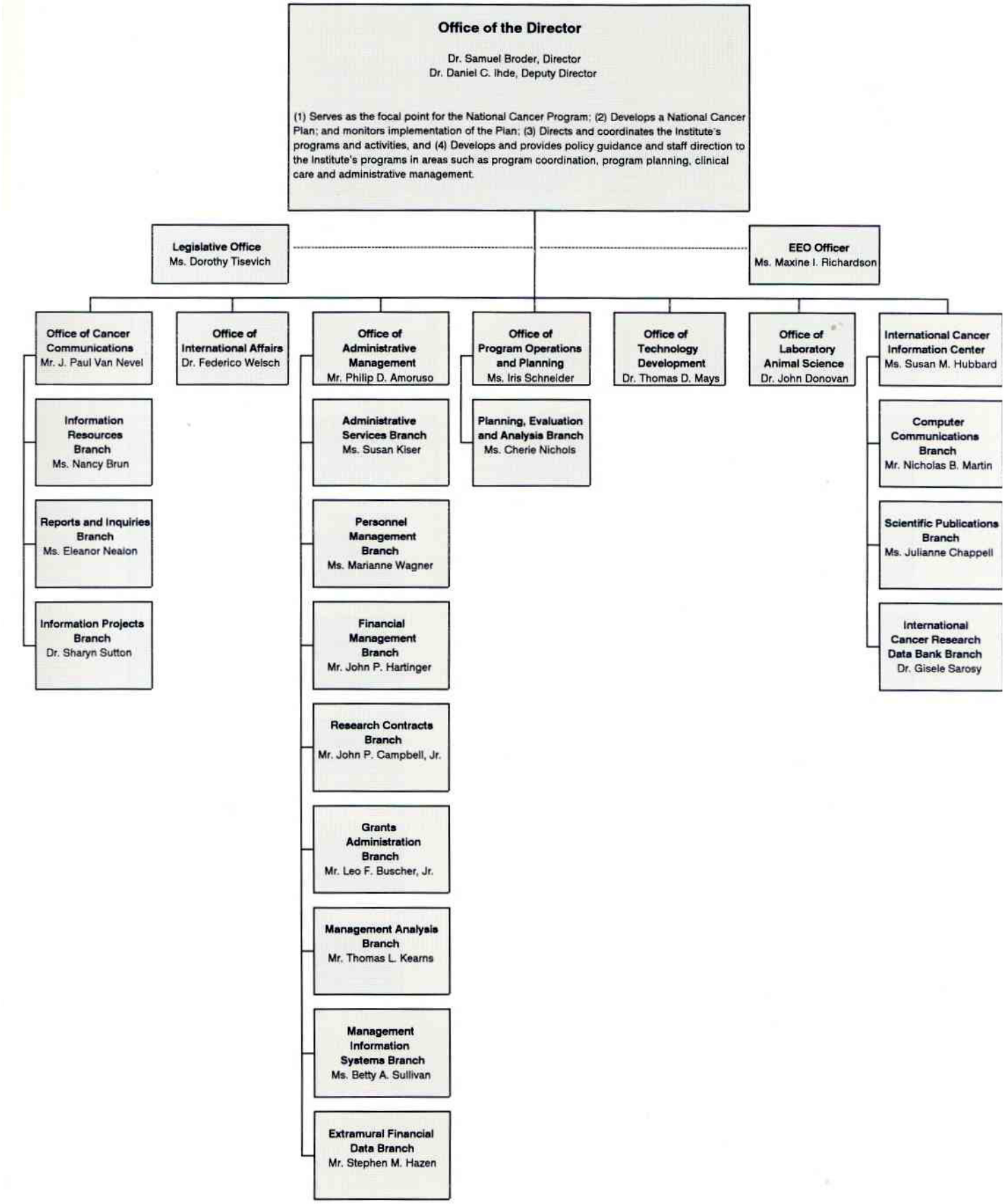
Dr. Werner Kirsten
Associate Director, Frederick Cancer Research and Development Center

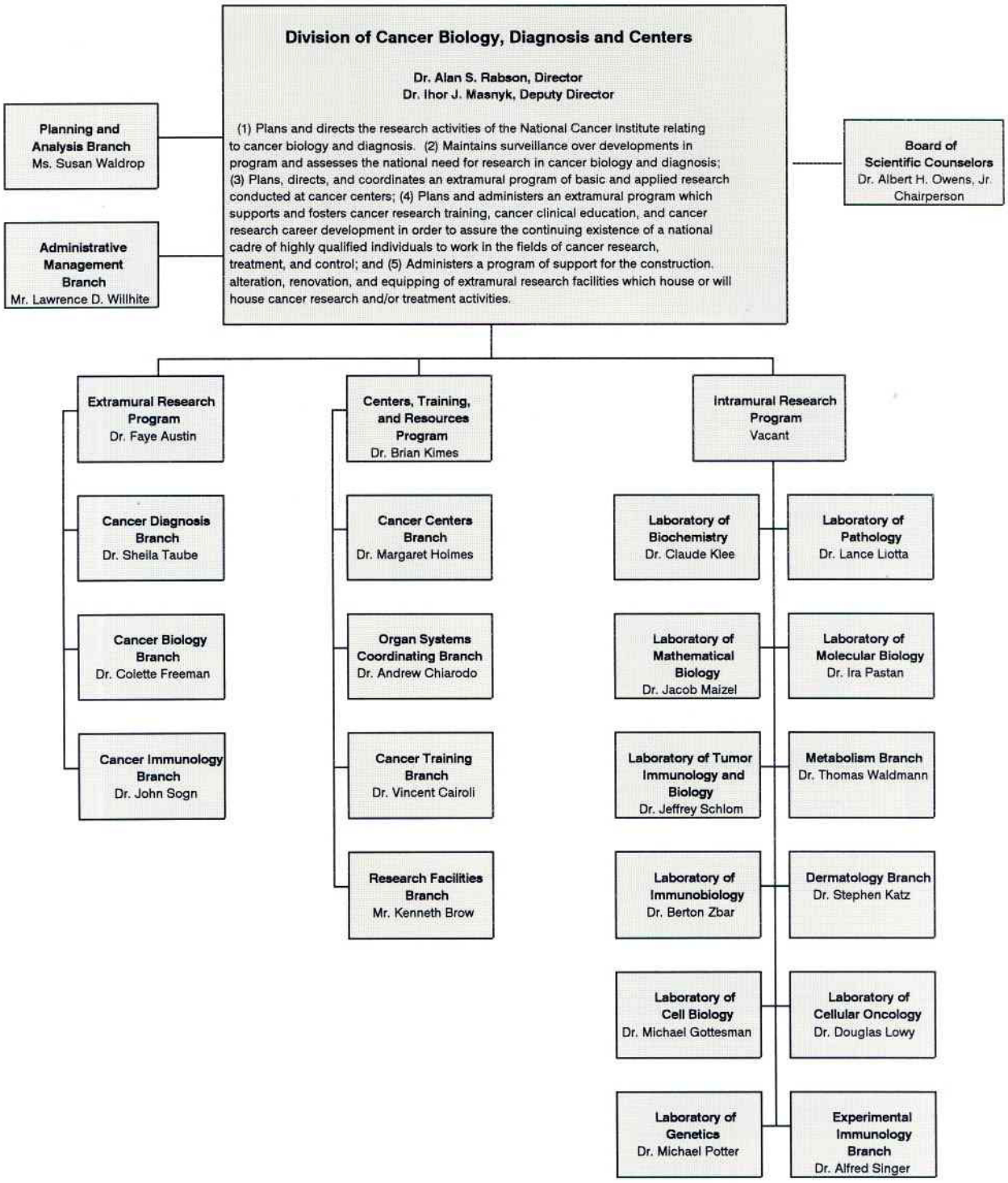
Dr. Alan Rabson
Director, Division of Cancer Biology, Diagnosis and Centers

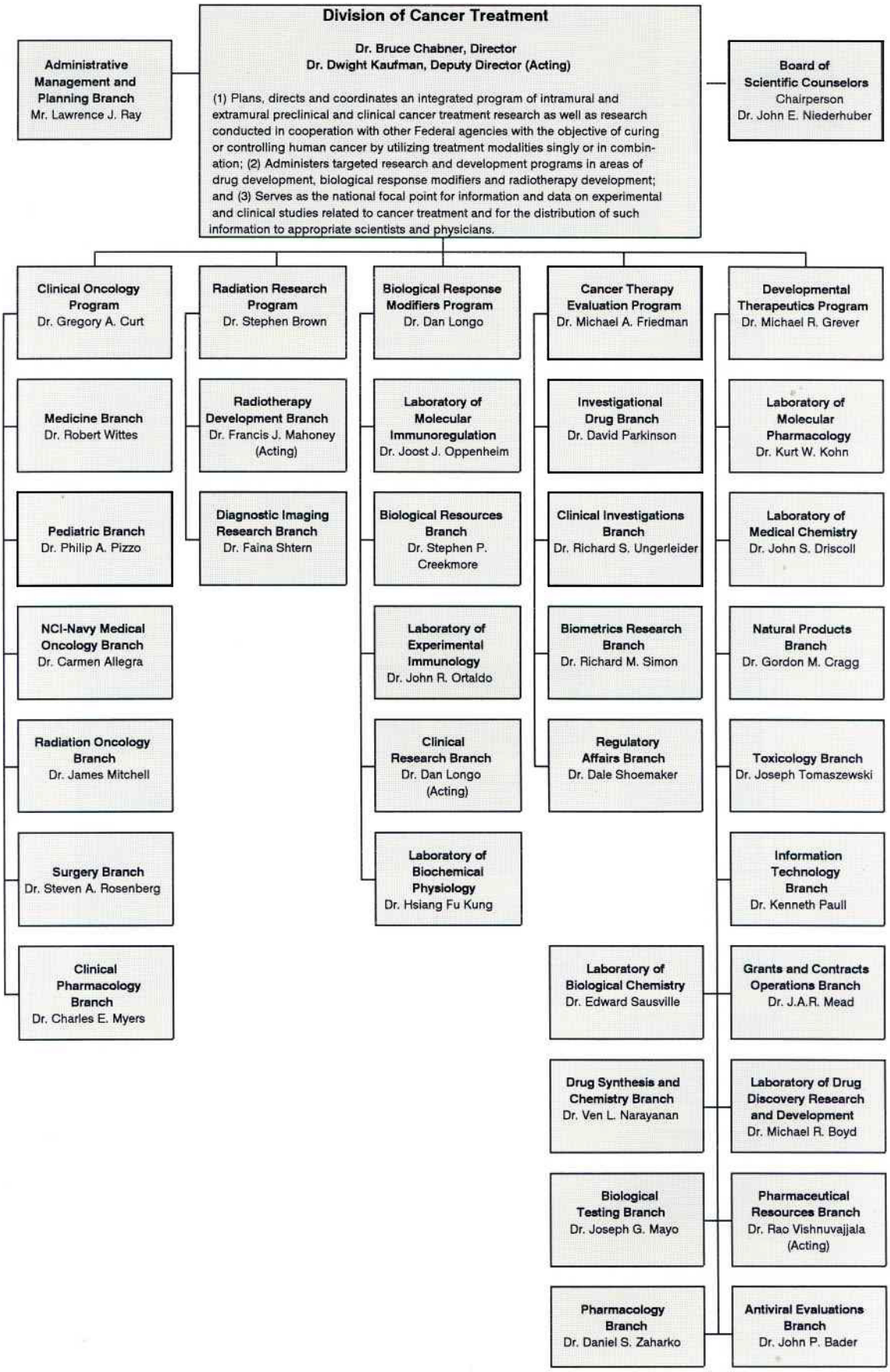
Ms. Iris Schneider
Executive Secretary

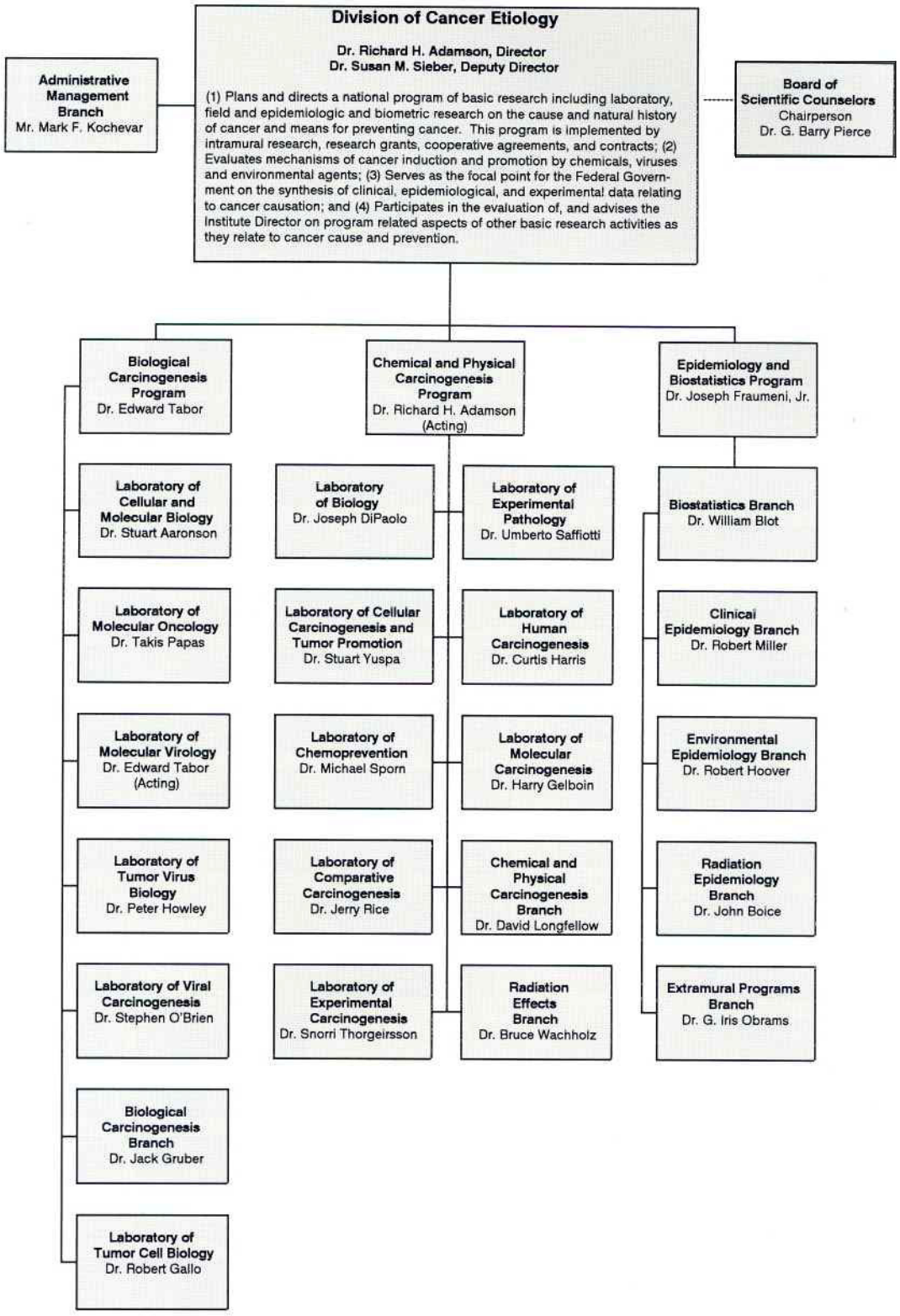
National Cancer Institute
Organization

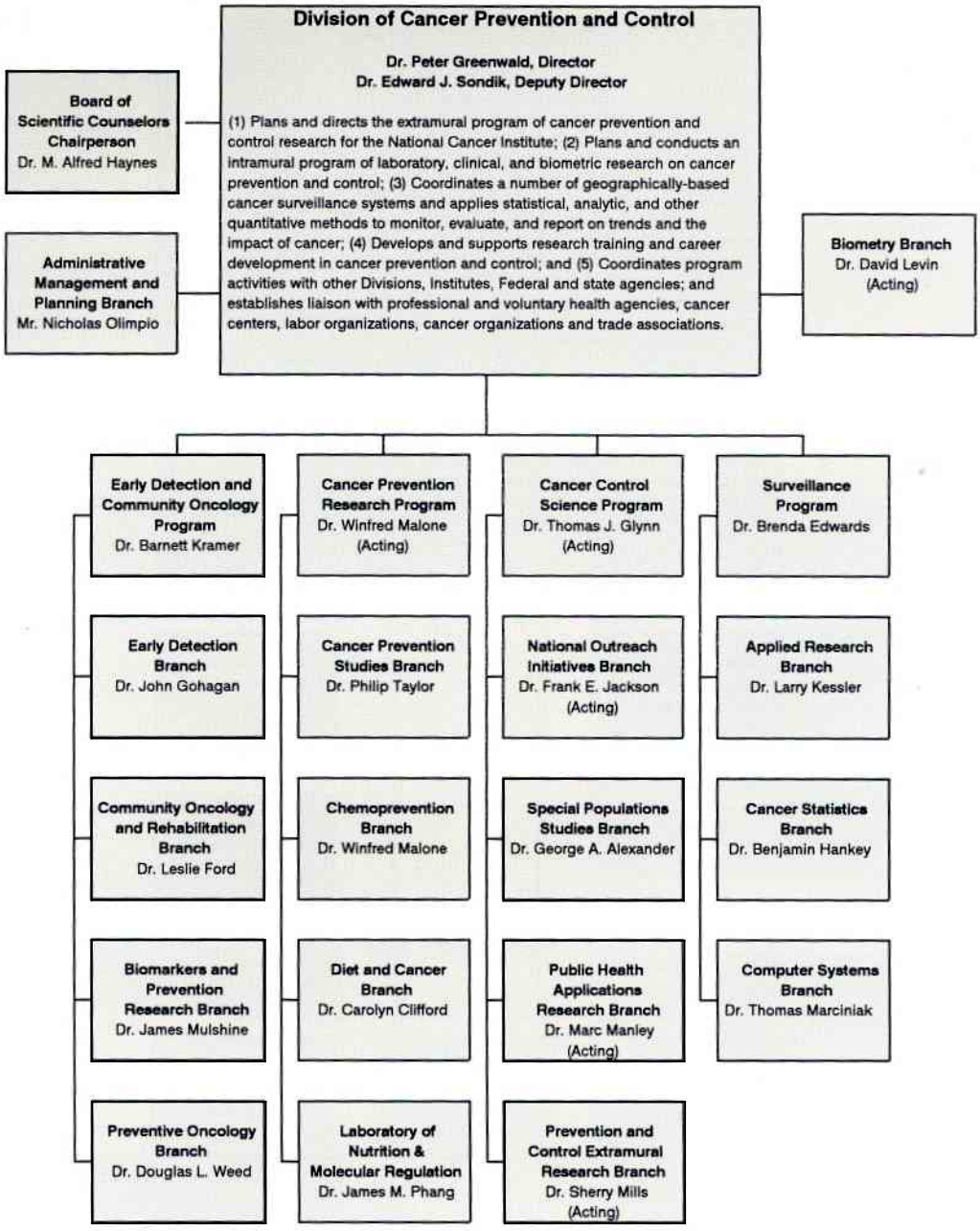



Office of the Director
Dr. Samuel Broder, Director
Dr. Daniel C. Ihde, Deputy Director
(1) Serves as the focal point for the National Cancer Program; (2) Develops a National Cancer Plan; and monitors implementation of the Plan; (3) Directs and coordinates the Institute's programs and activities, and (4) Develops and provides policy guidance and staff direction to the Institute's programs in areas such as program coordination, program planning, clinical care and administrative management.
Legislative Office
Ms. Dorothy Tisevich
EEO Officer
Ms. Maxine I. Richardson
Office of Cancer Communications
Mr. J. Paul Van Nevel
Information Resources Branch
Ms. Nancy Brun
Reports and Inquiries Branch
Ms. Eleanor Nealon
Information Projects Branch
Dr. Sharyn Sutton
Office of International Affairs
Dr. Federico Welsch
Office of Administrative Management
Mr. Philip D. Amoruso
Administrative Services Branch
Ms. Susan Kiser
Personnel Management Branch
Ms. Marianne Wagner
Financial Management Branch
Mr. John P. Hartinger
Research Contracts Branch
Mr. John P. Campbell, Jr.
Grants Administration Branch
Mr. Leo F. Buscher, Jr.
Management Analysis Branch
Mr. Thomas L. Kearns
Management Information Systems Branch
Ms. Betty A. Sullivan
Extramural Financial Data Branch
Mr. Stephen M. Hazen
Office of Program Operations and Planning
Ms. Iris Schneider
Planning, Evaluation and Analysis Branch
Ms. Cherie Nichols
Office of Technology Development
Dr. Thomas D. Mays
Office of Laboratory Animal Science
Dr. John Donovan
International Cancer Information Center
Ms. Susan M. Hubbard
Computer Communications Branch
Mr. Nicholas B. Martin
Scientific Publications Branch
Ms. Julianne Chappell
International Cancer Research Data Bank Branch
Dr. Gisele Sarosy


Division of Cancer Biology, Diagnosis and Centers
Dr. Alan S. Rabson, Director
Dr. Ihor J. Masnyk, Deputy Director
(1) Plans and directs the research activities of the National Cancer Institute relating to cancer biology and diagnosis. (2) Maintains surveillance over developments in program and assesses the national need for research in cancer biology and diagnosis; (3) Plans, directs, and coordinates an extramural program of basic and applied research conducted at cancer centers; (4) Plans and administers an extramural program which supports and fosters cancer research training, cancer clinical education, and cancer research career development in order to assure the continuing existence of a national cadre of highly qualified individuals to work in the fields of cancer research, treatment, and control; and (5) Administers a program of support for the construction, alteration, renovation, and equipping of extramural research facilities which house or will house cancer research and/or treatment activities.
Planning and Analysis Branch
Ms. Susan Waldrop
Administrative Management Branch
Mr. Lawrence D. Willhite
Board of Scientific Counselors
Dr. Albert H. Owens, Jr.
Chairperson
Extramural Research Program
Dr. Faye Austin
Cancer Diagnosis Branch
Dr. Sheila Taube
Cancer Biology Branch
Dr. Colette Freeman
Cancer Immunology Branch
Dr. John Sogn
Centers, Training, and Resources Program
Dr. Brian Kimes
Cancer Centers Branch
Dr. Margaret Holmes
Organ Systems Coordinating Branch
Dr. Andrew Chiarodo
Cancer Training Branch
Dr. Vincent Cairoli
Research Facilities Branch
Mr. Kenneth Brow
Intramural Research Program
Vacant
Laboratory of Biochemistry
Dr. Claude Klee
Laboratory of Mathematical Biology
Dr. Jacob Maizel
Laboratory of Tumor Immunology and Biology
Dr. Jeffrey Schlom
Laboratory of Immunobiology
Dr. Berton Zbar
Laboratory of Cell Biology
Dr. Michael Gottesman
Laboratory of Genetics
Dr. Michael Potter
Laboratory of Pathology
Dr. Lance Liotta
Laboratory of Molecular Biology
Dr. Ira Pastan
Metabolism Branch
Dr. Thomas Waldmann
Dermatology Branch
Dr. Stephen Katz
Laboratory of Cellular Oncology
Dr. Douglas Lowy
Experimental Immunology Branch
Dr. Alfred Singer


Division of Cancer Treatment
Dr. Bruce Chabner, Director
Dr. Dwight Kaufman, Deputy Director (Acting)
(1) Plans, directs and coordinates an integrated program of intramural and extramural preclinical and clinical cancer treatment research as well as research conducted in cooperation with other Federal agencies with the objective of curing or controlling human cancer by utilizing treatment modalities singly or in combination; (2) Administers targeted research and development programs in areas of drug development, biological response modifiers and radiotherapy development; and (3) Serves as the national focal point for information and data on experimental and clinical studies related to cancer treatment and for the distribution of such information to appropriate scientists and physicians.
Administrative Management and Planning Branch
Mr. Lawrence J. Ray
Board of Scientific Counselors
Chairperson
Dr. John E. Niederhuber
Clinical Oncology Program
Dr. Gregory A. Curt
Medicine Branch
Dr. Robert Wittes
Pediatric Branch
Dr. Philip A. Pizzo
NCI-Navy Medical Oncology Branch
Dr. Carmen Allegra
Radiation Oncology Branch
Dr. James Mitchell
Surgery Branch
Dr. Steven A. Rosenberg
Clinical Pharmacology Branch
Dr. Charles E. Myers
Radiation Research Program
Dr. Stephen Brown
Radiotherapy Development Branch
Dr. Francis J. Mahoney (Acting)
Diagnostic Imaging Research Branch
Dr. Faina Shtern
Biological Response Modifiers Program
Dr. Dan Longo
Laboratory of Molecular Immunoregulation
Dr. Joost J. Oppenheim
Biological Resources Branch
Dr. Stephen P. Creekmore
Laboratory of Experimental Immunology
Dr. John R. Ortaldo
Clinical Research Branch
Dr. Dan Longo (Acting)
Laboratory of Biochemical Physiology
Dr. Hsiang Fu Kung
Cancer Therapy Evaluation Program
Dr. Michael A. Friedman
Investigational Drug Branch
Dr. David Parkinson
Clinical Investigations Branch
Dr. Richard S. Ungerleider
Biometrics Research Branch
Dr. Richard M. Simon
Regulatory Affairs Branch
Dr. Dale Shoemaker
Laboratory of Biological Chemistry
Dr. Edward Sausville
Drug Synthesis and Chemistry Branch
Dr. Ven L. Narayanan
Biological Testing Branch
Dr. Joseph G. Mayo
Pharmacology Branch
Dr. Daniel S. Zaharko
Developmental Therapeutics Program
Dr. Michael R. Grever
Laboratory of Molecular Pharmacology
Dr. Kurt W. Kohn
Laboratory of Medical Chemistry
Dr. John S. Driscoll
Natural Products Branch
Dr. Gordon M. Cragg
Toxicology Branch
Dr. Joseph Tomaszewski
Information Technology Branch
Dr. Kenneth Paull
Grants and Contracts Operations Branch
Dr. J.A.R. Mead
Laboratory of Drug Discovery Research and Development
Dr. Michael R. Boyd
Pharmaceutical Resources Branch
Dr. Rao Vishnuvajjala (Acting)
Antiviral Evaluations Branch
Dr. John P. Bader

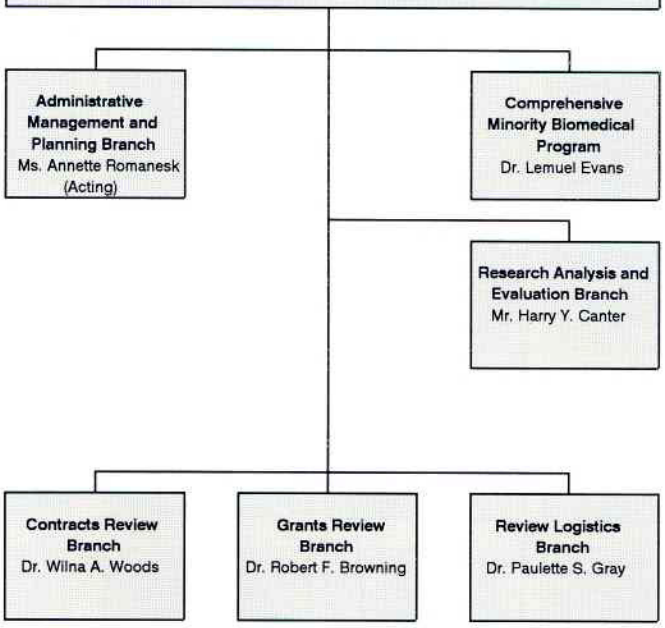

Division of Cancer Etiology
Dr. Richard H. Adamson, Director
Dr. Susan M. Sieber, Deputy Director
(1) Plans and directs a national program of basic research including laboratory, field and epidemiologic and biometric research on the cause and natural history of cancer and means for preventing cancer. This program is implemented by intramural research, research grants, cooperative agreements, and contracts; (2) Evaluates mechanisms of cancer induction and promotion by chemicals, viruses and environmental agents; (3) Serves as the focal point for the Federal Government on the synthesis of clinical, epidemiological, and experimental data relating to cancer causation; and (4) Participates in the evaluation of, and advises the Institute Director on program related aspects of other basic research activities as they relate to cancer cause and prevention.
Administrative Management Branch
Mr. Mark F. Kochevar
Board of Scientific Counselors
Chairperson
Dr. G. Barry Pierce
Biological Carcinogenesis Program
Dr. Edward Tabor
Chemical and Physical Carcinogenesis Program
Dr. Richard H. Adamson (Acting)
Epidemiology and Biostatistics Program
Dr. Joseph Fraumeni, Jr.
Laboratory of Cellular and Molecular Biology
Dr. Stuart Aaronson
Laboratory of Biology
Dr. Joseph DiPaolo
Laboratory of Experimental Pathology
Dr. Umberto Saffiotti
Biostatistics Branch
Dr. William Blot
Laboratory of Molecular Oncology
Dr. Takis Papas
Laboratory of Cellular Carcinogenesis and Tumor Promotion
Dr. Stuart Yuspa
Laboratory of Human Carcinogenesis
Dr. Curtis Harris
Clinical Epidemiology Branch
Dr. Robert Miller
Laboratory of Molecular Virology
Dr. Edward Tabor (Acting)
Laboratory of Chemoprevention
Dr. Michael Sporn
Laboratory of Molecular Carcinogenesis
Dr. Harry Gelboin
Environmental Epidemiology Branch
Dr. Robert Hoover
Laboratory of Tumor Virus Biology
Dr. Peter Howley
Laboratory of Comparative Carcinogenesis
Dr. Jerry Rice
Chemical and Physical Carcinogenesis Branch
Dr. David Longfellow
Radiation Epidemiology Branch
Dr. John Boice
Laboratory of Viral Carcinogenesis
Dr. Stephen O'Brien
Laboratory of Experimental Carcinogenesis
Dr. Snorri Thorgeirsson
Radiation Effects Branch
Dr. Bruce Wachholz
Extramural Programs Branch
Dr. G. Iris Obrams
Biological Carcinogenesis Branch
Dr. Jack Gruber
Laboratory of Tumor Cell Biology
Dr. Robert Gallo


Division of Cancer Prevention and Control
Dr. Peter Greenwald, Director
Dr. Edward J. Sondik, Deputy Director
(1) Plans and directs the extramural program of cancer prevention and control research for the National Cancer Institute; (2) Plans and conducts an intramural program of laboratory, clinical, and biometric research on cancer prevention and control; (3) Coordinates a number of geographically-based cancer surveillance systems and applies statistical, analytic, and other quantitative methods to monitor, evaluate, and report on trends and the impact of cancer; (4) Develops and supports research training and career development in cancer prevention and control; and (5) Coordinates program activities with other Divisions, Institutes, Federal and state agencies; and establishes liaison with professional and voluntary health agencies, cancer centers, labor organizations, cancer organizations and trade associations.
Board of Scientific Counselors Chairperson
Dr. M. Alfred Haynes
Administrative Management and Planning Branch
Mr. Nicholas Olimpio
Biometry Branch
Dr. David Levin
(Acting)
Early Detection and Community Oncology Program
Dr. Barnett Kramer
Early Detection Branch
Dr. John Gohagan
Community Oncology and Rehabilitation Branch
Dr. Leslie Ford
Biomarkers and Prevention Research Branch
Dr. James Mulshine
Preventive Oncology Branch
Dr. Douglas L. Weed
Cancer Prevention Research Program
Dr. Winfred Malone
(Acting)
Cancer Prevention Studies Branch
Dr. Philip Taylor
Chemoprevention Branch
Dr. Winfred Malone
Diet and Cancer Branch
Dr. Carolyn Clifford
Laboratory of Nutrition & Molecular Regulation
Dr. James M. Phang
Cancer Control Science Program
Dr. Thomas J. Glynn
(Acting)
National Outreach Initiatives Branch
Dr. Frank E. Jackson
(Acting)
Special Populations Studies Branch
Dr. George A. Alexander
Public Health Applications Research Branch
Dr. Marc Manley
(Acting)
Prevention and Control Extramural Research Branch
Dr. Sherry Mills
(Acting)
Surveillance Program
Dr. Brenda Edwards
Applied Research Branch
Dr. Larry Kessler
Cancer Statistics Branch
Dr. Benjamin Hankey
Computer Systems Branch
Dr. Thomas Marciniak

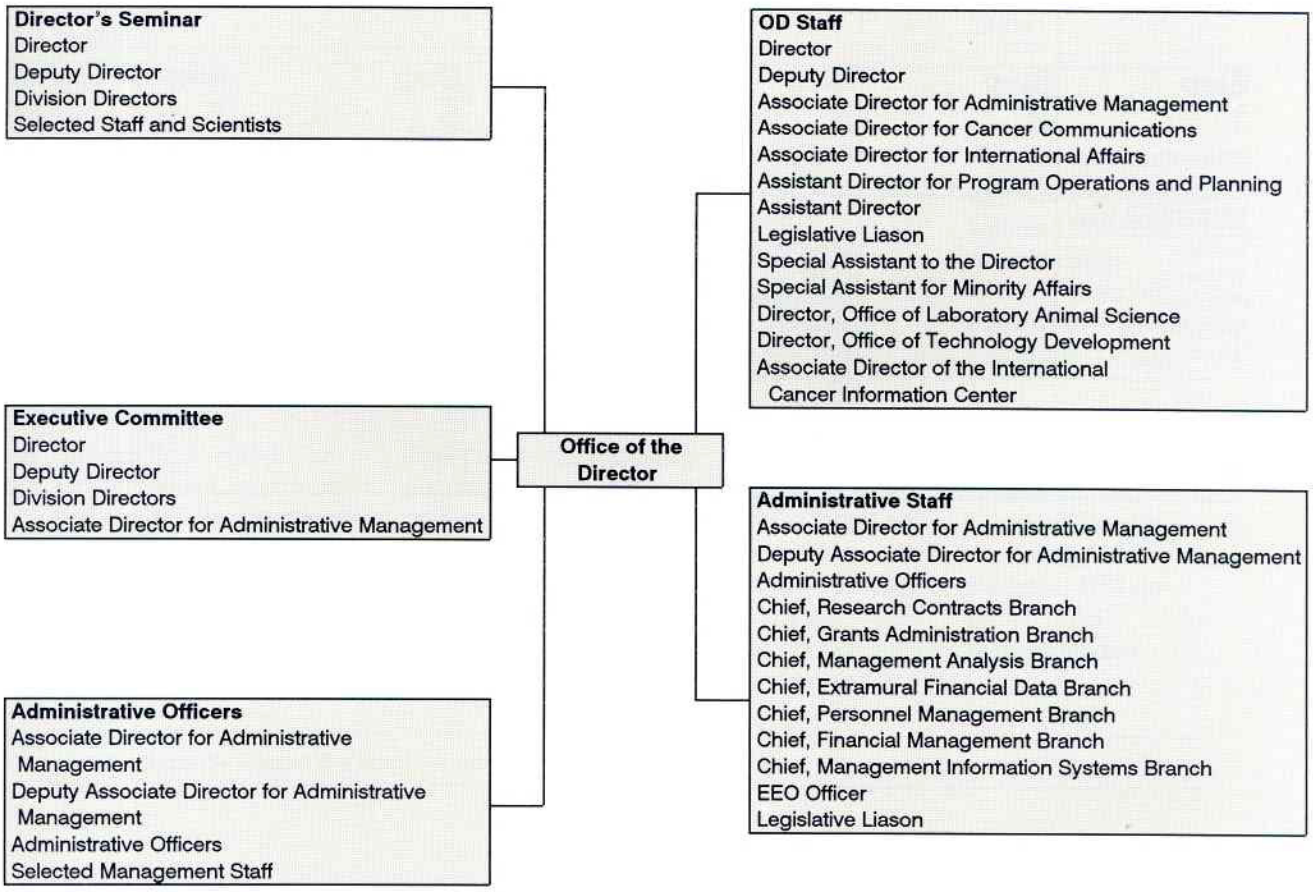
Division of Extramural Activities

Mrs. Barbara S. Bynum, Director
Dr. Marvin Kalt, Deputy Director
Dr. Vincent Oliverio, Associate Director
Dr. Elliot Stonehill, Special Assistant to the Director

(1) Administers and directs the Institute's grant and contract review processing activities; (2) Provides initial technical and scientific merit review of grants and contracts for the Institute; (3) Represents the Institute on overall NIH extramural and collaborative program policy committees, coordinates such policy within NCI, and develops and recommends NCI policies and procedures as related to the review of grants and contracts; (4) Coordinates the Institute's review of research grant and training programs with the National Cancer Advisory Board; (5) Coordinates the implementation of committee management policies within the Institute and provides the Institute's staff support for the National Cancer Advisory Board; (6) Monitors and coordinates the operation of the divisional Boards of Scientific Counselors to assure uniformity and timeliness of the concept review of projects to be developed under contract or in response to RFAs; (7) Coordinates program planning and evaluation in the extramural area; (8) Provides scientific reports and analysis to the Institute's grant and central programs; and (9) administers programs to broaden participation by minorities in cancer-related research and training activities and to enhance the effectiveness of programs in cancer treatment and control in reaching the minority community and and other historically underserved segments of the general population.



Information Flow for Program Implementation



Intramural Review Process

Board of Scientific Counselors BSC Approves Site Visit Schedule	Chairman, BSC Selects Site Visit Chairman Site Visit Chairman Selects Site Visit Team	BSC Site Visit Team Reviews Material Prepared by Division	BSC Site Visit Team Inspects and Reviews Laboratory	Site Visit Team Prepares Report and Presents it to BSC. After Review and Approval, BSC Transmits Final Recommendations to the Division Director		
Step 1 Scheduling and Approval	**Step 2** Team Selection Site Visit	**Step 3** Preparation for Site Visit	**Step 4** Site Visit	**Step 5** Site Visit Report and Recommendations	**Step 6** Implementation of Recommendations	**Step 7** Follow-up Report
NCI Divisions Division Prepares Proposed Site Visit Schedule		Division Prepares Background Material on Laboratory to be Site Visited and Sends to Site Visit Team	Site Visit Preparation by Laboratory		Division Implements Recommendations Contained in Site Visit Report	Division Prepares Report to BSC on Actions Taken

Research Positions at the National Cancer Institute[1]

The National Cancer Institute recognizes that one of the most valuable resources to be drawn upon in the fight against cancer is the wealth of scientific talent available in the U.S. and around the world. In an effort to attract and maintain the highest quality scientific staff, two personnel systems are used: the U.S. Civil Service System and the PHS Commissioned Corps. In addition, the Staff Fellowship Program and the NIH Visiting Program have been designed to meet special needs. Other special programs are available for those who qualify.

Position	Eligibility	Annual Salary	Mechanism of Entry
I. Civil Service			
A. Civil Service (tenured)	Appropriate advanced education, experience and knowledge needed by NCI to conduct its programs.	Minimum starting Ph.D. - $46,210 Physicians - $56,990	Office of Personnel Management; Contact Division Director of Laboratory Chief in area of interest or the NCI Personnel Office.
II. Special Appointment of Experts and Consultants			
A. Special Appointment of Experts and Consultants (non-tenured appointment which can be extended up to 4 years)	Applicants shall possess outstanding experience and ability as to justify recognition as authorities in their particular fields of activity.	Salary range is equivalent to GS-13 and with maximum limited to level V of the Executive Schedule $104,800.	Final approval rests with the Division Director or Deputy Director, NCI depending on recommended action.

[1] *Does not necessarily indicate that positions are currently available at the National Cancer Institute.*

Position	Eligibility	Annual Salary	Mechanism of Entry
III. Clinical Associate Program			
A. Clinical Associates	Appointment for 2 or 3 years with an additional 1-year extension for an initial 2-year appointment. Graduate of accredited medical or osteopathic school and completion of internship. Completion of 2 or 3 years of clinical training beyond the M.D. degree. Must be a U.S. Citizen or a permanent U.S. resident. **NOTE:** Foreign M.D.'s in a U.S. residency training program are also eligible through a Fogarty International Center appointment.	$38,500 - $42,500	Apply to NIH Office of Education Building 10 Room 1C-129
B. Pharmacology Research Associates (PRAT). Physicians committed to research careers in pharmacologic sciences, or clinical pharmacology.	Appointment for 2 years. Candidates must be U.S. citizens or permanent residents of the U.S. who have been awarded a doctoral degree or who have been certified by a university as meeting all the requirements leading to a doctorate. The degree must be in a biomedical or related science and must have been received within the 5 years preceding the date of application.	First year salaries range from $33,500 to $38,000 based on years of postdoctoral experience.	Apply to PRAT Program Westwood Building Room 919

Position	Eligibility	Annual Salary	Mechanism of Entry
IV. Visiting Program (limited tenure)[2]			
A. Visiting Fellow (maximum 3 years)	3 years or less postdoctoral experience or training.	First year salaries range from $25,000 to $28,000 based on years of postdoctoral experience	Contact Division Director or Laboratory Chief in area of interest.
B. Visiting Associate (1 year initial appointment with renewals to end of project)	3+ years of postdoctoral experience or training with appropriate knowledge needed by NCI.	$26,798 - $50,516	Contact Division Director or Laboratory Chief in area of interest.
C. Visiting Scientist (duration of project)	6+ years of postdoctoral experience with appropriate specific experience and knowledge needed.	$38,861 - $83,502	Contact Division Director or Laboratory Chief in area of interest.
V. Staff Fellowships			
A. Staff Fellowship	Physician or other doctoral degree equivalent who has less than 3 years of relevant postdoctoral research experience. U.S. citizen or resident alien. Maximum 7-year appointment.	Physicians $28,000 - $46,476 Other Doctors $28,000 - $45,336	Contact Division Director or Laboratory Chief in area of interest or the NCI Personnel Office.
B. Senior Staff Fellowship	Physician or other doctoral degree equivalent who has 3 to 7 years of relevant postdoctoral research experience. U.S. citizen or resident alien. Maximum 7 year appointment.	Physicians $39,000 - $70,850 Other Doctors $33,504 - $60,070	Contact Division Director or Laboratory Chief in area of interest or the NCI Personnel Office.

[2]*Under most circumstances, the various visiting programs are limited to non-citizens.*

Position	Eligibility	Annual Salary	Mechanism of Entry
VI. Civil Service Summer Employment Programs			
A. Summer Clerical Program	Must be 16 years of age or older. Noncitizens may compete provided they have permanent visa status and are from countries allied with the U.S.	GS-1 through GS-4. Grade is based on education and/or experience.	Apply to NIH on or before March 15.
B. Summer Aids	Provides summer employment opportunity for students who meet economic needs criteria. Must be 16 years of age or older. Disabled students are not required to meet economic criteria. Noncitizens may compete provided they have permanent residence status or owe allegiance to the U.S. (Natives of America Samoa & Swains Island)	Federal minimum wage.	Register with the local office of the State Employment service and apply to NCI.
VII. Special Programs			
A. Guest Researcher-organization other than NIH, PHS	Usually a scientist, engineer or other scientifically trained specialist who would benefit from the use of NCI facilities in furthering his or her research. Cannot perform services for NCI.	Established by sponsoring organization.	Contact Division Director or Laboratory Chief in area of interest; also apply to sponsoring agency, e.g., American Cancer Society, Eleanor Roosevelt Cancer Foundation, Leukemia Society of America, Inc., etc.

Position	Eligibility	Annual Salary	Mechanism of Entry
B. Commissioned Officer Student Training and Extern Program (COSTEP) Program (operates year-round). Maximum 120 days per 12-month period.	U.S. citizen. Must have completed one year of study in a medical, dental or veterinary school or a minimum of two years of baccalaureate program in a health related field such as engineering, nursing, pharmacy, etc. May be enrolled in a master's or doctoral program in a health related field (designated by the Assistant Secretary for Health). Physical requirements of PHS Commissioned Corps. Plans to return to college.	Pay and allowance of a Junior Assistant Health Service Officer. $2,250 per month.	Apply to Director, Division of Commissioned Personnel Attention: COSTEP Coordinator Room 4-35, Parklawn Building, 5600 Fishers Lane, Rockville, MD. 20857.
C. Fogarty International Scholars in Residence Program.	International reputation, productivity, demonstrated ability in biomedical field.	$90,000 for 1 year.	Nominations are submitted to Fogarty Center by Institute Director, any senior tenured member of the NIH scientific staff, or former scholar.
D. Stay-in-School Program	Provides employment opportunity for students who meet economic needs criteria and are attending accredited schools on a full-time or substantially full-time basis, and are in good academic standing. Must be 16 years of age or older. Disabled students are not required to meet economic criteria. Noncitizens may compete provided they have permanent residence status or owe allegiance to the U.S. (American Samoa or Swains Island)	Salary is commensurate with duties assigned and student's education and/or experience.	Register with the local office of the State Employment service and apply to NCI. No deadline required for applying. However, no new appointments are made between May 1 to August 30.

Position	Eligibility	Annual Salary	Mechanism of Entry
E. The Federal Junior Fellowship Program	Graduating high school senior in a public or private school. Must have demonstrated satisfactory academic performance with accumulative G.P.A. equivalent to a "C+" or above. Must plan to attend or have been accepted for admission to an accredited college or university and need financial assistance to attend school. Must be a U.S. citizen or a resident of American Samoa or Swains island. May be a non-citizen if lawfully admitted to the U.S. as a permanent resident and will be able to meet citizenship requirements prior to conversion and is a national of an allied country.	GS-2 through GS-5.	Nominations are submitted directly to NIH by high school principals or counselors.

Position	Eligibility	Annual Salary	Mechanism of Entry
F. Cooperative Education Program	Must be 16 years of age or older and enrolled in a baccalaureate graduate, associate, technical, trade, vocational or high school program and in good academic standing (GPA at least 2.0). School must participate in the coop program. Must be enrolled in a field of study related to the assigned work. U.S. citizen or national (resident of American Samoa or Swains Island) or noncitizen lawfully admitted to the U.S. as a permanent resident who will be able to meet citizenship requirements prior to conversion, and is a national of a country allied with the U.S.	GS-1 through GS-11	Contact Co-op Coordinator for NCI
VIII. Other Training Programs			
A. Cancer Prevention Fellowship Program	Must be an M.D., D.D.S., D.O., O.R., Ph.D., or other doctoral degree in a related discipline (epidemiology, biostatistics, and the biomedical, nutritional, public health, or behavioral sciences). Must be a U.S. citizen or resident alien eligible for citizenship within four years.	First year for an M.D., D.D.S., or D.O. $26,000 - $37,000 for Ph.D. $18,000 - $31,000.	Apply to Program Director, CFPP, Executive Plaza South, Room T41, Bethesda, Maryland, 20892.

Position	Eligibility	Annual Salary	Mechanism of Entry
B. Biotechnology Training Program	Physicians with little or no experience or training in fundamental research, but with an interest in biotechnology including its application to prevention and new treatment and diagnostic techniques, would be eligible. Ph.D. scientists with little or no experience or training in clinically related programs but with an interest in clinical applications of fundamental research methodology related to biotechnology would also be eligible. Typically, these candidates will have less than three years postdoctoral experience. The Biotechnology Training Program is established for United States citizens, or resident aliens who will be eligible for U.S. citizenship within four years.	First year Ph.D. $25,000 - $31,000 Physicians $37,000 - $41,000	Contact Division Director or Laboratory Chief in area of interest.
C. Cancer Nurse Training Program	Applications will be accepted from Graduates of NLN accredited baccalaureate nursing programs. Each candidate must submit academic transcripts demonstrating a minimum of a "B" average in undergraduate work, three references regarding their academic work and clinical capability, a letter describing their interest in the program, and a Personal Qualification Statement, SF-171.	Stipends for the program will be $2,500 per month.	Contact the Division of Cancer Treatment.

Position	Eligibility	Annual Salary	Mechanism of Entry
D. Student Research Training Program	The review and selection of candidates, as well as the day-to-day administration of the fellowships, will be the responsibility of each Division's Administrative Office. Must be 16 years of age, must have a cumulative GPA of 2.75 or above, must be either a U.S. citizen or resident alien. The length of the training fellowships may vary from 2 to 6 months, not to exceed 6 months during one 12-month period.	Stipends are based on education and experience at a pay range of $802 - $1,872 per month.	Contact Division Director or Laboratory Chief in area of interest. Application deadlines are March 1 for spring/summer months and October 1 for fall/winter months.
E. Special Volunteer Program	Volunteer service may be accepted for direct patient care, clerical assignments, technical assistance, or any other activities necessary to carry out the authorized functions of the NCI. Applicants must be at least 16 years of age.	N/A	Contact Division Director or Laboratory Chief in area of interest.
F. General Fellowship Program	M.D., Ph.D. or equivalent degrees as well as pre-doctoral candidates pursuing graduate work with the aim of achieving a doctoral degree. U.S. citizens, permanent residents, or foreign citizens are eligible.	Salary is commensurate with the duties assigned and candidate's education and/or experience.	Contact Division Director or Laboratory Chief in area of interest.

Position	Eligibility	Annual Salary	Mechanism of Entry
G. Cancer Epidemiology and Biostatistics Training Program	M.D.s and Ph.D.s with an interest in and an aptitude for epidemiology and/or biostatistical research in cancer. Ph.D. candidates in approved doctoral programs in epidemiology or biostatistics whose research would be the source of their dissertation. Master's level scientists whose degree is in a discipline related to epidemiology or biostatistics. Must be U.S. citizen or resident alien who will be eligible for U.S. citizenship within four years.	First year for M.D. $26,000 - $37,000 for Ph.D. $18,000 - $31,000 for Master's level $17,000 - $19,000	Contact the Administrative Office of the Division of Cancer Etiology.
H. Intramural Research Training Award (IRTA)	Appointments of 1 or 2 years with a maximum of 5 years to candidates with physician or other doctoral degree in the biomedical, behavioral or related sciences and 7 or fewer years of relevant postdoctoral research experience.	First year salaries range from $25,000 - $42,000 based on years of experience.	Contact Division Director or Laboratory Chief in area of interest.

Number of Deaths for the Five Leading Cancer Sites by Age Group and Sex

All Ages		Under 15		15-34		35-54		55-74		75+	
Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Lung	Lung	Leukemia	Leukemia	Leukemia	Breast	Lung	Breast	Lung	Lung	Lung	Colon & Rectum
88,973	48,040	354	267	721	661	8,865	8,983	55,296	28,893	24,649	15,569
Prostate	Breast	Brain & CNS	Brain & CNS	Non-Hodgkin's Lymphoma	Leukemia	Colon & Rectum	Lung	Colon & Rectum	Breast	Prostate	Lung
30,519	42,836	237	229	462	469	2,248	5,217	14,357	20,164	18,391	13,806
Colon & Rectum	Colon & Rectum	Endocrine	Endocrine	Brain & CNS	Cervix	Non-Hodgkin's Lymphoma	Colon & Rectum	Prostate	Colon & Rectum	Colon & Rectum	Breast
28,123	28,900	103	92	413	316	1,451	1,856	11,798	11,323	11,330	13,027
Pancreas	Pancreas	Non-Hodgkin's Lymphoma	Soft Tissue	Hodgkin's Disease	Brain & CNS	Brain & CNS	Ovary	Pancreas	Ovary	Pancreas	Pancreas
11,965	12,578	86	54	260	312	1,368	1,653	6,707	6,436	4,026	6,044
Leukemia	Ovary	Soft Tissue	Kidney & Renal Pelvis	Melanoma	Melanoma	Pancreas	Cervix	Esophagus	Pancreas	Urinary Bladder	Non-Hodgkin's Lymphoma
10,142	12,256	49	30	213	184	1,192	1,453	4,438	5,755	3,588	4,065

Source: Mortality tape (1989) from National Center for Health Statistics.

Relationship of Cancer to the Leading Causes of Death in the United States

Rank	Cause	Number of Deaths	Crude Death Rate per 100,000 Population	Percent of Total Deaths
	All Causes	2,149,904	871.0	100.0%
1	Diseases of the Heart	733,775	297.3	34.1
2	CANCER	496,130	201.0	23.1
3	Cerebrovascular	145,533	59.0	6.8
4	Accidents	94,905	38.4	4.4
5	Bronchitis, Emphysema & Asthma	84,338	34.2	3.9
6	Pneumonia & Influenza	76,535	31.0	3.6
7	Diabetes Mellitus	46,832	19.0	2.2
8	Suicide	30,218	12.2	1.4
9	Cirrhosis of the Liver	26,685	10.8	1.2
10	Homicide	22,826	9.3	1.1
11	Human Immunodeficiency Virus Infection	22,069	8.9	1.0
12	Nephritis & Nephrosis	21,113	8.6	1.0
13	Atherosclerosis	19,356	7.8	0.9
14	Septicemia	19,331	7.8	0.9
15	Diseases of Infancy	18,748	7.6	0.9
	Other & Ill-defined	291,510	118.1	13.6

Source: Mortality Tape (1989) from National Center for Health Statistics.

Estimated New Cancer Cases and Deaths by Sex for All Sites 1992*

	Estimated New Cases			Estimated Deaths		
	Total	Male	Female	Total	Male	Female
All Sites	1,130,000	565,000	565,000	520,000	275,000	245,000
Buccal Cavity & Pharynx **(ORAL)**	30,300	20,600	9,700	7,950	5,175	2,775
Lip	3,600	3,100	500	100	75	25
Tongue	6,000	3,900	2,100	1,850	1,200	650
Mouth	11,500	6,900	4,600	2,200	1,300	900
Pharynx	9,200	6,700	2,500	3,800	2,600	1,200
Digestive Organs	241,000	127,100	113,900	120,800	63,950	56,850
Esophagus	11,100	7,900	3,200	10,000	7,500	2,500
Stomach	24,400	15,000	9,400	13,300	8,000	5,300
Small Intestine	3,400	1,900	1,500	950	500	450
COLON-RECTUM:						
Large Intestine	111,000	54,000	57,000	51,000	25,000	26,000
Rectum	45,000	25,000	20,000	7,300	3,900	3,400
Liver & Biliary Passages	15,400	8,200	7,200	12,300	6,600	5,700
Pancreas	28,300	13,900	14,400	25,000	12,000	13,000
Other & Unspecified Digestive	2,400	1,200	1,200	950	450	500
Respiratory System	185,000	115,000	70,000	151,000	96,800	54,200
Larynx	12,500	10,000	2,500	3,650	2,900	750
LUNG & BRONCHUS	168,000	102,000	66,000	146,000	93,000	53,000
Other & Unspecified Respiratory	4,500	3,000	1,500	1,350	900	450
Bone & Joint	2,000	1,100	900	1,050	550	500
Soft Tissue	5,900	3,200	2,700	3,300	1,600	1,700
MELANOMAS of SKIN	32,000	17,000	15,000	6,700	4,100	2,600
BREAST	181,000	1,000	180,000	46,300	300	46,000
Genital Organs	211,100	139,600	71,500	58,550	34,550	24,000
UTERUS:						
Cervix Uteri	13,500		13,500	4,400		4,400
Corpus, Endometrium	32,000		32,000	5,600		5,600
Ovary	21,000		21,000	13,000		13,000
Other & Unspecified Genital, Female	5,000		5,000	1,000		1,000
Prostate	132,000	132,000		34,000	34,000	
Testis	6,300	6,300		350	350	
Other & Unspecified Genital, Male	1,300	1,300		200	200	
Urinary Organs	78,100	54,700	23,400	20,200	12,700	7,500
Bladder	51,600	38,500	13,100	9,500	6,300	3,200
Kidney & Other Urinary	26,500	16,200	10,300	10,700	6,400	4,300
Eye and Orbit	1,700	900	800	275	125	150
Brain & Central Nervous System	16,900	9,100	7,800	11,800	6,500	5,300
Endocrine Glands	13,900	4,200	9,700	1,675	750	925
Thyroid	12,500	3,400	9,100	1,000	400	600
Other Endocrine	1,400	800	600	675	350	325
Leukemias	28,200	16,000	12,200	18,200	9,900	8,300
Lymphocytic Leukemias	11,800	7,000	4,800	5,200	3,000	2,200
Myeloid Leukemia	11,300	6,100	5,200	7,400	3,900	3,500
Other Leukemias	5,100	2,900	2,200	5,600	3,000	2,600
Other Blood & Lymph Tissues	60,900	33,500	27,400	30,100	15,600	14,500
Hodgkin's Disease	7,400	4,200	3,200	1,500	900	600
Non-Hodgkin's Lymphomas	41,000	23,000	18,000	19,400	10,000	9,400
Multiple Myeloma	12,500	6,300	6,200	9,200	4,700	4,500
All Other and Unspecified Sites	42,000	22,000	20,000	42,100	22,400	19,700

NOTE: The estimates of new cancer cases are offered as a rough guide and should not be regarded as definitive. Especially note that year-to-year changes may only represent improvements in the basic data. ACS six major sites appear in boldface caps.

** Carcinoma in situ and basal and squamous cell skin are not included in totals.*

SOURCE: American Cancer Society Cancer Facts and Figures (1992). Incidence estimates are based on rates from NCI SEER Program 1986-88.

The Cost of Cancer

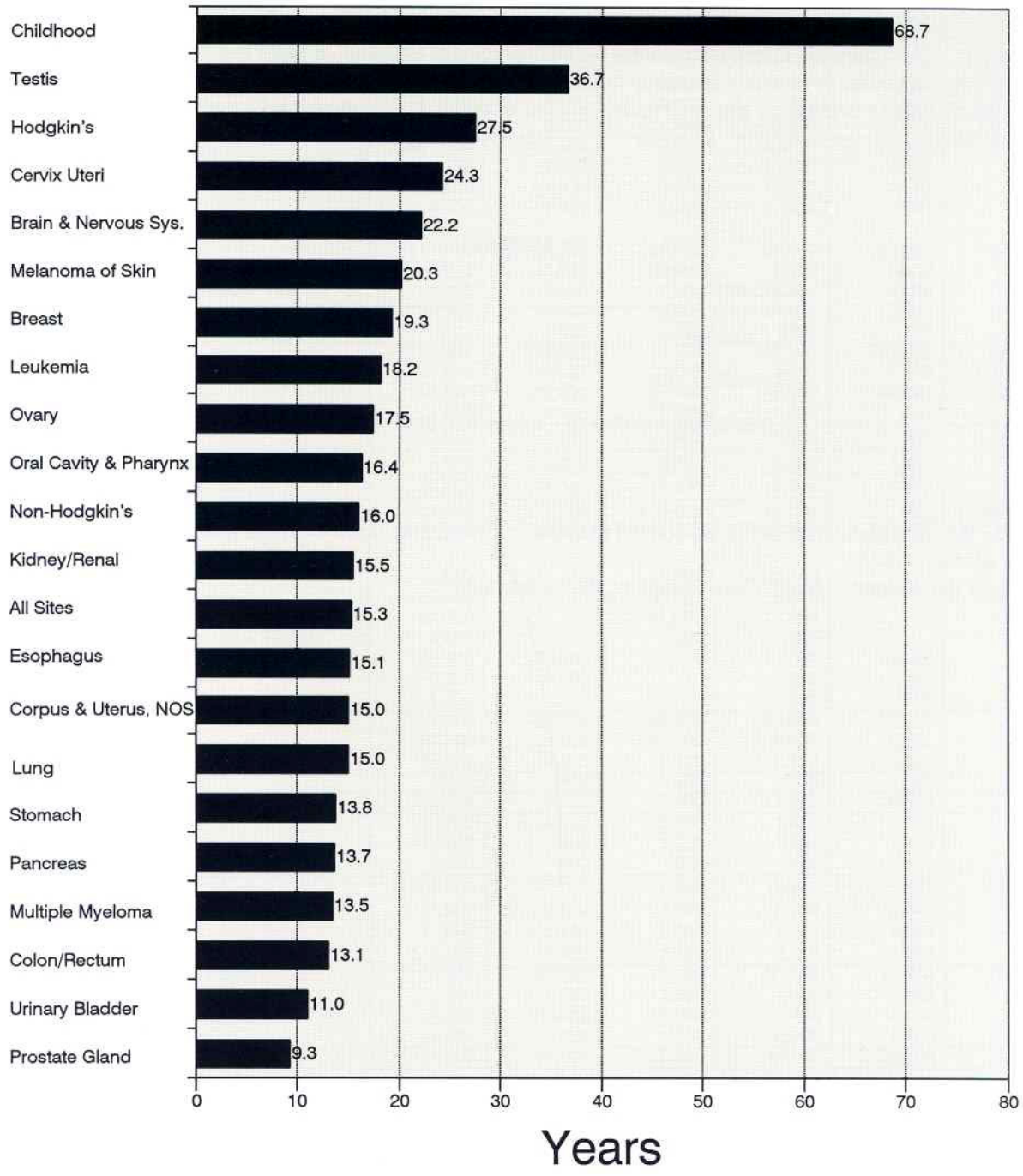
The direct cost of cancer is derived from the figures for care of patients. It does not include the cost of the productivity lost while individuals are away from their work due to treatment of disability or the value of lost productivity due to premature death. Figures for the direct cost of cancer and for all health care for 1990 are as follow:

(in Millions)

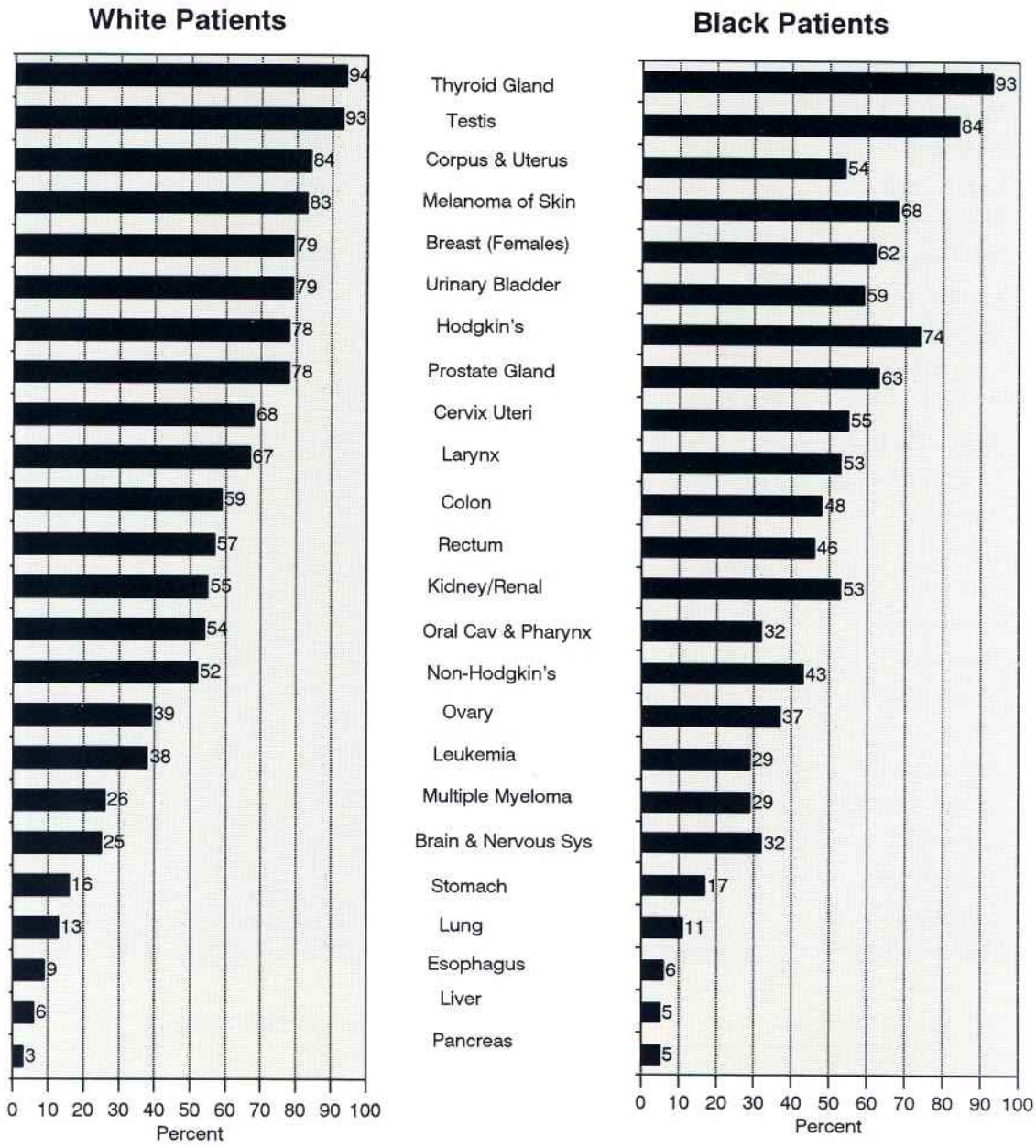
All Costs	Direct Cost
All Cancers	$ 35,256
All Health Care	$585,300
Percent Relationship of Cancer to Total	6%

Sources:
Brown, M.L. The National Economic Burden of Cancer: An Update. *Journal of the National Cancer Institute,* 1990, 82:1881-1814.
Office of the Actuary, Health Care Financing Administration.

Average Years of Life Lost Per Person Dying of Cancer All Races, Both Sexes, 1989

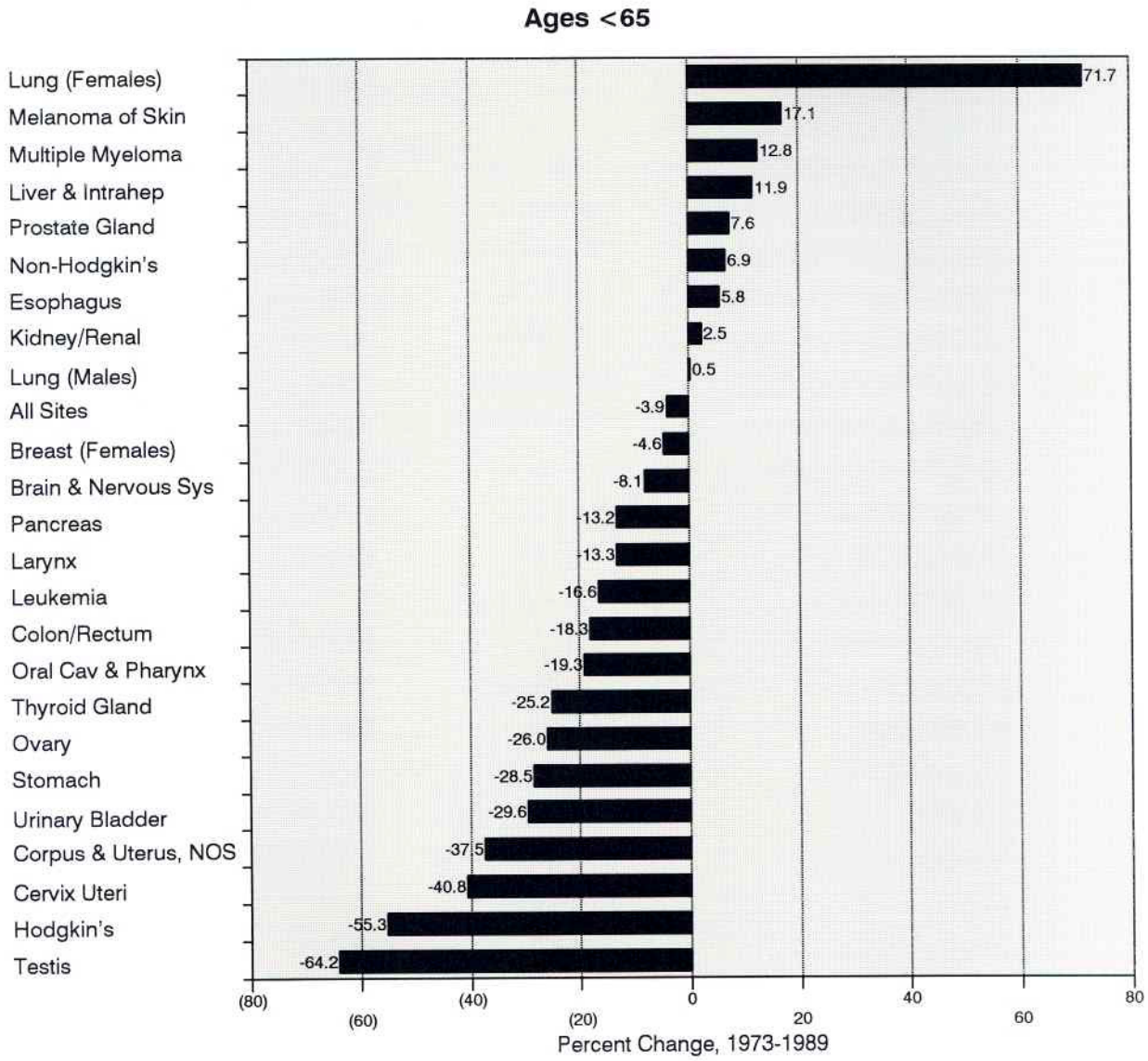


5-Year Relative Survival Rates, by Site White versus Black Patients 1983 to 1988



Data From SEER PROGRAM, 1983-1988 Males and Females

Cancer Mortality Rates
Changes from 1973 to 1989
(Ages Under 65)

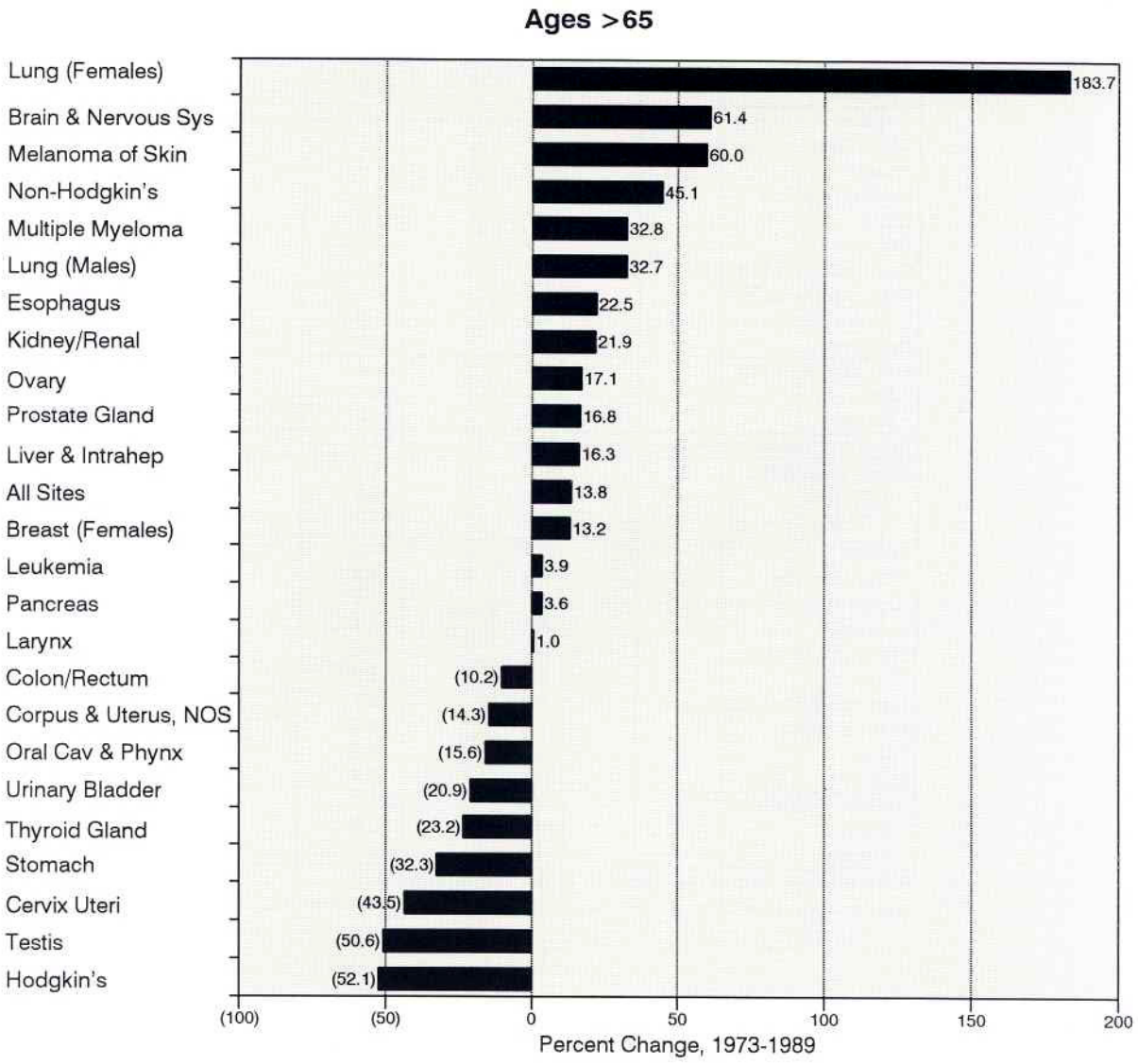


Note:

Progress and problems:

This graph illustrates percent changes in the annual death rate for a wide range of cancers. Cancers to the right of the zero axis have had increased cancer mortality rates, those to the left have had decreased mortality rates. If the graph is turned counter-clockwise, on its side, the bars pointing down show the major tumors in which a significant reduction in annual death rate has occurred. Progress is apparent: a reduction has occurred in the annual death rates since 1973 in both common and uncommon cancers. This definitely shows progress in the age group under 65, albeit more progress needs to be made.

Cancer Mortality Rates
Changes from 1973 to 1989
(Ages Over 65)



Note:

Progress and problems:

Comparing this chart to that for individuals under 65, it is clear that not as much progress is being made in reducing cancer death rates in older groups. The cancer deaths to the right of the zero axis have risen, those to the left have decreased. This graph should be compared to the accompanying graph addressing changes in mortality rates for people under age 65. Issues such as low-income, patterns of medical care, and other related factors are thought to be important considerations in the older population.

Cancer Mortality Rates
United States, 1985-1989

Cancer Site	Mortality Rate per 100,000		Ratio
	Blacks	Whites	Blacks/Whites
All Sites	223.4	168.4	1.3
Males	312.8	213.1	1.5
Females	164.2	138.8	1.2
Esophagus	8.8	2.9	3.0
Cervix Uteri	7.1	3.1	2.3
Prostate	49.5	24.4	2.0
Multiple Myeloma	5.6	2.9	1.9
Larynx	2.7	1.2	2.3
Stomach	8.9	4.4	2.0
Oral Cavity and Pharynx	5.3	2.8	1.9
Corpus & Uterus NOS	6.0	3.6	1.7
Liver & Intrahep.	4.0	2.6	1.5
Pancreas	11.9	8.4	1.4
Lung and Bronchus	59.5	47.4	1.3
Males	104.1	72.8	1.4
Females	28.2	28.2	1.0
Colon and Rectum	23.5	19.6	1.2
Breast (Females)	30.3	27.4	1.1
<50 years	9.2	6.0	1.5
≥ 50 years	95.0	93.5	1.0
Thyroid	0.4	0.3	1.3
Urinary Bladder	3.3	3.3	1.0
Kidney & Renal Pelvis	3.2	3.4	0.9
Leukemia	5.9	6.4	0.9
Hodgkin's Disease	0.6	0.6	1.0
Ovary	6.3	8.0	0.8
Non-Hodgkin's Lymphomas	4.0	6.1	0.7
Brain & CNS	2.5	4.3	0.6
Testis	0.2	0.3	0.7
Melanoma of Skin	0.4	2.4	0.2
All Sites Except Lung	163.9	121.0	1.4
Males	208.7	140.3	1.5
Females	136.0	110.6	1.2

NOTE: The annual number of cancer deaths per 100,000 persons is derived from estimates of the National Center for Health Statistics, adjusted to the 1970 US population age distribution.

Cancer Incidence Rates
Unites States, 1985-1989

	Incidence Rates per 100,000		Ratio
Cancer Site	**Blacks**	**Whites**	**Blacks/Whites**
All Sites	410.7	380.4	1.1
Males	535.0	442.6	1.2
Females	327.0	344.1	1.0
Esophagus	10.8	3.2	3.4
Multiple Myeloma	8.3	3.9	2.1
Cervix	14.8	7.8	1.9
Stomach	12.9	7.0	1.8
Liver & Intrahep.	4.3	2.2	2.0
Pancreas	14.3	8.9	1.6
Larynx	7.1	4.6	1.5
Prostate	139.7	98.8	1.4
Lung and Bronchus	78.1	57.2	1.4
Males	127.3	81.9	1.6
Females	42.3	39.1	1.1
Oral Cavity and Pharynx	14.2	10.7	1.3
Kidney and Renal Pelvis	9.0	8.4	1.1
Colon and Rectum	52.2	50.0	1.0
Colon	40.1	35.5	1.1
Rectum	12.1	14.5	0.8
Leukemia	8.8	10.3	0.9
Breast (Females)	92.5	110.8	0.8
<50 years	31.7	32.8	1.0
≥50 years	279.9	351.5	0.8
Ovary	10.1	14.9	0.7
Non-Hodgkin's Lymphomas	8.9	14.1	0.6
Brain and Other Nervous	4.1	6.7	0.6
Corpus & Uterus NOS	14.8	22.3	0.7
Hodgkin's Disease	1.8	3.1	0.6
Thyroid	2.3	4.4	0.5
Bladder	9.8	18.2	0.5
Testis	0.7	5.0	0.1
Melanoma of Skin	0.8	11.7	0.1
All Sites Except Lung	332.6	323.2	1.0
Males	407.7	360.7	1.1
Females	284.7	305.0	0.9

NOTE: The annual number of new cancer cases per 100,000 persons is derived from NCI's SEER Program, adjusted to the 1970 US population age distribution.

The Prevalence of Cancer: Estimated Number of Persons Diagnosed With Cancer United States, 1992

	1992 Estimated Prevalence		
	Total	**Males**	**Females**
ALL SITES	7,305,000	2,826,000	4,479,000
Oral & Pharynx	209,000	130,000	79,000
Stomach	72,000	41,000	31,000
Colon/Rectal	1,275,000	592,000	683,000
Colon	909,000	406,000	503,000
Rectum	366,000	186,000	180,000
Pancreas	24,000	11,000	13,000
Larynx	140,000	111,000	29,000
Lung & Bronchus	374,000	213,000	161,000
Melanoma of Skin	384,000	182,000	202,000
Breast	1,758,000	-	1,758,000
Cervix Uteri	194,000	-	194,000
Corpus & Uterus	517,000	-	517,000
Ovary	174,000	-	174,000
Prostate Gland	562,000	562,000	-
Testis	107,000	107,000	-
Urinary Bladder	562,000	400,000	162,000
Kidney & Renal Pelvis	158,000	96,000	62,000
Brain and Nervous System	75,000	38,000	37,000
Thyroid	182,000	44,000	138,000
Hodgkin's Disease	136,000	74,000	62,000
Non-Hodgkin's Lymphomas	251,000	124,000	127,000
Leukemia	102,000	52,000	50,000

NOTE: Based on estimates of number of persons diagnosed with cancer prepared by the Connnecticut Cancer Registry and population estimates from the National Cancer Institute; projections based on linear extrapolation.

Fiscal Year 1992 Budget

(Dollars in Thousands)

A. Actual Obligations Resulting From Appropriated Funds:

FY 1992 Appropriation	$1,989,278
Section 214 Salary & Expense Reduction	-482
Section 513(a)-Travel Reduction	-780
Section 514(a)-Salary & Expense Reduction	-21,475
Transfer to other NIH Institutes for Cancer Research	-15,000
Rescission	-3,954
	1,947,587
Less:	
Lapse	-16
Actual NCI Obligations	**1,947,571**

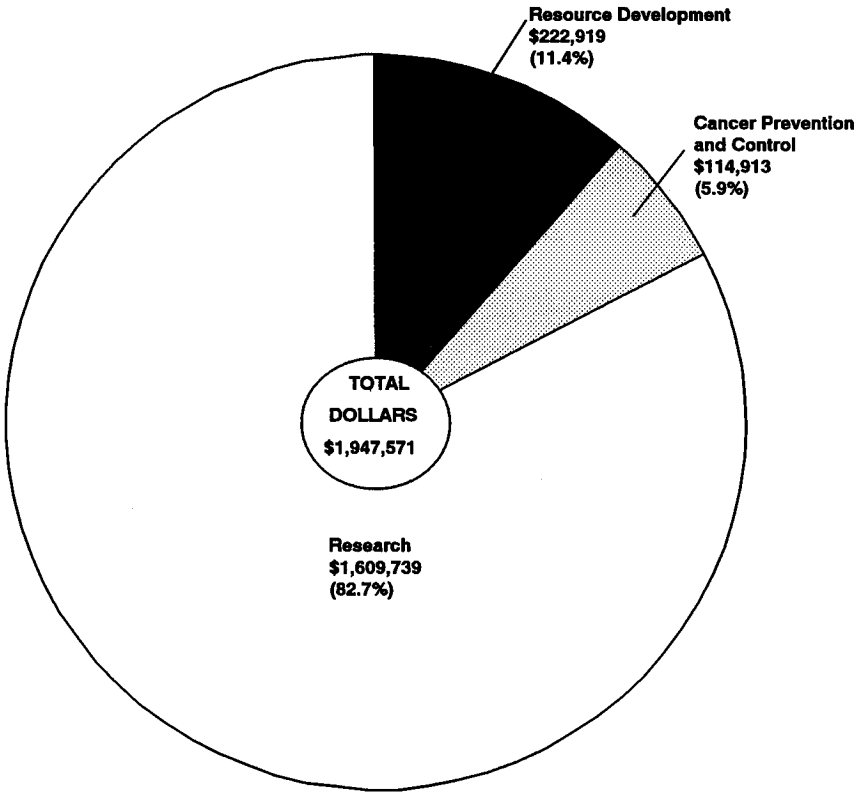
B. Reimbursable Obligations:

● Acquired Immune Deficiency Syndrome (AIDS):	
Office of the Director, NIH	1,864
● Construction Reimbursement from NIH	2,813
● Other Reimbursements	14,009
Reimbursements	18,686

C. Total NCI Obligations $1,966,257

Program Structure
Fiscal Year 1992

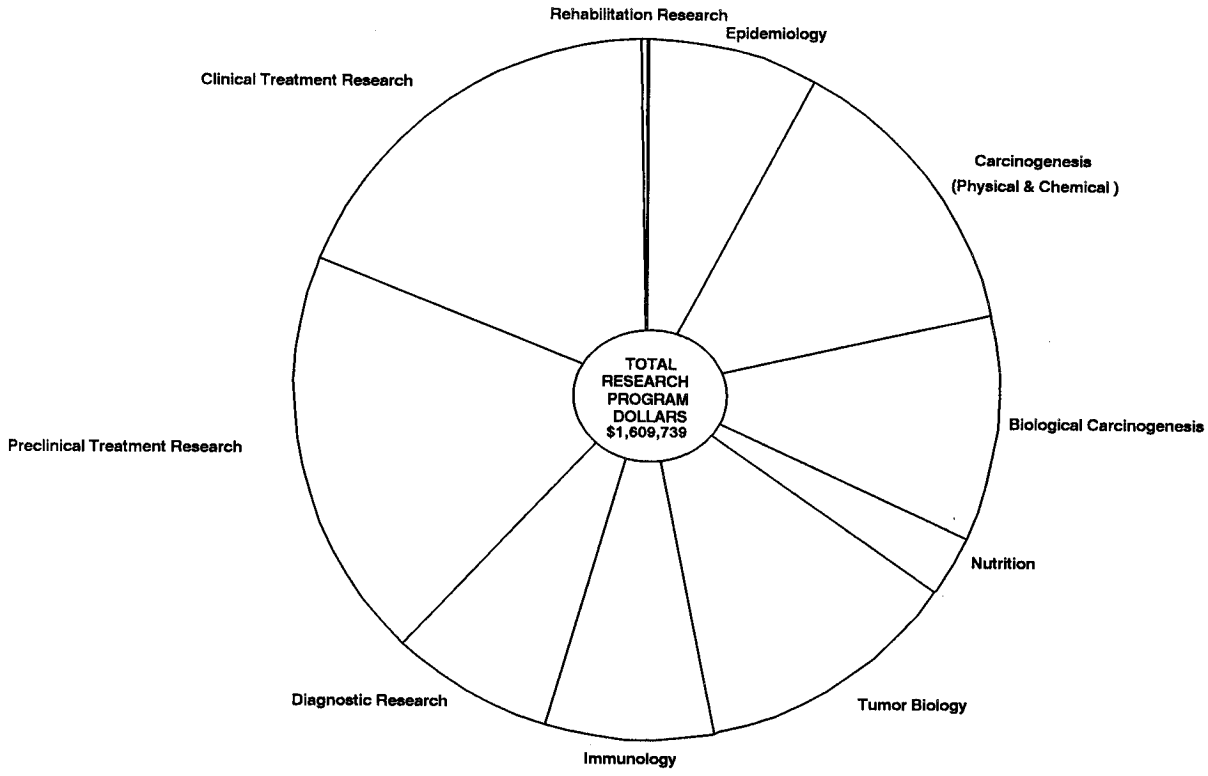
(Dollars in Thousands)



	Dollars	Percent
RESEARCH		
Cancer Causation	$545,109	28.0%
Detection and Diagnosis Research	134,765	6.9%
Treatment Research	611,008	31.4%
Cancer Biology	318,857	16.4%
Subtotal Research	$1,609,739	82.7%
RESOURCE DEVELOPMENT		
Cancer Centers Support	146,286	7.5%
Research Manpower Development	64,360	3.3%
Construction	12,273	0.6%
Subtotal Resource Development	$222,919	11.4%
CANCER PREVENTION AND CONTROL	$114,913	5.9%
TOTAL NCI	$1,947,571	100.0%

NCI Research Programs
Fiscal Year 1992

(Dollars in Thousands)

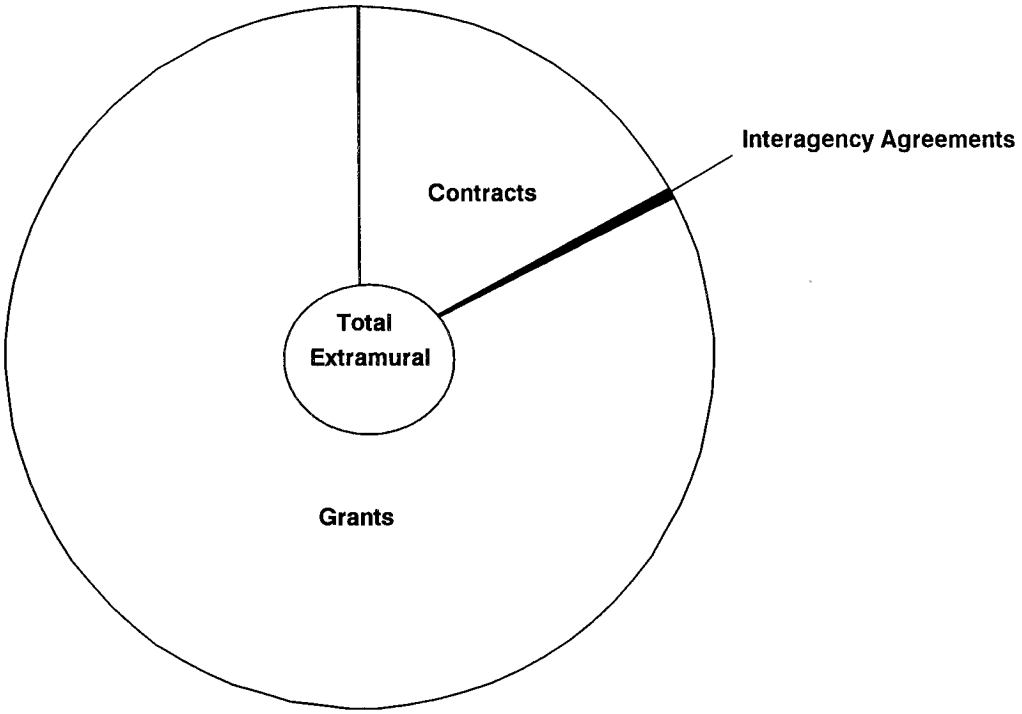


All Budget Activities	Dollars	Percent of Total
Research Programs	$1,609,739	82.7%
Resource Development		
Cancer Centers Support	146,286	7.5%
Research Manpower Development	64,360	3.3%
Construction	12,273	0.6%
Cancer Prevention and Control	114,913	5.9%
Total NCI	$1,947,571	100.0%

Research Budget Activity	Dollars	Percent of Total
Epidemiology	$125,722	7.8%
Carcinogenesis (Physical & Chemical)	219,244	13.6%
Biological Carcinogenesis	169,225	10.5%
Nutrition	46,294	2.9%
Tumor Biology	195,380	12.1%
Immunology	123,477	7.7%
Diagnostic Research	121,543	7.6%
Preclinical Treatment Research	305,125	19.0%
Clinical Treatment Research	299,780	18.6%
Rehabilitation Research	3,949	0.2%
Total	$1,609,739	100.0%

Extramural Funds
Fiscal Year 1992

(Dollars in Thousands)



	Dollars	Percent
CONTRACTS:		
SBIR Contracts	$2,112	0.1%
Research Support Contracts	190,832	13.0%
Construction Contracts	4,000	0.3%
Cancer Control Contracts	51,710	3.5%
Subtotal Contracts	$248,654	16.9%
INTERAGENCY AGREEMENTS	8,236	0.6%
GRANTS:		
Cancer Control Grants	34,296	2.3%
Training Activities	37,143	2.5%
Cancer Centers	144,785	9.8%
SBIR Grants	17,277	1.2%
Construction Grants	8,000	0.5%
Other Research Grants	971,547	66.1%
Subtotal Grants	1,213,048	82.5%
TOTAL EXTRAMURAL FUNDS	1,469,938	100.0%
TOTAL INTRAMURAL/RMS/CONTROL	477,633	
TOTAL NCI	$1,947,571	

Total Dollars by Mechanism Fiscal Year 1992

(Dollars in Thousands)

Amount	Mechanism	Percent of Total
Research Project Grants		
$424,954	Traditional	21.8%
205,330	Program Projects	10.5%
29,726	FIRST Awards	1.5%
47,414	MERIT Awards	2.4%
17,277	SBIR Grants	0.9%
59,878	Outstanding Investigator Grants	3.1%
45,107	RFAs	2.3%
44,171	Coop. Agreements	2.3%
873,857	Total	44.9%
Cancer Centers		
127,351	Center Core Grants	6.5%
17,434	SPOREs	0.9%
144,785	Total Centers	7.4%
Other Research Grants		
	Research Career Programs:	
2,171	RCDA-K04	0.1%
2,833	Clinical Oncology - K12	0.1%
3,750	Physician Investigator-K11	0.2%
1,679	Preventive Oncology-K07	0.1%
3,682	Clinical Investigator Awards-K08	0.2%
14,115	Subtotal Careers	0.7%
8,087	Cancer Education Program	0.4%
77,163	Clinical Coop Groups	4.0%
2,880	Comp. Minority Biom. Support Program	0.1%
4,520	Scientific Evaluation	0.2%
952	Instrumentation Grants	0.0%
3,040	Shannon Awards	0.2%
3,305	Small Grants	0.2%
764	Conference Grants	0.0%
141	Minority Training Grant	0.0%
114,967	Total	5.9%
Total		
$1,133,609	Research Grants	58.2%

Amount	Mechanism	Percent of Total
Training Program		
33,028	NRSA Institutional	1.7%
4,115	NRSA Individual	0.2%
37,143	Total	1.9%
Research and Development Contracts		
190,832	Research Support Contracts	9.8%
8,236	Interagency Agreements	0.4%
2,112	SBIR Contracts	0.1%
201,180	Total	10.3%
Cancer Prevention and Control		
	Grants:	
38	Rehabilitation Research	0.0%
34,258	Cancer Control	1.8%
34,296	Subtotal Grants	1.8%
51,710	Contracts	2.7%
21,563	Inhouse	1.1%
107,569	Total	5.5%
Inhouse		
359,508	Intramural Research	18.5%
96,562	Research Management and Support	5.0%
456,070	Total	23.4%
Construction		
8,000	Grants	0.4%
4,000	Contracts	0.2%
12,000	Total	0.6%
Total		
$1,947,571	NCI	100.0%

Division Obligations by Mechanism Fiscal Year 1992

(Dollars in Thousands)

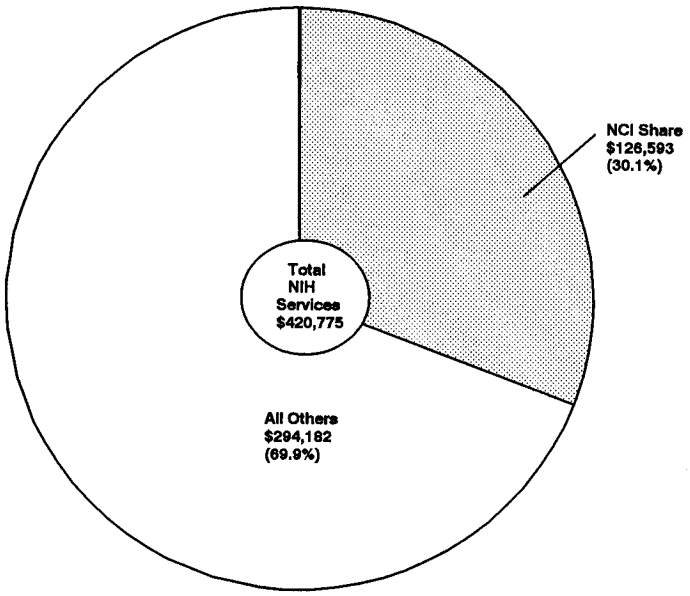
	DCBDC	DCT	DCE	DCPC	DEA	FCRDC	OD	Program Support	TOTAL NCI
Research Grants:									
Research Project Grants	$244,010	$273,407	$253,963	$81,777	$3,423				$856,580
SBIR Grants	2,625	10,617	1,922	2,113					17,277
Subtotal Research Project Grants	246,635	284,024	255,885	83,890	3,423	0	0	0	873,857
Cancer Centers Grants	143,831				954				144,785
Other Research Grants:									
Career Program	13,810				305				14,115
Cancer Education Program	8,087								8,087
Clinical Cooperative Groups		77,163							77,163
Minority Biomedical Support					2,880				2,880
Scientific Evaluation					4,520				4,520
Instrumentation Grants	952								952
Shannon Awards	1,050	940	1,050						3,040
Small Grants	1,112	1,097	1,096						3,305
Conference Grants	370	154	125	78	37				764
Minority Training Grant		141							141
Subtotal, Other Research Grants	25,381	79,495	2,271	78	7,742	0	0	0	114,967
Subtotal, Research Grants	415,847	363,519	258,156	83,968	12,119	0	0	0	1,133,609
NRSA Fellowships	36,779				364				37,143
Research and Development Contracts:									
R&D Contracts	5,782	69,971	40,660	17,869	862	36,725	27,199		199,068
SBIR Contracts		950	727	435					2,112
Subtotal, Contracts	5,782	70,921	41,387	18,304	862	36,725	27,199	0	201,180
Cancer Prevention and Control									
Rehabilitation Grants				38					38
Cancer Control Grants				34,258					34,258
Subtotal, Grants	0	0	0	34,296	0	0	0	0	34,296
Cancer Control Contracts				51,710					51,710
Inhouse				21,563					21,563
Total Prevention & Control	0	0	0	107,569	0	0	0	0	107,569
Inhouse(1)	62,697	101,173	71,917	3,228	8,811	1,191	55,175		304,192
NIH Management Fund							126,953		126,953
Construction	8,000					4,000			12,000
All Other(2)								24,925	24,925
Division Totals	$529,105	$535,613	$371,460	$213,069	$22,156	$41,916	$209,327	$24,925	$1,947,571

(1) Includes Research Management and Support and Intramural Research

(2) Includes Central Assessments for DHHS-NIH General Expense, and Program Evaluation

NIH Management Fund Reimbursement Fiscal Year 1992

(Dollars in Thousands)



DISTRIBUTION OF NCI PAYMENT		
	Dollars	Percent
Clinical Center	$80,904	63.7%
Division of Research Grants	12,152	9.6%
Division of Computer Research and Technology	8,391	6.6%
Standard Level User Charge	4,415	3.5%
Other Research Services	21,091	16.6%
Total, NCI Payment	$126,953	100.0%

The Management Fund provides for the financing of certain common research and administrative support activities which are required in the operations of NIH:

Clinical Center: Admissions and followup, anesthesiology, diagnostic x-ray, nuclear medicine, clinical pathology, blood bank, rehabilitation medicine, pharmacy, medical records, nursing services, patient nutrition service, housekeeping services, laundry, and social work

Division of Research Grants: initial scientific review of applications, assignment of research grant applications to institutes

Division of Computer Research and Technology: Research and development program in which concepts and methods of computer science are applied to biomedical problems

Standard Level User Charge: building rental including utilities and guard services

Other Research Services: procurement, safety, engineering, biomedical engineering, veterinary resources, and library

Special Sources of Funds

CRADAs

As a result of the Federal Technology Transfer Act of 1986, government laboratories are now authorized to enter into Cooperative Research and Development Agreements (CRADAs) with private sector entities. Licensing agreements are usually incorporated into the CRADA document, which addresses patent rights attributable to research supported under the CRADA.

CRADA Receipts Deposited to the U.S. Treasury

(dollars in thousands)

	Carryover from Prior Year	Receipts	Obligations
1990	$ 116	$ 61	$125
1991	52	115	66
1992	101	1,646	466
1993	1,281		

Royalty Income

NCI can now retain a portion of the royalty income generated by the patents related to NCI-funded research. A major portion of this royalty income is used to reward employees of the laboratory, to further scientific exchange and for education and training in accordance with the terms of the Act. A portion of the receipts is used to support the National Technical Information Service (NTIS), Department of Commerce, which handles the processing and collection phases. Support is also provided to NIH to cover expenses associated with technology transfer efforts.

Royalty Income Funding History

(dollars in thousands)

Years Available	Collections*	Inventor Payments	Other**
1989/1990	$ 813	$ 575	$ 238
1990/1991	1,452	871	581
1991/1992	2,084	431	1,653
1992/1993	1,681	345	1,336

* Does not include assessments by NIH and NTIS.
** To be used for the furtherance of technology transfer

AIDS

Acquired Immunodeficiency Syndrome (AIDS) Key Discoveries

The National Cancer Institute has assumed a leading role in Acquired Immunodeficiency Syndrome (AIDS) research since the disease was first recognized in 1981. Because of the research programs and administrative mechanisms already in place, investigators were able to rapidly apply existing methods in drug screening and advances in cancer virus research technology to the study of AIDS. Recent key discoveries, by NCI investigators include:

- Development, testing and successful clinical trials of the drugs azidothymidine (AZT), dideoxyinosine (ddI) and dideoxycytidine (ddC), confirming their effectiveness as anti-retroviral agents against AIDS.

- Progress in treating children with AIDS has occurred through the rapid introduction of antiretroviral agents into clinical trials. The studies performed by the Pediatric Branch contributed to the licensure of AZT for children in May of 1990 and dideoxyinosine (ddI) in October 1991. The latter, based solely on Pediatric Branch Studies, occurred simultaneously with licensure for adults, a historical event. The Pediatric Branch is currently completing studies of combination regimens to optimize activity (e.g., AZT plus ddI) as well as to offset toxicity (e.g., AZT plus G-CSF and erythropoietin).

- Preliminary work indicates that plasma levels of virus will prove to be a valuable tool in assessing the dosing schedule and effectiveness of treatment in both children and adults. Quantitative viral levels may provide a therapeutic index for drug effectiveness in future trials.

- There is evidence that HIV from patients on long-term AZT therapy which has become resistant to AZT remains sensitive to ddI and ddC. Preliminary results of combination therapy with AZT, acyclovir, ddI and ddC in patients with AIDS or severe ARC suggest that patients feel better, have increases in their T4 cells, and have decreases in HIV p24 antigen on the regimen.

- Identification through the high-capacity AIDS drug screen of many new compounds which are active against the AIDS virus in tissue culture experiments. These compounds include both synthetic drugs and natural products. Several of these are in the initial phases of development.

- Determination of the first crystal structure of retroviral protease and its successful use to predict the structure of the HIV protease and substrate using supercomputer methodology.

- Growth hormone (GH) and insulin-like growth factor (IGF)-1 are critical for normal T cell development within the thymus. GH-deficient dwarf mice have marked thymic hypoplasia and deficiency in T progenitor cells. Treatment of these mice with GH leads to T cell reconstitution within the thymus. In the severe combined immunodeficiency (SCID) mouse model reconstituted with human peripheral blood cells, GH and IGF-1 lead to increased numbers of lymph node and thymic CD4 cells and may promote immunoreconstitution by enhancing overall thymic function. Clinical trials combining GH and/or IGF-1 with AZT and ddI are underway in adults and children with severe HIV infection.

- The CD4 AIDS virus receptor on the surface of human T-cells has been found to be physically associated with a proto-oncogene known as ^{p56}lck, the protein product of which is a tyrosine-specific kinase. The efficacy of daily intramuscular injections of recombinant CD4 in preventing progression of simian AIDS in rhesus monkeys has been demonstrated. This protein may be useful as a therapeutic agent for the treatment of human AIDS.

- HIV-infected cells may release biologically active Tat, the protein product of the *tat* gene, which can be taken up by cells in close proximity and induce cell proliferation, viral transactivation and perhaps other toxic effects. In particular, scientists have learned that the *tat* gene can trigger the AIDS virus to replicate at an increased rate. Thus, manipulation of the *tat* gene could lead to control of the growth of the virus.

- Demonstration that, in addition to CD4 + T-lymphocytes, HIV can bind to and infect monocytes/macrophages, which also possess CD4 receptor molecules on their surfaces. In monocytes infected with HIV-1 and HIV-2, viral expression can be regulated in several ways: 1) latency (provirus with no viral expression); 2) restricted expression (intracytoplasmic viral antigens, RNA and virions but little or no detectable virus released); and 3) continuous production.

- Individuals infected with HIV may be asymptomatic for years before progressing to overt AIDS. Since monocytes can be a reservoir for HIV in infected individuals, their role in viral persistence and spread was studied. Latently infected monocytoid THP-1 cells and freshly isolated adherent monocytes from asymptomatic seropositive individuals did not show detectable viral expression until they are co-cultured with activated T cells from HIV-negative normal donors. Cell-cell contact is required and seems to induce factor(s) in monocytes capable of overcoming latency. Thus, monocytes in AIDS patients can harbor latent HIV inducible by T cells during an immune response. HIV produced by such monocytes infects T cells leading to viral-induced pathology.

- The pigtail macaque is a primate whose cells are receptive to infection by, and subsequent propagation of, HIV. Furthermore, *in vivo* infection of these macaques by HIV results in histopathologic changes in the CNS that parallel those seen in human AIDS-related dementia. This animal model provides an important testing ground to elucidate mechanisms underlying HIV-induced CNS dysfunction, define CNS penetration and pharmacology of antiretroviral drugs, and assess new compounds to inhibit HIV-induced neuroimmune destruction.

- The magnitude of CNS disease is often more prominent and the latency period which precedes HIV-related encephalopathy shorter in children than in adults, suggesting that fetal or developing brain cells (in particular, glial cells) may release cytokines capable of activating expression of latent HIV. To address the pathogenesis of neurologic disorders in HIV-1 infected children, NCI scientists are developing an *in vitro* model using a normal fetal olfactory neuroblast cell line, to investigate the potential contributions of direct viral infection and virally-induced cytokines in glial (and perhaps other accessory) cells to neurodevelopmental impairment.

- In a recent analysis of epidemiologic trends in Washington, D.C. during the first decade of the AIDS epidemic (1980 to 1991), using back-calculation methods and surveys of sentinel populations, NCI investigators have found that one in 57 males ages 20 to 64 have been diagnosed with AIDS. This frequency is more than six times greater than the national level. Two waves of infection have been detected, the first (approximately 1980 to 1985) in homosexual males and the second (since 1985) occurring in intravenous drug users (IVDU) and heterosexual men and women.

- Recent studies of vaginally-delivered multiple birth cohorts in HIV-infected women demonstrate that HIV transmission is greatest for the first-born infant, suggesting that some component of HIV transmission occurs at the time of the delivery in the cervix or vagina.

- Immunoepidemiologic studies have found that humoral immunity (i.e. antibody) directed against the HIV envelope glycoprotein gp120 in the mother protects against the risk for maternal-fetal transmission. Now, the protective contributions of cellular immunity have also been uncovered, using the T helper lymphocyte test. This HIV-specific T-cell immunity appears to occur very early in HIV infection and has been found in approximately 50 to 60 percent of seronegative individuals in high-risk populations (homosexual men, IVDUs, HIV-exposed health care workers), many of whom have not yet seroconverted after two years' follow-up, suggesting that T-cells are capable of mediating immune protection.

- More precise identification, by means of a multi-center study of male hemophiliacs, of predictors for an increased risk of developing AIDS. In particular a decline in CD4+ lymphocytes, the appearance of HIV antigen, and increased levels of alpha-interferon. The decline in immunity is associated with an increase in the infection rate of female spouses. This represents a major risk factor in the sexual transmission of HIV.

- Sequential studies have now defined critical peptides that elicit distinct T-cell and B-cell (especially neutralizing antibody) responses and identified those peptides recognized by multiple histocompatibility antigens. NCI scientists have now developed two new prototype synthetic vaccines consisting of broadly-recognized histocompatibility determinants of T helper cells (so-called "cluster peptides") and a combined site constructed to elicit both cytotoxic T lymphocytes (CTL) and neutralizing antibody.

- NCI scientists are developing genetically-engineered vaccines that combine immunogenic carriers with various HIV antigens to elicit cellular and humoral responses. Both T and B-cell immunity can be generated in macaques immunized with recombinant vaccinia virus carrier coupled to the gp160 envelope protein of simian immunodeficiency virus (SIV) and boosted with subunit gp160 produced in recombinant baculovirus-infected cells. Similarly, high titers of neutralizing antibody to HIV gp160 are elicited in dogs immunized with HIV gp160 subunits coupled to live or recombinant human adenovirus vectors and boosted with recombinant subunit gp160 produced in heterotypic adenovirus-HIV infected cultures.

- Eukaryotic recombinant expression vector systems, in particular the baculovirus-insect cell and metallothione promoter vector systems, HIV, simian immunodeficiency virus (SIV), and proviral molecular clones of bovine immunodeficiency virus (BIV), are being used to engineer novel noninfectious pseudovirons. These virus-like particles are designed to contain Gag proteins, Gag-Pol-Env, or Gag and a combination of T- and/or B-cell reactive virus Env epitopes (e.g., primary neutralizing and/or fusion domains) or immunomodulators (e.g., IL-2).

- The bovine immunodeficiency-like virus (BIV) is a unique member of the lentivirus subfamily of retroviruses. Chronic infection in specific pathogen-free rabbits *(Oryctolagus cuniculus)* has been established with a natural isolate or progeny of an infectious molecular clone of BIV. The infection results in a rapid and sustained BIV-specific humoral response suggesting that infection is targeted to cells of the immune system.

- Kaposi's sarcoma (KS) has gained importance because of the high incidence (20 to 30 percent) in patients with HIV infection and AIDS. Recently NCI researchers demonstrated that KS cells can be maintained in tissue culture if they are grown in conditioned media from HTLV-1 or HTLV-2 transformed or activated CD+4 T-cells. AIDS-KS cells release into the medium a number of cytokines which induce the AIDS-KS derived cells to proliferate. The factors have been shown to be biologically active growth-promoting proteins (cytokines) released by the T cells and not products of the virus itself.

- Within the last year, a glycoprotein growth factor known as Oncostatin M, derived from activated T-cells, has been found to act as a potent growth stimulator for AIDS-KS cells. This growth factor is distinct from other important cytokines in AIDS-KS, namely IL-6 and the HIV Tat protein, but binds to the active subunit of the IL-6 receptor. Oncostatin M appears to cause AIDS-KS cell proliferation both directly and in part by enhancing the expression of IL-6 by vascular endothelial cells, and further induces morphologic changes in AIDS-KS cells, namely to the spindle configuration of smooth muscle cells.

- The striking production of autostimulatory and angiogenic growth factors by KS cells suggest that these factors should be an important target for therapy. A new inhibitor of angiogenesis Fumagillin and its synthetic analog, TNP-470, are currently under pre-clinical development, with Phase I trails projected to begin in approximately one year.

- NCI scientists have found a non-cytotoxic bacterial product, a sulfated polysaccharide-peptidoglycan

compound (SP-PG) which inhibits the growth and vascular responses, in particular the induction of angiogenesis and hyperpermeability, of AIDS-KS spindle cells *in vitro* and in a nude mouse model.

- The remarkable occurrence of high-grade B-cell, non-Hodgkin's lymphomas (NHL) has recently emerged as a major sequela of HIV infection, especially in patients who survive other consequences of AIDS in a protracted state of profound immunosuppression. NHLs develop in approximately 10 percent of AIDS patients treated with dideoxynucleosides.

- Profound cellular immunodeficiency plays a central role in lymphomagenesis, as evidenced by the striking relationship between the depletion of CD4 lymphocytes and the development of NHL, particularly when the CD4 count falls below $50/mm^3$. NCI investigators are expanding the clinical data and laboratory correlates generated from the continuing follow-up of the original AZT-treated AIDS cohort (8 of the 55 of whom developed NHL a median of two years after AZT institution) and similar observations in 61 ddI-treated AIDS patients. In the AZT-treated cohort, there is roughly a 30 percent chance of developing NHL within three years. The most important risk factor determinant for both the AZT- and ddI-treated cohorts is a CD4 count below the critical level of $50/mm^3$.

Acquired Immunodeficiency Syndrome (AIDS) Funding by Functional Category Fiscal Year 1992

(Dollars in Thousands)

I. Basic Science Research	
Biomedical Research	
HIV and HIV genome	$30,812
Immunology	7,828
Blood/Blood products	364
Animal models & related studies	7,559
Subtotal, Biomedical Research	46,563
Therapeutic Agents	
Development	43,310
Clinical Trials	43,881
Subtotal, Therapeutic Agents	87,191
Vaccines	
Development	12,994
Clinical Trials	0
Subtotal Vaccines	12,994
TOTAL, BASIC SCIENCE RESEARCH	146,748
II. Risk Assessment and Prevention	
Surveillance	
Diseases associated with HIV	1,888
HIV surveys (incidence, prevalence)	0
Knowledge, attitudes, behaviors	0
Subtotal, Surveillance	1,888
Population-Based Research	
Transmission	
Sexual	1,667
Intravenous drug abusers	0
Hemophiliac populations	469
Blood recipient/donor studies	0
Perinatal infection	2,488
Occupationally related	0
Other/Miscellaneous	4,569
Subtotal, Transmission	9,193
Natural History and Cofactors	7,839
Subtotal, Population-Based Research	17,032
TOTAL RISK ASSESSMENT AND PREVENTION	18,920
Total, NCI	**$165,668**

Note: The functional codes of AIDS were developed by PHS at the request of Dr. James Mason, Deputy Secretary of HHS. These functional categories are intended to identify AIDS research in terms of "deliverables".

Acquired Immunodeficiency Syndrome (AIDS) Funding by Activity Fiscal Year 1992

(Dollars in Thousands)

By Mechanism:	
Research Project Grants	$19,495
Cancer Center Grants	4,818
Conference Grants	11
Shannon Awards	45
R&D Contracts	55,719
Intramural Research	79,143
Research Management and Support	6,437
Total, NCI	$165,668

By Research Thrust:	
Cancer Causation	$54,469
Detection and Diagnosis Research	13,466
Treatment Research	61,054
Cancer Biology	31,861
Total Research	160,850
Cancer Center Grants	4,818
Total, NCI	$165,668

By Division:	
Division of Cancer Biology, Diagnosis and Centers	$13,620
Division of Cancer Treatment	58,836
Division of Cancer Etiology	50,164
Frederick Cancer Research and Development Center	19,612
Division of Extramural Activities	1,138
Office of the Director	4,846
NIH Management Fund*	17,452
Total, NCI	$165,668

*Supports common services shared by NIH Institute; in AIDS the Management Fund is used principally for support costs associated with NCI's activities at the NIH Clinical Center.

Acquired Immunodeficiency Syndrome (AIDS) Funding History Fiscal Years 1982-1992

(Dollars in Thousands)

Fiscal Year	NCI Amount	NIH Amount	% NCI To NI
1982	$2,406	$3,355	72%
1983	9,790	21,668	45%
1984	16,627	44,121	38%
1985	26,874	63,737	42%
1986	45,050	134,667	33%
1987	63,755	260,907	24%
1988	89,944	473,285	19%
1989	122,247	627,076	19%
1990	150,304	740,509	20%
1991	160,869	799,821	20%
1992 (not including ADAMHA)	165,668	837,895	20%
1992 (including ADAMHA)	165,668	1,047,294	16%

Grant and Contract Awards by State Fiscal Year 1992

State	Grants		Contracts		Total NCI
	Number	Amount	Number	Amount	
Alabama	46	$14,140,680	25	$7,995,661	$22,136,341
Alaska	2	480,679	1	64,378	545,057
Arizona	65	21,984,891	3	444,412	22,429,303
Arkansas	11	1,605,951	0	0	1,605,951
California	586	169,739,472	43	12,038,327	181,777,799
Colorado	62	16,858,302	4	990,375	17,848,677
Connecticut	80	21,508,783	4	2,049,073	23,557,856
Delaware	3	495,519	0	0	495,519
District of Columbia	69	20,036,046	12	1,979,069	22,015,115
Florida	61	13,045,930	8	2,459,651	15,505,581
Georgia	31	4,727,473	13	3,975,706	8,703,179
Hawaii	23	5,330,060	4	1,257,314	6,587,374
Illinois	135	31,037,402	19	5,556,480	36,593,882
Indiana	37	7,932,331	11	2,019,566	9,951,897
Iowa	25	3,236,249	8	2,753,200	5,989,449
Kansas	21	3,762,664	6	1,456,163	5,218,827
Kentucky	26	3,251,463	3	912,101	4,163,564
Louisiana	15	2,756,535	1	133,263	2,889,798
Maine	10	2,584,445	1	154,351	2,738,796
Maryland	181	49,352,808	124	88,526,971	137,879,779
Massachusetts	425	128,651,261	22	5,715,791	134,367,052
Michigan	180	36,958,994	11	5,737,576	42,696,570
Minnesota	93	24,987,702	9	3,182,359	28,170,061
Mississippi	4	478,659	0	0	478,659
Missouri	57	14,245,551	9	2,400,400	16,645,951
Montana	0	35,750	0	0	35,750
Nebraska	21	3,751,811	4	2,003,845	5,755,656
Nevada	6	704,633	0	0	704,633
New Hampshire	40	14,254,668	2	454,481	14,709,149
New Jersey	59	11,703,424	5	2,187,148	13,890,572
New Mexico	22	3,714,045	10	2,057,299	5,771,344
New York	553	162,105,171	37	9,802,607	171,907,778
North Carolina	146	45,379,173	23	8,655,377	54,034,550
North Dakota	4	597,231	0	0	597,231
Ohio	121	25,617,358	8	3,734,401	29,351,759
Oklahoma	10	1,069,945	0	0	1,069,945
Oregon	31	6,456,918	3	1,312,480	7,769,398
Pennsylvania	333	106,309,276	13	4,020,484	110,329,760
Rhode Island	41	10,209,981	1	161,290	10,371,271
South Carolina	11	1,550,447	1	160,077	1,710,524
South Dakota	3	326,333	0	0	326,333
Tennessee	80	22,108,681	2	284,090	22,392,771
Texas	302	76,138,695	17	5,252,468	81,391,163
Utah	34	8,555,141	9	1,855,924	10,411,065
Vermont	21	4,938,534	2	266,069	5,204,603
Virginia	55	18,428,828	35	44,081,083	62,509,911
Washington	154	57,021,936	13	4,978,880	62,000,816
West Virginia	6	1,190,202	2	610,504	1,800,706
Wisconsin	94	24,567,350	8	2,499,738	27,067,088
Wyoming	1	50,000	0	0	50,000
Total	4,396	1,205,975,381	536	246,180,432	1,452,155,813
Puerto Rico	1	279,810	0	0	279,810
Total	4,397	$1,206,255,191	536	$246,180,432	$1,452,435,623

Institutions Receiving More than $5,000,000 in NCI Support Fiscal Year 1992

(Dollars in Thousands)

State	Institution	Grants	Contracts	Construction	Total NCI
Alabama	University of Alabama at Birmingham	$9,415	$1,480	$584	$11,479
	Southern Research Institute	3,016	5,484	0	8,500
Arizona	University of Arizona	19,241	184	0	19,425
California	University of California	72,137	2,688	0	74,825
	Stanford University	20,032	0	0	20,032
	University of Southern California	17,174	942	0	18,116
	Scripps Research Institute	8,499	0	0	8,499
	La Jolla Cancer Research Foundation	7,381	0	824	8,205
	Salk Institute for Biological Studies	7,601	0	0	7,601
	National Childhood Cancer Foundation	5,566	0	0	5,566
Colorado	University of Colorado System	7,975	345	0	8,320
Connecticut	Yale University	20,792	622	0	21,414
District of Columbia	Georgetown University	9,824	412	0	10,236
	U.S. Department of the Army	63	5,374	0	5,437
Florida	University of Miami	6,796	1,919	0	8,715
Georgia	Emory University	3,855	2,598	0	6,453
Illinois	University of Chicago	14,060	365	0	14,425
	University of Illinois System	6,626	2,620	0	9,246
Maryland	Johns Hopkins University	36,925	850	0	37,775
	Bionetics Research, Inc.	0	14,811	0	14,811
	Westat, Inc.	0	12,361	0	12,361
Massachusetts	Dana-Farber Cancer Institute	31,013	423	0	31,436
	Harvard University	18,980	237	0	19,217
	Massachusetts General Hospital	14,598	0	3,438	18,036
	Brigham and Women's Hospital	12,870	0	0	12,870
	Massachusetts Institute of Technology	9,896	0	0	9,896
Michigan	University of Michigan at Ann Arbor	18,389	279	0	18,668
	Wayne State University	8,995	0	0	8,995
	Michigan Cancer Foundation	2,967	2,681	0	5,648
Minnesota	University of Minnesota	12,917	494	0	13,411
	Mayo Foundation	9,739	429	0	10,168
Missouri	Washington University	9,700	259	0	9,959
Nebraska	University of Nebraska System	3,555	2,004	0	5,559
New Hampshire	Dartmouth College	14,006	454	0	14,460
New York	Memorial Sloan-Kettering	35,563	3,043	0	38,606
	Columbia University	19,798	0	0	19,798
	Roswell Park/NY State Dept of Health	14,647	1,290	0	15,937
	New York University	15,246	0	0	15,246
	Yeshiva University	12,871	0	0	12,871
	University of Rochester	10,859	0	0	10,859
	Cold Spring Harbor Laboratory	10,504	0	0	10,504
	American Health Foundation	8,215	1,522	0	9,737
	State University of New York	7,823	851	0	8,674
	Cornell University	5,339	0	0	5,339
North Carolina	University of North Carolina System	18,783	701	2,592	22,076
	Duke University	18,590	464	0	19,054
	Research Triangle Institute	0	5,823	0	5,823
Ohio	Case Western Reserve University	8,860	0	0	8,860
	Ohio State University	7,281	444	0	7,725
Pennsylvania	University of Pittsburgh	29,694	1,857	0	31,551
	Fox Chase Cancer Center	20,367	1,586	0	21,953
	University of Pennsylvania	14,477	521	0	14,998
	Wistar Institute of Anatomy and Biology	11,352	0	0	11,352
	Pennsylvania State University	8,925	0	0	8,925
	Thomas Jefferson University	8,144	0	0	8,144
Tennessee	St. Jude Children's Research Hospital	10,963	0	0	10,963
	Vanderbilt University	8,041	0	0	8,041
Texas	University of Texas System	53,376	3,523	0	56,899
	Cancer Therapy and Research Center	10,284	0	0	10,284
	Baylor College of Medicine	8,537	151	0	8,688
Utah	Utah State Higher Education System	8,438	1,856	0	10,294
Virginia	Program Resources, Inc.	0	40,691	0	40,691
	American College of Radiology	7,118	641	0	7,759
	University of Virginia	5,785	0	0	5,785
Washington	Fred Hutchinson Cancer Research Center	39,129	4,151	0	43,280
	University of Washington	12,407	483	0	12,890
Wisconsin	University of Wisconsin System	21,038	895	0	21,933
	Total	917,057	130,808	7,438	1,055,303

Cancer Centers
Funding History

Fiscal Year	1988	1989	1990	1991	1992
Center Support	$100,427,000	$101,127,000	$105,268,000	$110,481,000	$127,351,000
Annual Growth	4.8%	0.7%	4.1%	5.0%	15.3%

Cancer centers supported by the NCI multidisciplinary research programs at academic and other organizations are one of the key elements of the research infrastructure for cancer research. As a group, they are engaged in all aspects of cancer research, including basic, clinical and cancer control research, and also serve as a stable resource for training new cancer investigators. Of the 56 cancer center support grants (CCSG) awarded in FY 1992, 14 were to basic laboratory centers, 2 were to consortium centers, 12 were to clinical centers, and 28 have been awarded comprehensive status. In addition, 12 Cancer Center Planning Grants were funded through the P20 grant mechanism to increase geographic distribution of cancer centers in underrepresented areas.

The Cancer Centers Program promotes research by stimulating interactions between basic and clinical scientists who already have received peer-reviewed research support to take advantage of research opportunities, promotes cost-effectiveness of research resources, provides access to the newest technologies, and together with other support mechanisms such as the NCI Cancer Information Service contracts, enhances the interactions of the center with its local and regional communities.

Significant progress has been achieved during the past year with efforts in these major areas: (1) completion of the transition to new guidelines for comprehensive status with heightened emphasis on the conduct of high-priority clinical trials, cancer education, public information, cancer prevention and control research, and regional and community responsibilities; (2) enhancement of the Cancer Centers Program through improved program administration and fiscal management as well as initiation of a complete revision of the CCSG guidelines; (3) completion of two mini-workshops plus the annual NCI Cancer Center Director's Workshop in Buffalo, NY in June 1992; (4) integration of the Cancer Centers Branch with other components of the NCI; (5) Co-development of a Breast Cancer Summit Conference project with the Office of Cancer Communications and co-development of a Native American Training workshop with the Division of Cancer Prevention and Control; (6) funding of 12 Cancer Center Development Grants (P20s); (7) continuation of programs focusing on special problems of cancer in minority and other underserved populations; and (8) emphasis on high priority areas of research such as breast, cervical, ovarian, and prostate cancer, vaccine development, AIDS-related cancers and gene therapy.

Since 1978, the NCI has recognized a special class of NCI-designated Comprehensive Cancer Centers which provided a comprehensive set of cancer research and community services. On January 1, 1990, the Institute issued new guidelines that redefined the concept of an NCI-designated comprehensive cancer center and described the application processes that centers may use to attain and renew this designation. To receive this designation, a clinical cancer center must provide evidence that they meet eight key criteria for comprehensiveness.

Criteria for Comprehensiveness

Together with scientific excellence and leadership, the essential characteristics of a comprehensive cancer center include:

1) **Basic Laboratory Research**: A critical mass of integrated personnel, facilities and peer-reviewed support for interdisciplinary basic research is essential in a comprehensive cancer center.

2) **Basic/Clinical Research Linkage**: A comprehensive cancer center should facilitate the transfer of exciting laboratory discoveries to innovative clinical applications, including clinical treatment and prevention.

3) **Clinical Research**: A significant clinical research program utilizing patient resources of the institution and its region is essential.

4) **High-Priority Clinical Trial Research**: Comprehensive centers should participate significantly in clinical trials that have been accorded high-priority status by the NCI, unless the center is participating in trials testing competing hypotheses for the same disease site.

5) **Cancer Prevention and Control Research**: Comprehensive cancer centers are expected to have peer-reviewed research in cancer prevention and control and to have planned or ongoing involvement in cancer control on a regional and national basis.

6) **Education, Training and Provision of Updates on Current Technology**: It is essential that a comprehensive center be a focal point for clinical and research training, including state-of-the-art research and technology, for health care professionals locally and within the region.

7) **Information Services**: A comprehensive cancer center should have an established patient education program and the ability to provide patients and their families with up-to-date information on local as well as national resources that may be needed. In addition, the center should participate in its region's Cancer Information Service.

8) **Community Service and Outreach**: A comprehensive cancer center should define the community it serves, take steps to identify cancer issues and problems in this community, and carry out appropriate outreach programs addressing these concerns including cancer prevention and control activities.

Cancer Centers by State

State	Grantee Institution
Alabama	University of Alabama at Birmingham
Arizona	University of Arizona
California	Beckman Research Institute/City of Hope
	Charles R. Drew University of Medicine and Science
	La Jolla Cancer Research Foundation
	Salk Institute for Biological Sciences
	University of California at Los Angeles
	University of California at San Diego
	University of California at San Francisco
	University of Southern California
Colorado	University of Colorado Health Sciences Center
Connecticut	Yale University
District of Columbia	Georgetown University
Florida	University of Florida
	University of Miami
Georgia	Emory University
Hawaii	University of Hawaii at Manoa
Illinois	Illinois Cancer Center
	University of Chicago
Indiana	Indiana University-Purdue University at Indianapolis
	Purdue University West Lafayette
Iowa	University of Iowa
Kansas	University of Kansas Medical Center
Maine	Jackson Laboratory
Maryland	Johns Hopkins University
Massachusetts	Dana-Farber Cancer Institute
	Massachusetts Institute of Technology
	Worcester Foundation of Experimental Biology
Michigan	University of Michigan at Ann Arbor
	Wayne State University
Minnesota	Mayo Foundation
Missouri	Washington University
Nebraska	University of Nebraska Medical Center
New Hampshire	Dartmouth College
New Jersey	University of Medical/Dental NJ-R W Johnson Medical School
New Mexico	University of New Mexico Albuquerque
New York	American Health Foundation
	Cold Spring Harbor Laboratory
	Columbia University New York
	New York University
	Roswell Park Memorial Institute
	Memorial Sloan-Kettering
	University of Rochester
	Yeshiva University
North Carolina	Duke University
	University of North Carolina Chapel Hill
	Wake Forest University
Ohio	Case Western Reserve University
	Ohio State University
Oregon	Oregon Health Sciences University

Cancer Centers by State

State	Grantee Institution
Pennsylvania	Fox Chase Cancer Center
	Temple University
	University of Pennsylvania
	University of Pittsburgh
	Wistar Institute of Anatomy and Biology
Rhode Island	Roger Williams Hospital
South Carolina	Medical University of South Carolina
Tennessee	St. Jude Children's Research Hospital
Texas	Baylor College of Medicine
	Cancer Therapy and Research Center
	University of Texas Health Sciences Center San Antonio
	University of Texas Southwest Medical Center Dallas
	University of Texas System Cancer Center
Utah	University of Utah
Vermont	University of Vermont and State Agriculture College
Virginia	University of Virginia
	Virginia Commonwealth University
Washington	Fred Hutchinson Cancer Research Center
West Virginia	West Virginia University
Wisconsin	University of Wisconsin Madison

Specialized Programs of Research Excellence SPOREs

In 1992, the NCI established the Specialized Programs of Research Excellence (SPOREs) to promote interdisciplinary research and to speed the bidirectional exchange of basic and clinical science, i.e., research that moves basic research findings from the laboratory to applied settings involving patients and populations. The ultimate goal of the SPORE program is to move novel ideas into patients and populations that have the potential to reduce cancer incidence and mortality and to improve survival and quality of life.

Laboratory and clinical scientists work collaboratively in planning, designing and implementing research programs that impact on cancer prevention, detection, diagnosis, treatment and control. To facilitate this research, each SPORE develops and maintains specialized resources that benefit all scientists working on the specific cancer site, as well as SPORE scientists. An additional SPORE element is a career development program that recruits scientists both within and outside the SPORE institution to enlarge the cadre of laboratory and clinical scientists dedicated to translational research on human cancer. SPOREs meet annually to share data, assess research progress, identify new research opportunities and establish priorities for research most likely to reduce incidence and mortality and to increase survival.

In 1992, NCI funded a total of 20 SPOREs for $17,434,000, of which 9 were for breast cancer, 4 for lung cancer and 7 for prostate cancer research. SPOREs are funded both through the P50 and P20 mechanism. Eight institutions received full support as P50 SPOREs. Twelve P20s were awarded to institutions to conduct feasibility studies to determine whether they would qualify to become fully funded SPORE institutions. In the upcoming years, NCI plans to increase the use of the SPORE mechanism to include funding for other major cancer sites.

SPORE awards in 1992 by cancer site:

Site	Type	Number of Awards	Amount of Funding
Breast	P50	4	$7,494,000
	P20	5	595,000
	Total Breast	9	8,089,000
Lung	P50	2	3,959,000
	P20	2	400,000
	Total Lung	4	4,359,000
Prostate	P50	2	4,361,000
	P20	5	625,000
	Total Prostate	7	4,986,000
Total SPOREs	P50	8	15,814,000
	P20	12	1,620,000
	Total SPOREs	20	$17,434,000

NCI Foreign Research Grants and Contracts Fiscal Year 1992

(Dollars in Thousands)

Country	Number Grants	Grant $	Number Contracts	Contract $	Total Dollars Awarded	Percent of Total Dollars Awarded
Australia	9	$1,025	0	$0	$1,025	5.9%
Belgium	1	316	0	0	316	1.8%
Canada	22	2,070	4	1,511	3,581	20.5%
China	0	0	4	303	303	1.7%
Costa Rica	0	0	1	384	384	2.2%
Denmark	1	109	4	443	552	3.2%
Finland	1	97	2	3,942	4,039	23.1%
France	4	879	0	0	879	5.0%
Israel	6	617	0	0	617	3.5%
Italy	3	725	0	0	725	4.2%
Jamaica	0	0	1	707	707	4.1%
Japan	0	0	1	150	150	0.9%
New Zealand	0	0	7	471	471	2.7%
Norway	1	77	0	0	77	0.4%
Sweden	5	602	5	586	1,188	6.8%
Switzerland	1	52	1	1,066	1,118	6.4%
Trinidad	0	0	1	560	560	3.2%
United Kingdom	3	172	2	587	759	4.3%
Total Foreign	**57**	**$6,741**	**33**	**$10,710**	**$17,451**	**100.0%**

NOTE: Excludes Manpower Grants: $52,000

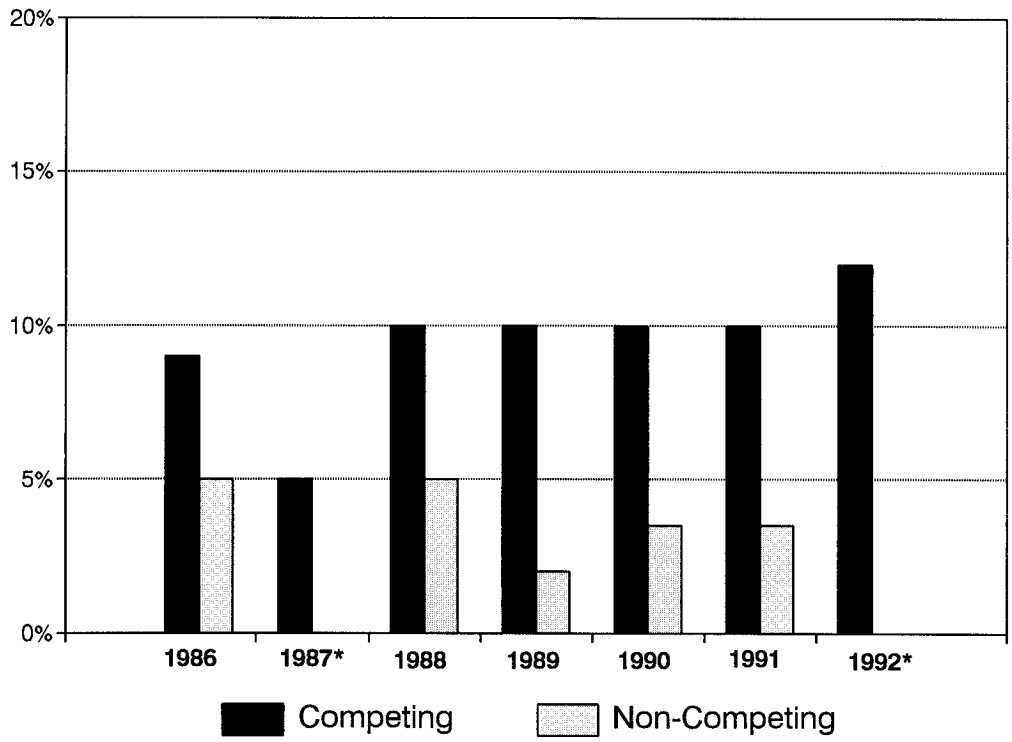
Total Research Project Grants Fiscal Years 1986-1992

(Dollars in Thousands)

Fiscal Year	Type Awarded	Requested No.	Requested Amt.	Recommended No.	Recommended Amt.	Awarded No.	Awarded Amt.	Percent Funded	Succes Rate
1986	Competing								
	New	2,354	$392,028	1,997	$277,698	564	$84,470	28.2%	
	Renewal	787	198,814	765	160,021	385	77,012	50.3%	
	Board Supplement	12	775	10	366	1	14	10.0%	
	Subtotal	3,153	591,617	2,772	438,085	950	161,496	34.3%	30.1%
	Noncompeting					2,111	397,664		
	Total					**3,061**	**559,160**		
1987	Competing								
	New	2,034	$390,474	1,782	$292,044	557	$97,643	31.3%	
	Renewal	898	241,189	882	195,014	504	120,550	57.1%	
	Board Supplement	7	731	7	429	0	0	0.0%	
	Subtotal	2,939	632,394	2,671	487,487	1,061	218,193	39.7%	36.1%
	Noncompeting					2,042	424,960		
	Total					**3,103**	**643,153**		
1988	Competing								
	New	2,167	$419,638	1,857	$316,789	470	$83,083	25.3%	
	Renewal	951	262,675	932	226,227	506	122,229	54.3%	
	Board Supplement	15	1,717	12	1,404	3	66	25.0%	
	Subtotal	3,133	684,030	2,801	544,420	979	205,378	35.0%	31.2%
	Noncompeting					2,078	460,025		
	Total					**3,057**	**665,403**		
1989	Competing								
	New	2,290	$474,978	2,090	$385,584	402	$73,081	19.2%	
	Renewal	823	246,172	802	202,283	324	85,645	40.4%	
	Board Supplement	14	2,883	9	1,485	2	49	22.2%	
	Subtotal	3,127	724,033	2,901	589,352	728	158,775	25.1%	23.3%
	Noncompeting					2,374	564,234		
	Total					**3,102**	**723,009**		
1990	Competing								
	New	2,193	$527,256	2,078	$429,203	421	$82,656	20.3%	
	Renewal	849	278,541	834	233,096	302	87,497	36.2%	
	Board Supplement	15	2,837	13	1,867	5	991	38.5%	
	Subtotal	3,057	808,634	2,925	664,166	728	171,144	24.9%	23.8%
	Noncompeting					2,288	568,336		
	Total					**3,016**	**739,480**		
1991	Competing								
	New	2,195	$512,665	2,036	$422,161	513	$102,364	25.2%	
	Renewal	837	286,858	836	245,420	323	94,231	38.6%	
	Board Supplement	8	1,161	8	897	4	421	50.0%	
	Subtotal	3,040	800,684	2,880	668,478	840	197,016	29.2%	27.6%
	Noncompeting					2,207	594,532		
	Total					**3,047**	**791,548**		
1992	Competing								
	New	2,544	$623,557	2,137	$477,510	664	$119,091	31.1%	
	Renewal	823	330,099	776	275,026	398	133,413	51.3%	
	Board Supplement	38	3,069	21	2,086	17	1,347	81.0%	
	Subtotal	3,405	956,725	2,934	754,622	1,079	253,851	36.8%	31.7%
	Noncompeting					2,231	620,006		
	Total					**3,310**	**873,857**		

Note: RPGs include R01 traditional grants, P01 program projects, R23 new investigator research awards, R29 FIRST awards, R35 Outstanding Investigator Grants, R37 MERIT awards, U01 Cooperative Agreement awards, R01 and U01 awards of Request for Applications, and R43/R44 Small Business Innovative Research awards. Percent funded is the number of awarded grants divided by the number of awards recommended. Success rate is the number of awarded grants divided by the number of awards requested. Requested data from 1986 through 1990 includes all submitted applications. Beginning in 1991, the requested data excludes applications not recommended for further review by DRG. 1992 requested and recommended data was preliminary at the time of printing and may be subject to change in the 1993 Fact Book.

Research Project Grants
Adjustments from Recommended Levels
Fiscal Years 1986-1992

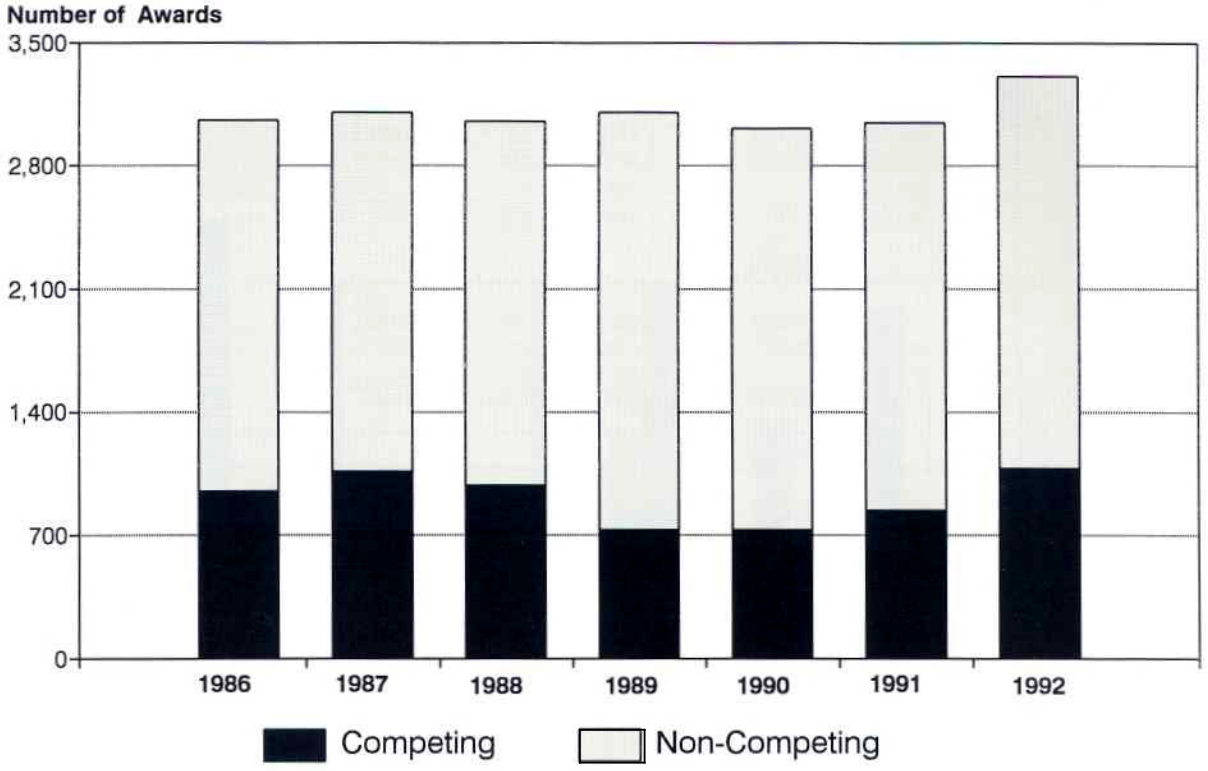


TYPE	1986	1987	1988	1989	1990	1991	1992
Competing	9.0%	5.0%	10.0%	10.0%	10.0%	10.0%	12.0%
Non-Competing	5.0%	0.0%	5.0%	2.0%	3.5%	3.5%	0.0%

NOTE: Future year (non-competing) approved amounts have been reduced by the percentage reductions applied during the competing grant cycle. The percent reductions shown are taken against this adjusted base.

**FY 1987 and 1992 non-competing awards were paid at the recommended level.*

Research Project Grants
Number of Awards
Fiscal Years 1986-1992



TYPE	1986	1987	1988	1989	1990	1991	1992
Competing	950	1,061	979	728	728	840	1,079
Non-Competing	2,111	2,042	2,078	2,374	2,288	2,207	2,231
Total	3,061	3,103	3,057	3,102	3,016	3,047	3,310

Research Project Grants Awarded History by Activity Fiscal Years 1988-1992

(Dollars in Thousands)

TYPE	1988 Number	1988 Amount	1989 Number	1989 Amount	1990 Number	1990 Amount	1991 Number	1991 Amount	1992 Number	1992 Amount
RO1	2,322	$367,475	2,239	$377,164	2,068	$371,225	1,949	$381,932	2,050	$424,954
PO1	159	170,119	165	188,015	162	185,130	165	190,470	183	205,330
R35	69	45,227	75	52,973	78	57,857	84	62,137	76	59,878
R37	105	24,114	132	32,353	153	39,264	163	43,687	162	47,414
UO1	57	18,490	70	20,939	87	31,145	85	32,431	123	44,171
R29	171	15,713	232	21,244	280	25,547	316	29,494	309	29,726
RO1-RFA	94	14,727	108	18,884	101	17,335	154	37,435	208	45,107
R43-R44	56	8,325	79	11,332	87	11,977	131	13,962	199	17,277
R23	24	1,213	2	105	0	0	0	0	0	0
TOTAL	**3,057**	**$665,403**	**3,102**	**$723,009**	**3,016**	**$739,480**	**3,047**	**$791,548**	**3,310**	**$873,857**

RO1 Research Project (Traditional)
To support a discrete, specified, circumscribed project to be performed by the named investigator(s) in an area representing his/her specified interest and competencies.

PO1 Research Program Projects
For the support of a broadly based, multidisciplinary, often long-term research program which has a specific major objective or a basic theme. A program project is directed toward a range of problems having a central research focus in contrast to the usually narrower thrust of the traditional research project.

R35 Outstanding Investigator Grants
To provide long-term support to an experienced investigator with an outstanding record of research productivity. This support is intended to encourage investigators to embark on long-term projects of unusual potential in a categorical program area.

R37 Method to Extend Research in Time (MERIT) Award
To provide long-term grant support to investigators whose research competence and productivity are distinctly superior and who are highly likely to continue to perform in an outstanding manner. Investigators may not apply for a MERIT award. Program staff and/or members of the cognizant National Advisory Council/Board will identify candidates for the MERIT award during the course of review of competing research grant applications prepared and submitted in accordance with regular PHS requirements.

UO1 Research Project (Cooperative Agreement)
To support a discrete, specified, circumscribed project to be performed by the named investigator(s) in an area representing his/her specific interest and competencies.

R29 First Independent Research Support and Transition (FIRST) Award
To provide a sufficient initial period of research support for newly independent biomedical investigators to develop their research capabilities and demonstrate the merit of their research ideas.

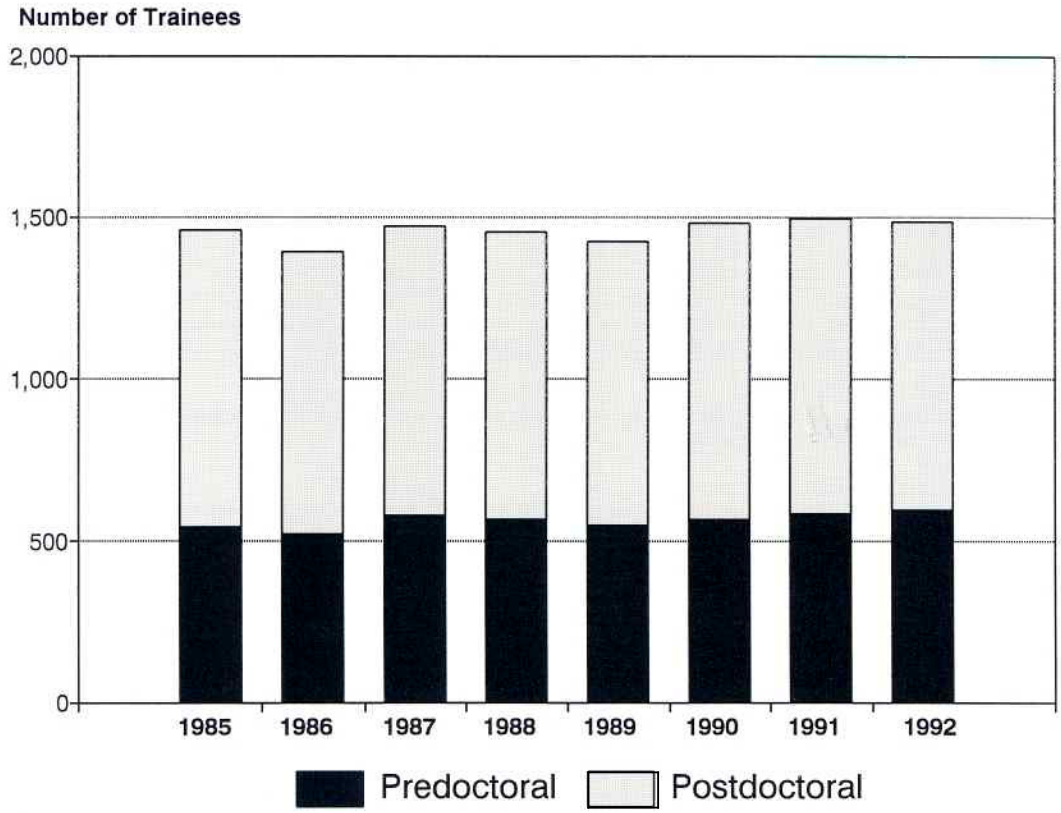
RFA Request for Applications
A formal statement which invites grant or cooperative agreement applications in a well-defined scientific area to accomplish specific program purposes and indicates the amount of funds set aside for the competition and/or the estimated number of awards to be made.

R43 Small Business Innovative Research (SBIR) Grants - Phase I
To support projects, limited in time and amount, to establish the technical merit and feasibility of R&D ideas which may ultimately lead to a commercial product(s) or service(s).

R44 Small Business Innovative Research (SBIR) Grants - Phase II
To support in-depth development of R&D ideas whose feasibility has been established in Phase I and which are likely to result in commercial products or services.

R23 New Investigator Research Awards
To support basic and clinical studies so that newly trained investigators remain active during the development stage of their careers.

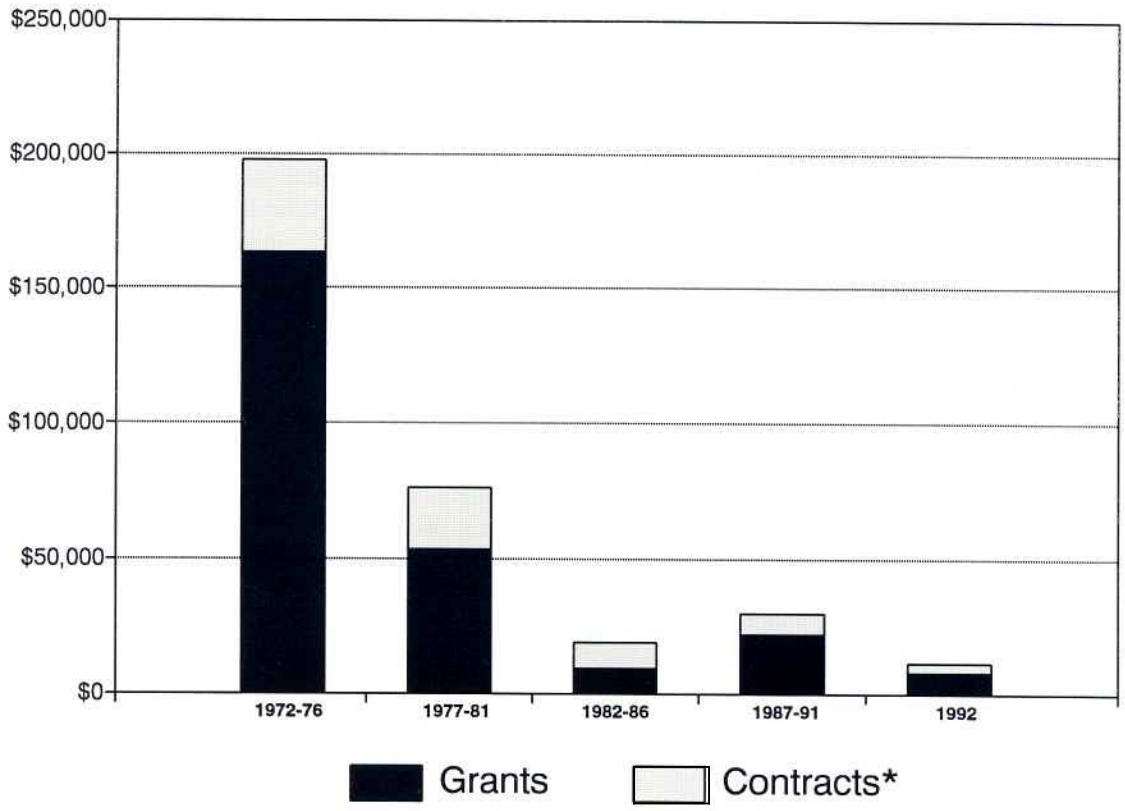
National Research Service Awards Fiscal Years 1985-1992



TYPE	1985	1986	1987	1988	1989	1990	1991	1992
Predoctoral	542	521	577	568	548	567	584	597
Postdoctoral	922	873	898	888	880	918	913	894
Total	1,464	1,394	1,475	1,456	1,428	1,485	1,497	1,491

Construction/ Renovation Funding Fiscal Years 1972-1992

(Dollars in Thousands)



TYPE	1972-1976	1977-1981	1982-1986	1987-1991	1992
Grants	$163,433	$53,293	$9,225	$22,068	$8,000
Contracts*	34,644	23,232	10,093	7,935	4,000
Total	198,077	76,525	19,318	30,003	12,000

NOTE: Fiscal year 1990 includes $10 million which was transferred to NCI from other NIH Institutes to partially fund several grants to an NIH Construction RFA.

**Includes repair and maintenance at the Frederick Cancer Research and Development Center.*

Selected Minority Focused Activities Fiscal Year 1992

Objectives:

- Reduce cancer incidence, morbidity and mortality in minority populations by increasing their involvement in the planning and implementation of intervention programs.
- Increase the number of minority patients involved in NCI-supported clinical trials in order to improve survival and cure rates in these populations.
- Enhance the intervention capabilities of minority researchers and influence them to develop careers as cancer investigators.
- Heighten awareness about cancer risk and prevention.
- Pursue basic research intended to understand the etiology and biology of cancer in defined minority populations.

Strategy:

The National Cancer Institute (NCI) has developed mechanisms to broaden participation by minority institutes and individuals in cancer-related research and training activities. NCI seeks to enhance the effectiveness of cancer treatment and control programs in reaching the minority community and other historically underserved segments of the general population.

Minority Activities:

Minority Accrual to Clinical Trials:
A number of factors are potential barriers to minorities participating in clinical trials. Economic and geographic constraints, foreign language barriers, cultural reluctance to seek early medical attention and/or experimental therapy for cancer, and possible physiologic differences, may explain why racial and ethnic minority patients tend to survive for a shorter time after cancer diagnosis than the national average. As part of a multi-faceted NCI plan to improve access to minority participation at all levels of cancer research, the Cancer Therapy Evaluation Program coordinates interrelated clinical programs. The individuals intended to benefit from these programs are Americans of African-American ancestry, Hispanics of Mexican, Puerto Rican, Cuban, or Central American descent, Asian-Americans, and Native Americans, including Alaskans and Hawaiian natives. Eight Cooperative Groups (NSABP, GOG, CCSG, NCCTG, SWOG, RTOG, CALGB, and ECOG) have developed plans to encourage early diagnosis and clinical trials participation among potential patients and to overcome language and logistic barriers for specific minority groups.

Special Populations Studies:
For special populations who experience high cancer rates and are underserved in terms of cancer prevention and control programs, NCI supports initiatives which focus research on interventions designed to address such barriers as cultural and behavioral nuances unique to special population groups as well as obstacles within the health care delivery systems. A study of the impact of socioeconomic status on cancer risk and survival promises to provide information on more effective delivery of cancer intervention programs. In addition, a cancer mapping program will assist local health officials to better target cancer services to such populations. Special populations research also investigates primary prevention interventions designed to meet the specific

needs of these groups. Support for several cancer control networks has allowed channeling of cancer prevention and control information to stimulate interest from culturally sensitive researchers to address the unique needs of special populations.

Minority Statistics:
NCI's Surveillance Program continues to expand and refine the data collection and analyses of minority populations. Efforts to increase population coverage of Hispanics continued in 1992 and similar efforts are being undertaken for other racial and ethnic groups, low-income populations and the elderly. In addition, 3,400 patients are being followed for survival in the Black/White Survival Study, which was designed to investigate the significance of social, behavioral, lifestyle, biological, treatment, and health care factors as contributors to the observed differences in survival among Black and white cancer cases. Also underway are efforts to describe the cancer incidence and mortality in Alaskan Natives and American Indians as well as the patterns of care, risk factors, and cultural entities that form barriers to early detection and treatment of cancer in these groups.

Minority-Based Community Clinical Oncology Program (MBCCOP):
Supports the development and implementation of effective cancer control and treatment strategies in minority populations by including these groups in clinical trials research as well as provides minority cancer patients with access to state-of-the-art cancer treatment and technology. Ten MBCCOPs are funded through 1994 involving over 270 physicians. Nearly 1,000 patients have been enrolled onto cancer prevention, control, and treatment clinical trials through this program.

Minority Health Professional Training Initiative (MHPTI):
The first phase of the MHPTI which began in 1991 is supporting training and career development opportunities for minority health professionals by engaging them in research in oncology or by providing them with training in subspecialities related to cancer. Such opportunities will increase the number of minority clinicians, clinical researchers, and other health professionals who are prepared to deal with the problem of excess mortality among minority populations due to cancer. As the result of the three Requests for Applications (RFAs) published this year, four awards to minority clinicians were made. This activity was announced in FY 1992.

Cancer Communications:
NCI continues to expand its Black American Cancer Education program -- "Do the right thing...Get a new attitude about cancer." "Do the right thing" (DTRT) was recognized this year by the communications industry through its prestigious Communications Excellence to Black Audience (CEBA) Award. "Do the right thing" urges Black Americans to adopt a "new attitude" and make some simple lifestyle changes as crucial steps toward maintaining good health.

Project Awareness is a program to expand and enhance current community-based efforts to increase breast cancer screening and follow-up among underserved women. Project Awareness was one of the public/private partnership programs described at the National Minority Cancer Awareness Week press conference. This program has been expanded into 8 cities. Local chapters of the ANMA spearheaded this project in conjunction with the CRFA, YWCA of the U.S.A. and the Congressional Families Action for Breast Cancer

Awareness campaign. Other Black American organizations supporting this effort are the NMA, The Links, Inc., and the Chi Eta Phi Sorority. The CIS and NBLIC will "co-chair" local efforts providing media relations and technical support as needed. The expanded Project Awareness was launched during National Breast Cancer Awareness Month 1992.

NCI collaborated with the Revlon Foundation and Univision Spanish Television Network to produce and distribute the half-hour television special and Public Service Announcements (PSAs) on mammography "Una vez al año...Para toda una vida." The TV special was developed as a tool for educating Hispanic women on the need for breast cancer screening. The program kicked off 1992 National Minority Cancer Awareness Week (NMCAW) and premiered as an exclusive national network special by Univision's 602 affiliates. Univision is the most influential Spanish-language network in the United States. Its broad-based, family oriented programming is viewed by an estimated 22 million U.S. Hispanics and by Spanish-speaking audiences in 18 Latin American countries and Spain. Univision serves nearly every major Hispanic market in the country, covering 90 percent of U.S. Hispanic households. NCI is now distributing the film to Hispanic organizations through the Cancer Information Service (CIS) offices. NCI continued to work closely with Telemundo, the second largest Spanish television network to use the film as public service programming.

NCI developed and tested nutrition education materials for low literacy segments of specific ethnic populations. These populations include American Indians, Alaskan Natives, Hawaiian Natives, Chinese, Filipino, Vietnamese, Hispanics, blacks, and whites. A total of 43 pieces have been developed which include tipsheets, booklets, posters, and scripts for three video and one audio tape. Some of these materials are bilingual and are currently being pretested with appropriate groups across the country. A guide for physicians, "Teaching Your Ethnic Patients," is also being developed.

Appropriations of the NCI 1938-1993

	1938 through 1968.....	$1,690,550,220	
	1969.....	185,149,500	
	1970.....	190,486,000	
13.6%	1971.....	230,383,000	
$3,718,759,220	1972.....	378,794,000	
	1973.....	492,205,000	
	1974.....	551,191,500	
	1975.....	691,666,000	1
	1976.....	761,727,000	
	"TQ".....	152,901,000	2
	1977.....	815,000,000	
	1978.....	872,388,000	3
	1979.....	937,129,000	
	1980.....	1,000,000,000	4
	1981.....	989,355,000	5
	1982.....	986,617,000	6
86.4%	1983.....	987,642,000	7
$23,616,756,000	1984.....	1,081,581,000	8
	1985.....	1,183,806,000	
	1986.....	1,264,159,000	9
	1987.....	1,402,837,000	10
	1988.....	1,469,327,000	11
	1989.....	1,593,536,000	12
	1990.....	1,664,000,000	13
	1991.....	1,766,324,000	14
	1992.....	1,989,278,000	15
	1993.....	2,007,483,000	16
	Total (1938-1993).....	**27,335,515,220**	

Transition Quarter ("TQ") --

July 1, 1976 through September 30, 1976. The interim period in changing of the Federal Fiscal Year from July 1 through June 30 to October 1 through September 30.

[1] *Includes $18,163,000 for training funds provided by Continuing Resolution.*

[2] *Includes $3,201,000 for training funds provided by Continuing Resolution.*

[3] *Includes $20,129,000 for training funds provided by Continuing Resolution.*

[4] *1990 appropriation authorized under a Continuing Resolution.*

[5] *Reflects 1981 rescission of $11,975,000.*

[6] *Amount included in continuing resolution. Includes $47,988,000 transferred to the National Institute of Environmental Health Sciences for the National Toxicology Program.*

[7] *Appropriated under Continuing Resolution and Supplemental Appropriation Bill.*

[8] *Includes $23,861,000 for training funds provided by a Continuing Resolution and $4,278,000 in a Supplemental Appropriation Bill.*

[9] *Includes $6,000,000 from a Supplemental Appropriation Bill.*

[10] *Authorized under Omnibus Continuing Resolution.*

[11] *Authorized under Omnibus Continuing Resolution.*

[12] *Appropriation prior to reduction contained in G.P. 517 (-$19,122,000) and G.P. 215 (-$2,535,000) and P.L. 100-436, Section 213, (-$1,013,000).*

[13] *Appropriation prior to reduction contained in P.L. 101-166 (-$6,839,000) and P.L. 101-239 (-$22,829,000).*

[14] *Appropriation prior to reductions in P.L. 101-517 (-$8,972,000 for salary and expense reduction; -$42,568,000 for across-the-board reduction).*

[15] *Appropriation prior to reductions in P.L. 102-170 (-$21,475,000 for salary and expense reduction; -$1,262,000 for travel reduction; $15,000,000 transferred to other institutes for cancer research).*

[16] *Appropriation prior to reductions in P.L. 102-294 (-$16,060,000 for .8% reduction to all line items, -$9,933,000 for S&E reduction, -$139,000 for consultant services reduction.)*

By-Pass Budget Requests Fiscal Years 1973-1994

Fiscal Year	Request
1973	$550,790,000
1974	640,031,000
1975	750,000,000
1976	898,500,000
1977	948,000,000
1978	955,000,000
1979	1,036,000,000
1980	1,055,000,000
1981	1,170,000,000
1982	1,192,000,000
1983	1,197,000,000
1984	1,074,000,000
1985	1,189,000,000
1986	1,460,000,000
1987	1,570,000,000
1988	1,700,000,000
1989	2,080,000,000
1990	2,195,000,000
1991	2,410,000,000
1992	2,612,000,000
1993	2,775,000,000
1994	3,200,000,000

NOTE: Following the original passage of the National Cancer Act in December, 1971, a provision was included for the Director of the National Cancer Institute to submit a budget request directly to the President; hence it has come to be called the Bypass Budget. The Budget submitted for 1973 was the initial submission.

Comparison of Dollars, Positions and Space Fiscal Years 1972-1992

	Dollars		Positions		Space**	
	Obligations ($000's)	Percent of Increase Over Prior Year	Actual Full-Time Permanent Employees	Percent of Increase Over Prior Year	Allocated Space (Square Feet)	Percent of Increase Over Prior Year
1972	$378,636	-	1,665	-	329,587	-
1973	431,245	13.9%	1,736	4.3%	357,972	8.6%
1974	581,149	34.8%	1,805	4.0%	381,436	6.6%
1975	699,320	20.3%	1,849	2.4%	382,485	0.3%
1976	760,751	8.8%	1,955	5.7%	387,324	1.3%
1977	814,957	7.1%	1,986	1.6%	428,285	10.6%
1978	872,369	7.0%	1,969	-0.9%	491,725	14.8%
1979	936,969	7.4%	1,973	0.2%	493,156	0.3%
1980	998,047	6.5%	1,837	-6.9%	467,730	-5.2%
1981	989,338	-0.9%	1,815	-1.2%	472,633	1.0%
1982	986,564	-0.3%	1,703	-6.2%	477,782	1.1%
1983	986,811	0.0%	1,731	1.6%	484,093	1.3%
1984	1,081,460	9.6%	1,698	-1.9%	466,890	-3.6%
1985	1,177,853	8.9%	1,596	-6.0%	466,890	0.0%
1986	1,210,284	2.8%	1,573	-1.4%	465,790	-0.2%
1987	1,402,790	15.9%	1,642	4.4%	465,790	0.0%
1988	1,468,435	4.7%	1,708	4.0%	458,556	-1.6%
1989	1,570,342	6.9%	1,701	-0.4%	483,778	5.5%
1990	1,644,330 *	4.7%	1,837	8.0%	489,604	1.2%
1991	1,712,669	4.2%	1,921	4.6%	499,396	2.0%
1992	1,947,571	13.7%	2,037	6.0%	477,067	-4.5%

* Includes $10,130 which was transferred to NCI from other NIH Institutes to partially fund several grants responding to a NIH Construction RFA.

** Does not include space at the Frederick Cancer Research and Development Center.

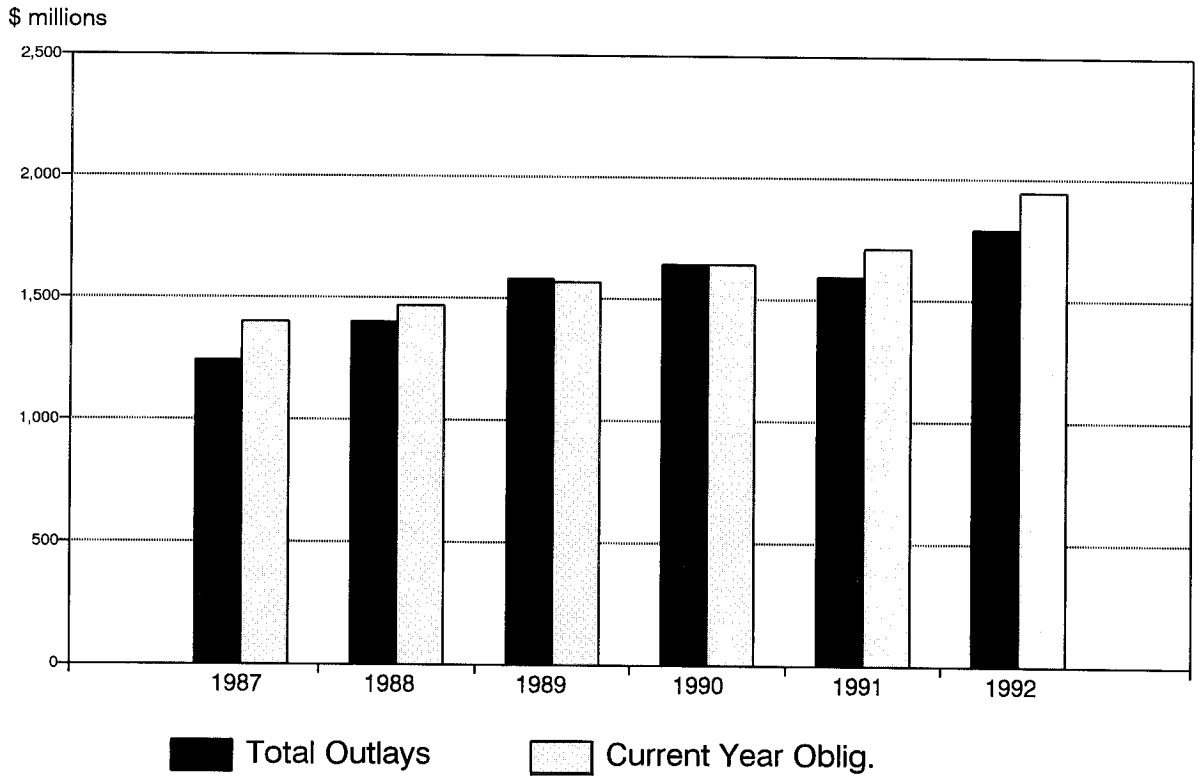
Personnel Resources

Fiscal Year	Number of FTEs*			Number of Employees
	Cancer	AIDS	Total	
1984	2,344	72	2,416	2,371
1985	2,145	85	2,230	2,195
1986	2,003	98	2,101	2,096
1987	1,981	129	2,110	2,272
1988	2,137	146	2,283	2,302
1989	1,985	188	2,173	2,201
1990	1,960	232	2,192	2,322
1991	2,045	300	2,345	2,437
1992	2,219	306	2,525	2,604

** Full-time Equivalents*

National Cancer Institute
Obligations and Outlays
Fiscal Year 1987-1992

(Dollars in Millions)



$ in Millions	1987	1988	1989	1990	1991	1992
Prior Year Outlays	$680	$723	$815	$885	$856	$831
Current Year Outlays	565	680	765	759	739	961
Total Outlays	1,245	1,403	1,580	1,644	1,595	1,792
Current Year Obligations	1,403	1,468	1,570	1,644	1,713	1,948

Obligations: Orders placed, grants awarded, contract increments funded, salaries earned and similar financial transactions which legally utilize or reserve an appropriation for expenditure.

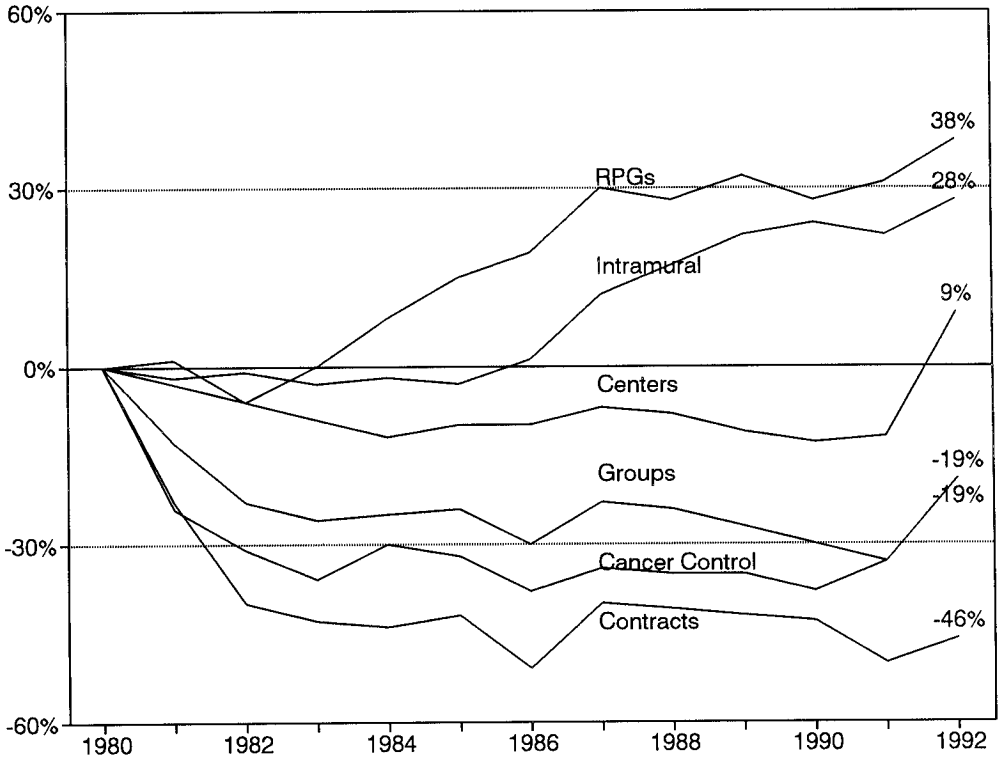
Outlays: Payments (cash or checks) made from appropriations.

Constant Dollar Trends

(Dollars in Millions)

Fiscal Years 1980-1992

Percent Change in Obligations as 1980 Constant Dollars



Constant Dollars	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Research Project Grants	$321	$324	$301	$322	$345	$369	$383	$417	$412	$425	$412	$420	$442
Cancer Prevention & Control	67	51	46	43	47	46	42	44	43	44	42	45	55
Centers & SPOREs	67	65	63	61	59	61	60	62	62	59	59	59	73
Intramural Research	142	140	141	138	139	138	143	159	166	173	177	173	182
Clinical Cooperative Groups	48	42	37	36	36	36	34	37	37	35	33	32	39
R&D Contracts	189	145	114	107	106	109	92	113	111	110	107	95	102
Subtotal	834	766	702	706	733	759	753	833	831	845	829	824	892
All other mechanisms	124	98	90	76	77	81	75	78	77	77	81	84	92
Total NCI	$958	$863	$792	$782	$810	$840	$828	$911	$908	$922	$910	$908	$984
NCI Change over 1980	base	-10%	-17%	-18%	-15%	-12%	-14%	-5%	-5%	-4%	-5%	-5%	3%
Current Dollars													
Research Project Grants	$321	$355	$358	$406	$461	$517	$559	$643	$666	$723	$740	$792	$874
Cancer Prevention & Control	67	56	55	54	63	64	61	68	70	74	75	85	108
Centers & SPOREs	67	71	75	77	79	85	88	96	100	101	105	111	145
Intramural Research	142	153	168	174	186	194	209	245	269	294	317	326	360
Clinical Cooperative Groups	48	46	44	45	48	51	49	57	59	60	60	61	77
R&D Contracts	189	159	136	135	142	153	135	174	180	187	192	179	201
Subtotal	834	840	836	891	979	1,064	1,101	1,283	1,344	1,439	1,489	1,554	1,765
All other mechanisms	124	107	107	96	103	114	109	120	125	131	145	158	183
Total NCI	$958	$947	$943	$987	$1,082	$1,178	$1,210	$1,403	$1,469	$1,570	$1,634	$1,712	$1,948
Deflators	1.0	1.1	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.7	1.8	1.9	2.0

Note: Constant dollars are calculated using the Biomedical Research and Development Price Index.

NATIONAL CANCER INSTITUTE

NIH Publication No. 93-512
February 1993