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Brain Tumor Research Needs Stronger Interdisciplinary Collaboration, PRG Says

Recent advances in neuroscience and cancer biology present new opportunities to make progress in the treatment of brain tumors, according to an expert panel convened by NCI and the National Institute of Neurological Disorders & Stroke.

Progress in the basic understanding of many aspects of brain tumor biology could provide new targets for therapies and more rational ways of delivering therapies, said the report by the Brain Tumor Progress Review Group, a panel of expert advisors.

"In the clinic, new techniques in surgery and radiation therapy are

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In Brief:

New Design For NCI's CancerNet Wins Prestigious Web Site Design Awards

CANCERNET, NCI's cancer information Web site, has received a 2000 Web Business Award from CIO Magazine as one of the top 50 Internet and top 50 intranet sites that "demonstrated the ability to blend technology and design while incorporating the needs of their target audience." CancerNet also was recognized by the WWW Health Awards, picking up a Gold Award, the highest honor given, for Patient Education Information, as well as a special award for Best Site Structure and Navigation. CancerNet also has been selected as a useful Web site by the American Association of Retired Persons and the World Organization of Webmasters. CancerNet is posted at http://cancernet.nci.nih.gov/. The site is managed by the Cancer Information Products and Systems Program in the NCI Office of Communications. . . . **CLARA BLOOMFIELD**, director of the Ohio State University Comprehensive Cancer Center since 1997, has been elected to membership in the Institute of Medicine of the National Academy of Sciences. Bloomfield also is deputy director of the Arthur G. James Cancer Hospital and Richard J. Solove Research Institute. . . . . **CHATCHADA KARANES** was appointed medical director of the National Marrow Donor Program, of Minneapolis. Karanes has been affiliated with NMDP since 1988 while a faculty member at Wayne State University in the bone marrow transplant program. She will direct the Search and Transplant Services Department and develop professional education initiatives, said NMDP chief medical officer **Dennis Confer**. . . . **BRIAN DRUKER**, director of the Hematologic Malignancies Program of the Oregon Cancer Center at Oregon Health Sciences University, and his colleagues **Moshe Talpaz**, of M.D. Anderson Cancer Center, and **Charles**

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PRG Says Research Tools, Training, Are Biggest Needs

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just beginning to be exploited in the treatment of brain tumors," said the report, presented last week to the Advisory Committee to the NCI Director. "Other innovative approaches, such as gene and immunological therapies, are still in their infancy but represent substantial hopes for the future. Preventive factors identified in recent epidemiological studies, if replicated and understood at the biological level, may lead to intervention strategies.

"A concerted, interdisciplinary, and timely approach to addressing these priorities will allow the development of new diagnostic and therapeutic techniques that may ameliorate and, it is hoped, eventually cure brain tumors," the report said.

The report was the fourth in a series of Progress Review Group recommendations to NCI. The Institute has received recommendations for further research in breast, prostate, and colorectal cancers over the past two years. PRGs are underway in pancreatic cancer and lymphoma and leukemia, and NCI has established a timeline for expert reviews in other major cancers over the next two years.

The Brain Tumor PRG made recommendations to NINDS as well as NCI because of the need for collaboration between oncologists and neuroscientists, said Richard Kaplan, an NCI senior investigator and co-executive director of the group.

"The field of neuroscience is exploding with new understanding from molecular and chemical sciences, and presumably this will have a major effect on clinical treatment," Kaplan said to **The Cancer Letter**. "We had to bring together experts in neurosciences as well as oncologists. It's going to be a highly useful outcome of the PRG to get these fields working together."

Thomas Jacobs of NINDS represented that Institute as co-executive director of the PRG.

"A unique aspect of this PRG is for the implementation to be collaborative between NINDS and NCI," Kaplan said. "Both institutes and their leaders are looking at this as an opportunity. Even though brain tumors aren't the largest problem we deal with, they are on the cusp of several important scientific advances and we will have to be collaborative."

The institutes expect to develop by March a plan for implementing the report's recommendations, Kaplan said.

David Louis, director of the Molecular Neuro-Oncology Lab at Massachusetts General Hospital, and Jerome Posner, emeritus chairman of the Department of Neurology at Memorial Sloan-Kettering Cancer Center, were co-chairmen of the Brain Tumor PRG.

Need For Research Tools, Infrastructures

The brain tumor group encouraged NCI and NINDS to support the development of research tools and infrastructures, including better animal models of brain tumors, and validated data banks and tissue banks. The group also said funding for training of new investigators is urgently needed.

The Brain Tumor Progress Review Group report includes an overview with recommendations, as well as several appendices in specific areas. The report and appendices are available at http://osp.nci.nih.gov/Prg_assess/PRG/BTPRG/.

Following are excerpts from the report:

Introduction

Brain tumors represent a unique challenge in that they affect the organ that is the essence of the "self." Furthermore, because each area of the brain serves a different but vital function, the therapy that is most effective for other cancers—surgical removal of either the entire organ or the tumor with a generous surround of normal tissue—cannot be used to cure brain tumors. Unfortunately, most brain tumors are relatively insensitive to other cancer treatment, including radiation and chemotherapy.

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Coupled with the difficulty in treating brain tumors is the unique biology of the brain:

—Brain tumors occur in an organ that is enclosed in a bony canal that allows little room for growth of the tumor without compressing and damaging normal brain.

—Many brain tumors extensively invade normally functioning brain, making complete surgical removal impossible.

—In their early stages, brain tumors are protected behind a blood-brain barrier; even when this barrier is disrupted in the bulk of the tumor, infiltrating tumor cells at the growing edge remain protected.

—Disruption of the blood-brain barrier leads to edema, which the brain tolerates poorly because of the limited intracranial space and the lack of lymphatics to rid itself of the products of edema and other debris.

—The brain itself is rich in expressed genes and therefore is a fertile field for the growth of both primary tumors and metastases.

—The brain and brain tumors appear to be less susceptible to attack by the immune system than are tumors in other organs.

Even the term brain tumor, which suggests a single type of tumor, can be misleading. There are a bewildering variety of central nervous system tumors; the World Health Organization lists 126. Many of these tumors are not, strictly speaking, in the brain but arise from structures intimately associated with that organ, such as tumors of the covering membranes (meningiomas) and adjacent cranial and paraspinal nerves (schwannomas). Brain tumors range from benign (most meningiomas) to highly aggressive (glioblastomas). They affect both adults and children (although the distribution of tumors varies) and are often highly resistant to treatment.

Section I: Scientific Priorities--Basic Biology

The highest scientific priorities in basic biology are as follows:

—Understand the complex biology of brain tumors, both primary and metastatic, and their interaction with normal brain elements as they relate to oncogenesis, progression, tumor cell dispersal, and heterogeneity. Define the genetic changes and molecular pathways involved in brain tumor initiation and maintenance.

—Characterize the interactions of brain tumor cells with the normal brain. Provide a detailed molecular classification of the cells of origin for distinct tumor types and define their lineage associations, as well as the signal transduction pathways that regulate cell fate and the mechanisms by which the local environment of the brain influences cell migration and differentiation.

—Understand genotypic influences on phenotypic behavior, tumor type, age at onset, anatomical position, cell of origin, and cellular biology: Isolate the genes that predispose to human brain tumors and understand their relationship to the genes that regulate normal development. Identify the genes that regulate patients' responses to chemotherapy and radiotherapy and those that mediate tumor chemoresistance and radioresistance. Characterize both central nervous system and systemic immune responses in patients with brain tumors.

—Understand the blood-brain barrier and its regulation. Understand the mechanisms underlying the spread and establishment of metastases in the central nervous system.

Epidemiology

Important epidemiological scientific priorities include:

—Support the linking of existing databases to provide larger numbers of samples for epidemiological studies.

—Expand and enhance databases to include all primary brain and spinal tumors—malignant and nonmalignant, adult and pediatric—and to have the flexibility to accommodate new histological and molecular classifications of tumors.

—Develop epidemiological studies of patients' susceptibility to the toxic effects of current treatment modalities and investigate risk and protective factors with study designs that incorporate biological measures. Use validated animal models (see "Models," Section II) to study the potential causal factors of brain tumors and of treatment-induced neurotoxicity.

Detection and Diagnosis

The ability to characterize tumors comprehensively at the molecular level raises the possibility that diagnosis could be based on molecular profiling, either alone or with histological examination, rather than on histological phenotype alone....

In light of such possibilities, the following priorities in the detection and diagnosis of brain tumors were identified:

—Develop a molecular- and imaging-based classification scheme for brain tumors that can be used to predict tumor behavior and to guide treatment

decisions more accurately and objectively than is possible with current histopathological methods.

—Develop techniques that can reliably detect brain injury related to tumor or treatment and use such techniques to assess the efficacy of neuroprotective interventions.

Treatment

Treatment options for patients with brain tumors have been limited and, for most types of tumors, have provided only modest benefits. Some of the likely reasons for these limitations include the unique structural and physiological aspects of the central nervous system, especially its vulnerability to damage from many therapies as well as from neoplastic processes themselves. Research in the treatment of brain tumors has been hampered by the lack of clinically predictive model systems; by a minimal understanding, until quite recently, of fundamental tumor biology; and by a narrow range of available therapeutic agents for testing that have had little expected specificity for brain tumors. The major challenge for the future is to develop more effective techniques to treat brain tumors without damaging the brain. Marked progress is currently being made in dissecting the molecular mechanisms of neoplasia in the brain and elsewhere.

These advances are enabling the rapid identification of relevant molecular targets, and the result is a vast array of potential therapeutic approaches and agents in the development pipeline. At the same time, advances in neuroimaging are raising the tantalizing possibility of clinically assessing the capacity of an agent to alter its intended target. It therefore seems reasonable to expect an improved rate of success in research on the treatment of brain tumors. Because the special characteristics of these tumors will continue to present problems and challenges, however, the following priorities were identified:

—Facilitate the development of novel therapeutic agents and approaches for adult and pediatric brain tumors. These approaches should include, but not be limited to, chemotherapeutic, immunologic, antiangiogenic, genetic, and viral agents.

—Increase knowledge about the mechanisms of existing therapies for both adult and pediatric brain tumors.

—Improve the therapeutic index of new agents that are specifically relevant to the central nervous system.

—Enhance the therapeutic ratio for radiation therapy for brain tumors. (Overcome radioresistance of primary brain tumors; overcome normal tissue toxicity such as necrosis/edema and functional deficits.) Develop novel drug targeting systems that enhance the uptake by brain tumors of small- and large-molecule diagnostic and therapeutic agents. Develop clinical consortia for immunotherapy that are similar to those for radiation and chemotherapy.

—Develop therapies that are less toxic than existing therapies to both the mature and the immature nervous system.

Outcomes

Traditional outcome measurements used in brain tumor studies have included overall and recurrence-free patient survival and, in some instances, radiological response to therapy. Such measurements, however, largely ignore crucial issues relating to quality of life and biological endpoints of response. These issues are of particular importance in tumors for which effective therapies may not exist and in pediatric tumors, for which effective tumor control may be associated with significant long-term morbidity. For these reasons, there is an immediate and crucial need for better measurement tools and surrogate markers to assess patient quality of life and tumor response to therapy. Such outcome markers would facilitate the assessment of neurotoxicity, thereby providing an opportunity to discard potentially neurotoxic therapies sooner. They would also facilitate more accurate assessment of therapeutic response, thereby allowing effective therapies to be continued while ineffective therapies are discontinued. The following priorities were therefore identified:

—Improve techniques for measurement of quality of life and include such measurements in all clinical trials of brain tumor. Refine the ability to detect response to existing therapies, such as radiation, and to novel treatments, using surrogate markers measured either by imaging or in biological fluids (e.g., serum or cerebrospinal fluid).

—Establish clinical and imaging markers of neurotoxicity from existing therapies, such as radiation, and from novel treatments. Extend the use of such markers to preclinical evaluations in animal models.

Specific Tumors

Recognizing the remarkable diversity of human brain tumors and the distinct clinical questions associated with different tumor types, the PRG

members were concerned that most of the general scientific sessions would concentrate on the more common tumors, such as malignant gliomas and medulloblastomas, to the exclusion of other brain tumor types. To address the possibility that research priorities might relate to different types of brain tumors, the PRG convened four special breakout sessions to focus on particular groups of brain tumors: pediatric brain tumors, intraaxial brain tumors (excluding malignant gliomas and medulloblastomas), extraaxial brain tumors, and metastases to the brain. These four special breakout sessions met after the 12 general scientific sessions had adjourned. The special sessions included attendees from the earlier, general discussions, thereby allowing important issues from the general sessions to be applied to discussions of the specific tumor groups. Remarkably, the research priorities and needed resources identified by these special groups echoed those of the general sessions, although some different emphases were placed according to tumor type:

—The session on pediatric brain tumors emphasized clinical problems such as the need to study long-term outcomes for survivors of brain tumors, to investigate the impact of therapies on the developing brain, and to focus on some of the rarer, more primitive tumors occurring in children. The group addressing intraaxial brain tumors highlighted issues relating to low-grade gliomas, primary central nervous system lymphomas, and germ cell tumors.

—The session on extraaxial brain tumors emphasized the need for studies that incorporate careful long-term follow-up for these often slowly growing lesions. The group discussing metastatic tumors of the brain made the unique recommendation to convene a PRG devoted to the biology of metastasis.

Section II: Resource Priorities--Models

Models are central to making the transition from developing scientific concepts to understanding human tumors within the context of the tissues that they affect. Models may be used for therapeutic screens, in preclinical trials, or to study the basic biology of tumors. However, because currently available cellular, tissue, and animal models do not accurately represent the biology of human brain tumors, it is vital to:

—Develop tissue and cell culture systems that replicate the biology of human brain tumors.

—Create genetically and behaviorally accurate models for brain tumors in mice and other animals.

—Generate tissue-based, imaging, and genomic methods to validate and compare animal models with their human counterparts.

—Improve the availability of the reagents needed to create new animal models of brain tumors, the sophisticated technologies used to evaluate and validate those models, and the animal models themselves.

To accomplish these priorities, a mechanism must be created to support the development and validation of model systems that more accurately reflect the biology of brain neoplasms. Although the NCI Mouse Models for Human Cancer Consortium has been established to fund the development of mouse cancer models, additional mouse models of the various brain tumors that are not addressed through the MMHCC, as well as models in other animals, remain high priorities.

Tissue Banks and Databases

Addressing the complex biology of brain tumors requires innovative tumor banking and characterization facilities with relevant and appropriate clinical and radiological databases. Tissue banks linked to clinical databases are also vital for translating research discoveries into clinically relevant information. Because current tissue banks are typically institution based, they are limited in scope and amount of available specimens. These banks also process tissues in different ways, and their specimens are usually not sufficiently annotated with clinical and radiological information. Because of the rarity of many brain tumor types, including both adult and pediatric neoplasms, there is a great need for organized, interinstitutional approaches to banking and data management of both adult and pediatric neoplasms.

An effective tissue bank or database must do the following:

—Collect and bank tissue, blood, cerebrospinal fluid, and (when available) normal brain from patients with all varieties of brain tumors. In particular, attention should be paid to banking pediatric tumors; rarer intraaxial tumors, such as low-grade gliomas and lymphomas; tumors that follow long clinical courses, such as meningiomas; and metastases, when tissue from the primary tumor is also available. Specialized banks should also focus on acquiring clinical and radiological information and tissues from distinct populations, such as patients with neurofibromatosis 2, who provide unique opportunities to follow the natural history of particular tumors. Public and professional educational efforts will be required to ensure that both common and rare brain tumors are

submitted to the banks. In this regard, a challenge will be to alter the sociology of data sharing in order to make a concerted shift to a shared, distributed system.

—Maintain a comprehensive database of relevant clinical and demographic, pathologic, biologic, and therapeutic information on all patients whose tissue is banked. Develop links to population databases to enhance potential etiological and other epidemiological studies.

—Involve multidisciplinary participation of surgeons, pathologists, scientists, and other professionals, including neurooncologists, to ensure reliable and consistent tissue processing.

—Provide mechanisms to ensure access, on a competitive and open basis, by researchers to the material and data in the bank.

—Employ approved and ethical methodologies to protect patient confidentiality and ensure appropriate patient consent.

—Feature local and regional facilities and facilitate effective communication and collaboration among centers.

—Be supported by ongoing funding, potentially for longer than 5-year periods, to facilitate study of tumors with long clinical courses, such as meningiomas.

Genomics and High-Throughput Screening

The explosion of information in genomics, together with the promise of similar advances on the near horizon in proteomics, raise the need for technologies that allow high-throughput screens of brain tumors and related specimens (e.g., other tissues from patients with brain tumors). Such high-throughput screens would allow large amounts of information to be gleaned quickly and would facilitate further translational research toward more tailored therapeutic approaches. These screens can occur at the tissue level ex vivo or, in the future, at the molecular neuroimaging level in vivo. For such large-scale approaches to be functional, considerable emphasis will need to be placed on bioinformatics support. The highest priorities:

—Develop high-throughput laboratory approaches to understand gene function and to identify the targets and pathways that are critical to brain tumor biology.

—Develop high-throughput laboratory approaches to identify the genes and genetic variations that underlie tumor resistance to chemotherapy and radiation therapy, as well as the allelic variations that influence responses to therapy in individual patients.

—Develop high-throughput laboratory approaches to identify antigens that may be used to further understanding of the immunological features of brain tumors and to develop novel immunological therapies.

—Develop high-throughput neuroimaging approaches for the in vivo characterization of the molecular features of tumors and the surrounding brain that could monitor and influence therapies.

—Develop the bioinformatics support necessary for rapid and accurate analysis of data generated via these high-throughput approaches.

—Establish a consortium of brain tumor modeling laboratories for the purpose of testing novel therapies.

—Allocate resources for the generation of cDNA microarrays based on the mouse equivalent of the human sequences identified through the Brain Tumor Genome Anatomy Project (BT-GAP).

—Create a mechanism to ensure affordable access to these reagents and models.

Communication

Recent attempts to bring together NCI and NINDS to address questions in brain tumor research—the BT-PRG, the BT-GAP, and the establishment of a combined NCI-NINDS Neuro-oncology Branch—have been widely applauded and further inter-institutional interactions strongly encouraged.

The possible extension of such interactions to the grants review process was also deemed an important area for discussion. Because the Center for Scientific Review reviews most unsolicited brain tumor grant applications, the brain tumor research community believes that better coordination among the institutes and CSR is needed.

Improved communication could prevent brain tumor biology from "falling between the cracks" among the various review groups that may have relatively few brain tumor biologists. It is anticipated that coordinated efforts by NINDS, NCI, and CSR on the referral, review, and funding of brain tumor research applications would facilitate the implementation of the national plan for brain tumor research. Goals for improved communication extend to clinical problems as well. There is clearly a need for increased dissemination of information to patients, as well as to clinicians outside of neurooncology centers, with regard to the variety of available treatment options. The relatively low percentage of

patients with adult malignant gliomas who are enrolled in clinical trials may reflect an inadequate knowledge of treatment options on the part of both patients and physicians. This area of need represents an ideal opportunity for patient advocacy groups to collaborate with physicians to develop strategies to educate patients and clinicians about treatment options, including clinical trials, as well as about the specialized expertise that is available at neurooncology centers. For these reasons, the following priorities were identified:

—Establish a set of interactive meetings involving scientists from different biological disciplines (cancer biologists and geneticists, neurobiologists, immunologists, and radiation biologists) that focus specifically on important issues in brain tumor biology.

—Facilitate collaborations among different disciplines by encouraging interdisciplinary grant applications in brain tumor biology and etiology. Continue to develop combined programs in brain tumor research from NCI and NINDS and explore the possibility of revisions in the grant review process for brain tumor research.

—Encourage coordinated activities by advocacy groups toward further education of patients and clinicians about available treatment options for brain tumors.

Training

Achieving the goals for brain tumor research outlined in this report requires an adequately sized and well-trained scientific and clinical work force specializing in brain tumor research. Unfortunately, there is a dearth of basic scientists working in the field of brain tumors, which lacks sufficient numbers of clinicians who are cross-trained in brain tumor biology and scientists who are aware of the problems driving clinical neurooncology research. As is the case for biomedical science in general, there exists a true crisis caused by the small number of clinician-investigators now entering academic medicine. This issue has been discussed elsewhere and will not be recapitulated here, but its importance should not be underestimated. High priorities for brain tumor research are therefore as follows:

—Enhance training opportunities and support:

— Encourage funding for interdisciplinary and translational research. Recruit new talent and sustain proven talent in the field of brain tumor research.

—Create innovative public and private programs to stimulate promising young investigators to choose a career in clinical or laboratory brain tumor research through, for example, tuition loan payback or forgiveness and fellowships.

—Develop a joint NCI-NINDS campaign to encourage students to pursue interdisciplinary careers in the field of brain tumor research. Develop at NIH a model for a joint NCI-NINDS interdisciplinary training program in neurooncology at both the basic science and the clinical level. This program might include not only training at NIH for 3 years, but also additional support for the first 3 years of the individual's career as an independent investigator.

In Washington:

Continuing Resolution Funds Agencies Through Dec. 5

Congress returned to Washington last week, but the lame duck session failed to produce a spending bill for the Departments of Labor, HHS & Education, which funds NIH.

Instead, Congress passed a continuing resolution that will keep the agencies funded through five unfinished bills on last year's budget adjusted only for inflation. The resolution calls for Congress to return on Dec. 5 and complete unfinished business.

Meanwhile, NIH institutes are facing another deadline: a batch of non-competing grants as well as some new grants that need to be funded by Dec. 1. NIH officials said later this week, directors of the institutes will discuss strategy for meeting these obligations.

"Institute directors will be meeting this week to figure out how we will approach this fiscal year," said NCI Director Richard Klausner. "Right now, we have a flat budget, and we will deal with it as we have in the past."

While NIH is likely to find a way to cut the checks to researchers during the current round of grants, Washington observers are uncertain about the final outcome of the budget controversy. While it's an open secret that NIH was slated to receive a 15-percent increase, the bill that funds biomedical research holds the dubious distinction of being the only appropriations measure that has not been sent to the White House.

The bill's premier Senate champion, Labor-HHS subcommittee chairman Arlen Specter (R-Penn.), bowed out of the process, leaving it to Sen. Ted Stevens (R-Ak.), chairman of the full appropriations

committee, to fight the battle to the end. On the House side, subcommittee chairman Rep. John Porter (R-Il.) will retire at the end of the session and is thus a lame duck in a lame duck Congress.

So far, the issues that held up the spending bill have been divisive enough: reduction of class sizes and taxation issues. Now, Congressional Republicans are pondering ways to torpedo the "ergonomics" workplace safety rule recently signed by President Clinton.

These issues will be discussed in an uncertain climate, likely before legislators learn whether Texas Gov. George W. Bush or Vice President Al Gore will be sworn in as President Jan. 20.

Considering the level of uncertainty on Capitol Hill, observers worry that even if the Labor-HHS bill gains the momentum required to be submitted to the President, the measure will become a magnet for amendments that could make it unacceptable to the Administration.

Oncology professional societies were pleased with the proposed 15-percent increase, a third such boost in three years. These incremental increases are part of a bipartisan effort to double the NIH budget between fiscal 1998 and 2003.

"The American Society of Clinical Oncology is concerned that delays in final action on the FY 2001 spending bill may jeopardize the goal of doubling the NIH budget and may result, more immediately, in the interruption of important research programs or the postponement of promising new initiatives," said Arlene Forastiere, an oncologist at Johns Hopkins Oncology Center and chairman of the ASCO Public Issues Committee.

"We urge Congress to approve the NIH funding bill immediately upon its return in early December and to guarantee that NIH receives the full 15 percent increase in funding for the fiscal year 2001," Forastiere said.

The American Association for Cancer Research Chief Executive Officer Margaret Foti said legislators shouldn't lose sight of the goal to increase the funding for cancer research.

"The AACR feels strongly that now is the time for our elected officials to make cancer a national priority," Foti said. "In a recent bipartisan national poll commissioned by our organization, more than two thirds of the American public stated unequivocally that it favors at least doubling the current federal cancer research budget and increasing the funding needed to prevent and cure cancer."

In Brief:

Denman Hammond, NCCF Founder, Receives Award

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Sawyers, of Jonsson Cancer Center, University of California, Los Angeles, were awarded a $7.5 million Leukemia and Lymphoma Society Specialized Center for Research grant for studies on molecularly targeted therapy for treatment of chronic myelogenous leukemia. . . . . **G. DENMAN HAMMOND**, president and CEO of the National Childhood Cancer Foundation, was named "Cancer Fighter of the Year" by the Beckstrand Cancer Foundation of Long Beach, Ca. Hammond was chairman of the Children's Cancer Group for 25 years, and founded NCCF, based in Arcadia, Ca. NCCF has become the funding-raising foundation and grantee organization for the recently merged Children's Oncology Group. . . . **DENNIS FRYBACK,** a member of the University of Wisconsin Comprehensive Cancer Center and professor of preventive medicine and industrial engineering at University of Wisconsin, was elected to the Institute of Medicine. . . . **SUSAN HAGNESS,** a member of the University of Wisconsin Comprehensive Cancer Center, was among 59 faculty honored with 2000 Presidential Early Career Awards for Scientists and Engineers. Hagness is working on technology that could bring new speed to computing and electronic communications. . . . **JEAN JENKINS**, a **c**linical nurse specialist consultant at NCI, was invited to become a Fellow of the American Academy of Nursing. Jenkins works in the Genetics Section of the Medicine Branch in the Division of Clinical Sciences, where she is responsible for cancer genetic studies. She began her career as an oncology staff nurse at NIH in 1975. She completed her MSN 1984 at Catholic University and received a Ph.D. from George Mason University in 1999. She chaired a working group of the National Coalition for Health Professional Education in Genetics to develop core competencies in genetics for health professionals. . . . **RONALD LEVY**, of Stanford University School of Medicine, will receive the Key to the Cure Award from the Cure for Lymphoma Foundation at its annual Cabaret for the Cure on Nov. 20 in New York City. The foundation will present its Trailblazer Award to Ortho Biotech, the Together Award to **Morton Coleman** of Weill Medical College of Cornell University, and the Lymphoma Advocacy Award to **Gwen Darien**, editor of MAMM Magazine.

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