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Eliminating the Suffering and Death Due to Cancer

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"Jumping" DNA: A Tool for Finding Cancer Genes

Researchers have developed a new method of inducing cancer in mice and then rapidly identifying the genes involved. The mice are engineered to carry bits of DNA called transposons that, in the presence of a particular protein, jump randomly around the chromosomes of mouse cells, occasionally landing in genes and causing mutations.

As genetic mutations accumulate, the mice develop aggressive tumors and die. Researchers can pinpoint which genes were mutated by tracking molecular "tags" that mark where the transposons inserted themselves. Commonly mutated genes in mouse tumors may be versions of cancer genes in people.

"We think this is a powerful way to identify cancer genes for many different cancers," says Dr. Neal Copeland of the Mouse Cancer Genetics Program in the National Cancer Institute's (NCI's) Center for Cancer Research. "A number of the cancer genes we have found so far in the mice are known cancer genes in humans."

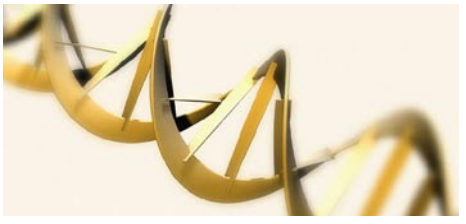
The researchers have also identified some potentially novel cancer genes. One of the new method's appealing features is that no prior knowledge about the genetics of a tumor is required to search for genes.

(continued on page 2)

Director's Update

The Cancer Genome: An Important Project for a New Era

Why do colon polyps in some patients never amount to more than a benign nodule, while in other patients they progress to a mortal threat? Why do two patients with the "same" type and stage of breast cancer respond so differently to the same treatment? The answers lie in gaining a deeper understanding of the genetic differences between cancer types. Working with the National Human Genome Research Institute (NHGRI), NCI hopes to undertake a project to characterize the human cancer genome, which we believe will allow us to gain such an understanding and much more.



Identifying the genes implicated in particular cancers will enable researchers to understand the disease more fully and develop more targeted treatments.

Although we know more about the molecular basis of many cancers than we did just 5 years ago, the heterogeneity of these approximately 200 diseases has precluded a comprehensive

(continued on page 2)

(Jumping DNA continued from page 1)
The project was started by Drs. David Largaespada and Adam Dupuy at the University of Minnesota in Minneapolis in 1997. A few years ago, Dr. Dupuy brought the transposon technology to NCI, where he has been working with Drs. Copeland and Nancy Jenkins.

The Minnesota and NCI groups collaborated while testing the method in different types of mice. Regardless of genetic background, the mice all died within 120 days, and some developed multiple tumors, according to findings in the July 14 *Nature*.

Dr. Largaespada began the project just as colleagues at the University of Minnesota had created a modified transposon using a version from salmon. Like almost all DNA transposons in vertebrates, it had not functioned for millions of years, but the researchers eliminated genetic mutations that had rendered it immobile, causing an "awakening."

Named *Sleeping Beauty*, the transposon has been used to induce mutations in the sperm and eggs of mice. But the transposon was not active enough to cause tumors, so the challenge was to increase the frequency of movement from one chromosomal location to another.

The researchers succeeded, and the new *Sleeping Beauty* transposon system can cause tumors in a variety of tissues throughout the lifetime of a mouse, providing another tool for finding cancer genes and potential leads for treatments.

"In some mice, clusters of gene mutations accumulate over time, and you begin to see a tumor's genetic 'fingerprint,'" says Dr. Largaespada. "This is important because the most effective cancer treatments may be combinations of drugs that attack each mutant gene product."

Dr. Dupuy recently modified the system so that *Sleeping Beauty* can be made to jump in specific tissues rather than around the whole body. The researchers are developing mice that can be used to investigate breast, colon, and prostate cancer in people.

The mice could also help researchers sift through the avalanche of mutations routinely identified in human tumors. For example, the proposed cancer genome project, which is in a pilot project planning phase, will need tools for identifying mutations that actually contribute to the disease, as opposed to just being present in tumors. ◆

(Director's Update continued from page 1)
understanding of the genetic aberrations that fuel them. A more systematic understanding could elucidate the cellular pathways that spur cancer cell growth and enable their spread throughout the body. This information, in turn, will provide a catalog of therapeutic targets and allow clinical trials to focus on patients who are most likely to respond to an agent based on knowledge of patients' tumor genetics. And these are just some of the expected benefits.

Embarking upon such an ambitious venture requires significant planning and discussion. As such, we're taking a phased approach to ensure that the appropriate systems, technologies, and processes for success can and will be developed, and to confirm that we can generate the sort of data and insights we expect.

The project began last week with a 3-day workshop involving some of the world's leading experts in areas such as cancer genomics, bioinformatics, microarray and proteomic technologies, and bioethics, as well as members of the advocacy community. Participants discussed issues with the aim of identifying the best approaches to characterizing the cancer genome—ones that will first be tested in a 3-year pilot. Plans for a pilot would have to be approved by key NCI and NHGRI advisory boards.

One focus of the pilot would be technology development. Although the Human Genome Project, in addition to providing the baseline catalog of human DNA sequences, resulted in tremendous advances in sequencing and other technologies, additional improvements are required to ensure that a project of this scale can be completed at an acceptable cost within a reasonable time frame. For example, informatics needs will include systems for managing the collection, integration, storage, and dissemination of tissue samples, and the clinical and genomic data associated with them. And new analytical tools will be needed to integrate and interpret experimental data on genomic alterations.

The development of such technologies would be integrated into other components of NCI's advanced technologies portfolio. Because the project would involve the collection of patient tissue samples, for example, it would enhance NCI's efforts to build stronger biorepositories.

At its heart, this project is about a vision to better understand and change the face of cancer. With proper planning and reliance on the wealth of intellectual talent available in the global biomedical research community, I believe the cancer genome project could fundamentally alter patient treatment by speeding the arrival of truly individualized molecular oncology. ◆

Dr. Andrew C. von Eschenbach
Director, National Cancer Institute

Spotlight

Testing Shark Cartilage as a Cancer Drug

More than a decade after shark cartilage was first touted as a potential cure for cancer, researchers still do not know whether cartilage has something to offer cancer patients. The best hope for finding out may be a lung cancer study that's testing a drug made from a concentrated extract of shark cartilage.

The drug, AE-941 (Neovastat), was developed by the pharmaceutical company Aeterna Zentaris of Quebec City. Unlike shark products in health food stores and on the Internet, it's been through the same development process as other pharmaceutical drugs and is available only through the trial.

"This is an interesting natural product," says Dr. Scott Saxman of the Cancer Therapy Evaluation Program at NCI, which is collaborating with other NCI programs to sponsor the trial. Studies of the drug in mice suggested that it impairs blood vessel growth, or angiogenesis, through various mechanisms.

Long before shark cartilage became a folk remedy, researchers were investigating cartilage in efforts to develop cancer drugs that kill tumors by inhibiting the blood vessels that supply them with nutrients. Cartilage lacks blood vessels and can prevent their growth.

The research has been done mainly with shark cartilage, as opposed to another type, not because sharks are resistant to cancer (they do get cancer), but because they are a reliable source of the material. Their skeletons are made almost entirely of cartilage.

According to Aeterna Zentaris, no sharks are killed to manufacture AE-941; the cartilage comes from the remains of sharks slaughtered for meat.

"This trial has nothing to do with a belief that sharks are somehow magical creatures," says Dr. Charles Lu, of the University of Texas M.D. Anderson Cancer Center, who leads the AE-941 study. "We want to know whether a cartilage product developed as a pharmaceutical and tested in a scientifically rigorous manner is effective against cancer."

In the trial, patients with non-small-cell lung cancer will either receive AE-941 or a placebo while undergoing chemotherapy and radiation treatments. About 360 patients out of a planned 750 are enrolled, and there are no results yet.

The trial is funded by NCI and the National Center for Complementary and Alternative Medicine. (In an unrelated trial, patients with advanced kidney cancer did not benefit from AE-941.)

No one knows how many cancer patients consume shark products, but surveys in the late 1990s reported that more than 25 percent of some patient populations used them as complementary or alternative medicine (CAM).

Around that time, NCI decided to evaluate two very different products: AE-941, which had science behind it but was not in use; and Benefin, a powder extract already used by patients.

"The combination of the two trials was intended to provide a better picture of products that have rarely been scientifically evaluated," says Dr. Jeffrey White, director of NCI's Office of Cancer Complementary and Alternative Medicine.

The Benefin trial recently closed early because enrollment was low and preliminary results were discouraging. "We didn't see any evidence of a benefit, and the extract wasn't well tolerated," says Dr. Charles Loprinzi, of the Mayo Clinic, who led the trial.

Reporting their findings in the July 1 *Cancer*, the researchers say that well-designed trials of other cartilage substances, such as AE-941, may well succeed. Dr. Loprinzi, who has evaluated a dozen CAM agents derived from natural products, views cartilage as just another source of potential anticancer agents.

The process of creating AE-941—by purifying a substance to concentrate biologically active molecules—is basically what cancer researchers have done for years, notes Dr. Andrew Vickers, of Memorial Sloan-Kettering Cancer Center, who has written about CAM products.

"The lesson is that to develop agents for cancer you need to be very careful about it," Dr. Vickers says. "You can't

(continued on page 5)

Cancer Research Highlights

Benign Breast Disease Indicates Relative Risk for Breast Cancer

Women with different types of noncancerous breast lesions have differing risks of developing subsequent breast cancer, according to a study in the July 21 *New England Journal of Medicine*.

The research team, led by Dr. Lynn Hartman of the Mayo Clinic School of Medicine, looked at medical records of 9,087 women diagnosed with benign breast disease, and then noted the incidence of breast cancer for a median of 15 years after the initial diagnosis.

Among the study population, 707 women developed breast cancer, which revealed a relative risk of 1.56 for any type of positive biopsy; 67 percent had nonproliferative lesions, which showed a relative risk of 1.27 for subsequent breast cancer; 30 percent had proliferative changes but no abnormalities in the ducts or lobes, which carried a relative risk of 1.88; and 4 percent had atypical hyperplasia, which represented a relative risk of 4.24. Among the general population over 15 years, 5 in 100 women developed breast cancer; among women with nonproliferative disease, the cases of breast cancer increased to 6 in 100.

Such risk ratios are important, say the study authors, because greater use of mammography to screen women for breast disease is increasing the number of biopsies performed and the discovery of more benign disease. An accompanying editorial notes that the study results "help stratify women with a benign lesion into high-risk and low-risk groups for breast cancer." The editorial also stressed the need for effective communication by physicians when explaining risk factors to their patients.

Low Long-Term Risk for Second Testicular Cancer

The long-term risk of testicular cancer patients developing a second cancer in the opposite (contralateral) testicle is very low, according to a study in the July 20 *Journal of the National Cancer Institute (JNCI)*.

Based on data from 29,515 U.S. men with testicular cancer—as reported in NCI's Surveillance, Epidemiology, and End Results database from 1973 through 2001—287 patients developed subsequent (metachronous) cancer in the contralateral testicle. Led by Dr. Sophie D. Fossa of the Norwegian Radium Hospital in Oslo, the investigators concluded that there is a 15-year cumulative risk of 1.9 percent for developing disease in the other testicle, with a 10-year overall survival rate of 93 percent after diagnosis of metachronous contralateral cancer.

"The need to perform a routine biopsy of the contralateral testis in patients with newly diagnosed unilateral testicular cancer is a matter of ongoing discussion," the researchers observe. They also note that the study results demonstrate "the low cumulative risk of metachronous contralateral testicular cancer and favorable overall survival of patients diagnosed with metachronous contralateral testicular cancer is in accordance with the current U.S. approach of not performing a biopsy on the contralateral testis."

However, the researchers caution, "A biopsy may be justified for high-risk patients, especially those with a history of testicular maldescent, infertility, testicular atrophy, or a family history of testicular cancer."

Tumor Cells Use Protein to Fend Off Anti-Angiogenesis Drugs

The very mechanism by which anti-angiogenesis agents work to attack tumors—disrupting the vasculature and blood supply that provides the nutrients for the tumors' existence and growth—may fuel resistance to the agents in cells that survive their initial onslaught.

The findings, from an NCI-funded study published in the July 1 *Cancer Research*, indicate that by cutting off the blood supply, the drugs actually induce a super-state of oxygen and glucose deprivation that spurs the production of a prosurvival protein, GRP78. For tumor cells that aren't destroyed early in treatment, says study lead author Dr. Amy Lee, of the USC Keck School of Medicine, the proteins provide protection against subsequent treatments.

"Most researchers in the past concentrated on genetic mutations" as the root of tumor cell drug resistance, Dr. Lee says. "But in this study we're talking about…the tumor cells protecting themselves in the microenvironment." A study, published in 2003 and led by Dr. Lee, looked at how GRP78 blocks cell death and found increased GRP78 production in cancer cells that had become resistant to the chemotherapy drug etoposide.

For the recent study, the researchers tested two investigational agents in a mouse model of breast cancer: combrestatin A4P, which targets tumor vasculature; and contortrostatin, an

(Highlights continued on page 5)

(Highlights continued from page 4)
anti-angiogenesis agent. In tumor cells that survived the initial treatment, increases in GRP78 levels were seen. They also found that GRP78 was overproduced in human cell lines from etoposide-resistant breast cancer. However, the tumor microenvironment must be critical to GRP78's production, the authors concluded, because in tissue culture, treating the human breast cancer cells used to create the xenograft mouse model failed to increase GRP78 levels.

Study Shows Fidelity of Medicare Chemo Data

Elderly Americans are consistently underrepresented in cancer clinical trials, making it difficult to know whether study results are relevant for the broader population. But there is another source of data on the use of cancer chemotherapy in the elderly: Medicare reimbursement records. To test whether these data are reliable for retrospective studies, researchers compared the records from two gold-standard clinical trials, in which the mean age of participants was 71, with those kept by Medicare for the same patients. The study results are published in the July 20 *JNCI*.

The research team used data from two Cancer and Leukemia Group B (CALGB) clinical trials, one for breast cancer patients and another for lung cancer patients. They linked these data with contemporaneous Medicare reimbursement records and looked for J9XXX codes, which track specific intravenous agents. After analyzing records from 175 patients, the team found that 89 percent of chemotherapy treatments recorded in the CALGB records were also tracked in Medicare records and that the specific chemotherapy regimens tracked were equal between the two data sets.

"Broadly, these results support the validity of the growing body of published observational research that uses Medicare chemotherapy claims from within the National Cancer Institute's SEER-Medicare data to describe chemotherapy use and outcomes among elderly Medicare beneficiaries," the authors concluded. ◆

Cervical Cancer Incidence Signifies Broader Health Care Disparities

A recent report by NCI's Center to Reduce Cancer Health Disparities found that high cervical cancer rates are a marker for larger disparities in health and in access to health care.

Excess Cervical Cancer Mortality: A Marker for Low Access to Health Care in Poor Communities notes that although cervical cancer deaths are consistently declining in the United States overall, certain populations of women continue to suffer from high cervical cancer mortality. Women in these groups generally live in regions with high rates of other treatable diseases; don't have a usual source of health care; and have fewer preventive health services, lower incomes, and lower education levels than other women.

The authors propose intensifying outreach to underserved women, stressing the importance of a "medical home" to ensure continuity of care, increased availability of patient navigators, and more female and minority health care providers. The report also called for improved insurance coverage, linguistically accessible information services, and optimized HPV testing and vaccine development, the latter of which could eliminate the cause of more than 90 percent of cervical cancers. ◆

(Spotlight continued from page 3)
just make global claims like, 'shark cartilage cures cancer.'"

False claims about sharks rarely getting cancer and exaggerated reports of Cuban cancer patients benefiting from shark cartilage ignited the fad in the early 1990s. It persists, says Dr. Vickers, because patients who are not doing well will always want to try something else, and these products are widely available in stores and on the Web.

"People do take over-the-counter natural products," says Dr. Saxman. "And there's evidence that some of these products can enhance or interfere with other medications, so patients need to inform their doctors and discuss whether they should be taking them."

According to Aeterna Zentaris, no sharks are killed to manufacture AE-941; the cartilage comes from the remains of sharks slaughtered for meat. Nonetheless, in the last 15 years, global shark populations have declined significantly, and researchers attribute this to overfishing and rising consumer demand for shark products.

Of course, if AE-941 proves useful against cancer, researchers could try to create a synthetic version, removing sharks from the process entirely. ◆

UPDATE: Mammography Insurance Reimbursement

For information about state laws enacted through June 30, 2005, requiring third-party payers to offer or provide coverage for screening mammograms, go to http://www.scld-nci.net/scld_products_data_2005.cfml. ◆

Funding Opportunities

PAR-05-140: AIDS International Training and Research Program
Letter of Intent Receipt Dates: Nov. 21, 2005; Nov. 21, 2006; Nov. 21, 2007. Application Receipt Dates: Dec. 21, 2005; Dec. 21, 2006; Dec. 21, 2007

This funding opportunity will use the D43 award mechanism. For more information, see http://cri.nci.nih.gov/4abst.cfm?initiativeparfa_id=3098. Inquiries: Dr. Jeanne McDermott—mcdermoj@mail.nih.gov

PAR-05-141: Basic and Preclinical Research on Complementary and Alternative Medicine

R01 and R21 Application Receipt Dates: Oct. 1, 2005; Feb. 1, June 1, and Oct. 1, 2006; Feb. 1, June 1, and Oct. 1, 2007; Feb. 1 and June 1, 2008

R15 Application Receipt Dates: Sept. 25, 2005; Jan. 25, May 25, and Sept. 25, 2006; Jan. 25, May 25, and Sept. 25, 2007; Jan. 25 and May 25, 2008

This funding opportunity will use the R01, R21, and R15 award mechanisms. For more information, see http://cri.nci.nih.gov/4abst.cfm?initiativeparfa_id=3099. Inquiries: Dr. Wendy Smith—smithwe@mail.nih.gov; Dr. Cindy Davis—davisci@mail.nih.gov

PA-05-142: Biobehavioral Methods to Improve Outcomes Research
Application Receipt Dates: Oct. 1, 2005; Feb. 1, June 1, and Oct. 1, 2006; Feb. 1, June 1, and Oct. 1, 2007; Feb. 1 and June 1, 2008

This funding opportunity will use the R01 and R21 award mechanisms. For more information, see http://cri.nci.nih.gov/4abst.cfm?initiativeparfa_id=3100. Inquiries: Dr. Paige McDonald—Mcdonalp@mail.nih.gov ◆

Featured Clinical Trial

Chemotherapy for Recurrent or Treatment-Resistant Lymphomas

Name of the Trial
Phase II Study of UCN-01 in Patients with Relapsed or Refractory Systemic Anaplastic Large Cell or Mature T-Cell Lymphomas (NCI-04-C-0173). See the protocol summary at http://cancer.gov/clinicaltrials/NCI-04-C-0173.

Principal Investigator
Dr. Wyndham Wilson, Dr. Keiron Dunleavy (Protocol Co-Chair), and Dr. Alan Wayne (Protocol Co-Chair), NCI Center for Cancer Research.

Dr. Wyndham Wilson

Why Is This Trial Important?
Lymphomas are cancers of the immune system. There are many different types of lymphoma, and treatment and prognosis depend on the type of lymphoma a patient has and how advanced the cancer has become.

In this trial, researchers are trying to determine whether a new drug called UCN-01 will help kill cancer cells in patients who have a type of lymphoma called anaplastic large cell lymphoma. This type of lymphoma starts in white blood cells called T cells. Anaplastic lymphoma primarily affects children. UCN-01 belongs to a group of drugs called protein kinase inhibitors. Protein kinases are enzymes in cells that help activate or deactivate other proteins, which may play a role in tumor cell growth.

"Protein kinases are like switches that turn other proteins on or off," said Dr. Wilson. "A number of tumor cells have these switches abnormally turned on or off, and this abnormal activity contributes to the survival of the tumor.

"In anaplastic large cell lymphoma, a protein kinase called ALK is turned on all the time. We hope that UCN-01 will inhibit the action of this abnormally activated kinase and cause the tumor cell to enter apoptosis, or programmed cell death.

"We are also interested in seeing if this drug will be useful against other T-cell lymphomas."

Who Can Join This Trial?
Researchers will recruit 18-37 patients aged 9 or over who have been diagnosed with anaplastic large cell lymphoma or mature T-cell lymphoma that has not responded to treatment or has recurred following previously successful treatment. See the list of eligibility criteria at http://cancer.gov/clinicaltrials/NCI-04-C-0173.

Where Is This Trial Taking Place?
The study is taking place at the NIH Clinical Center in Bethesda, Md.

Contact Information
For more information, contact the NCI Clinical Studies Support Center at 1-888-NCI-1937. The toll-free call is confidential. ◆

An archive of "Featured Clinical Trial" columns is available at http://cancer.gov/clinicaltrials/ft-all-featured-trials.

Notes

NCI Testifies on Radiation Effects from Nuclear Weapons Testing

At a July 19 Senate hearing, Dr. Kiyohiko Mabuchi, an expert with NCI's Radiation Epidemiology Branch, testified that NCI plans to prepare several scientific papers for peer-reviewed journals on the Institute's estimates that radioactive fallout from U.S. nuclear weapons testing in the Marshall Islands between 1947 and 1957 might be associated with as many as 500 excess cancers over the lifetimes of the exposed population. This would represent an approximate 9-percent increase over the estimated 5,600 lifetime cancer cases predicted to occur naturally in a comparable unexposed population.

NCI's estimates were first presented publicly to a House committee on May 25 (*NCI Cancer Bulletin*, June 7). At the July hearing, Dr. Mabuchi reiterated that NCI's estimates are highly uncertain due to limitations in radiation dose estimates and other factors. By pursuing scientific publication, "our work can be verified, refined, and employed by others," Dr. Mabuchi explained. Detailed information is available at http://dceg.cancer.gov/radia-researchDosimetryRMI.html.

New Web Sites Describes BCSC Resources

The Breast Cancer Surveillance Consortium (BCSC) recently launched a new Web site—http://breastscreening.cancer.gov/work/—to assist investigators who wish to initiate new research using the BCSC data on U.S. breast cancer screening practices. Development of new collaborative research ideas is a key goal of BCSC, a cooperative agreement between NCI and researchers who study breast cancer screening practices, created in response to the Mammography Quality Standards Act of 1992.

Another new BCSC Web site—http://breastscreening.cancer.gov/benchmarks/diagnostic/—provides information from a recent paper using BCSC data, "Performance Benchmarks for Diagnostic Mammography" (*Radiology* 2005;235(3):775-790). The study pooled data from BCSC registries on 332,926 diagnostic mammography exams performed between 1996 and 2001 at 151 facilities. The Web site contains tables and figures with performance parameters pertinent to the auditing of diagnostic mammography exams.

Diet and Communication Workshop

About 150 people attended the "Diet and Communication: What Can Communication Science Tell Us About Promoting Optimal Dietary Behavior?" workshop on July 14 and 15 in Bethesda, Md., to discuss applying communication science to the nutrition field. Dietitians, nutritionists, marketing executives, science writers, policy experts, and researchers discussed how communication research might be applied to nutrition health promotion. Speakers presented information from studies of media coverage, children's responses to television, nutrition in special populations, health campaigns, message design, and industry marketing tactics.

The workshop was sponsored by the Health Promotion Research Branch of NCI's Division of Cancer Control and Population Sciences and NIH's Division of Nutrition Research Coordination.

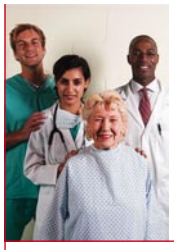
CNP Grantees Discuss Cancer Disparities

More than 350 principal investigators and community-based cancer outreach specialists from around the country gathered in Bethesda, Md., last week to network, share ideas and experiences, and hear from NCI divisions and offices as they prepare to launch programs as part of NCI's $95 million, 5-year Community Networks Program (CNP) to address cancer disparities in minority and underserved communities.

CNP will approach disparities reduction through community-based education, training, research, and interventions.

The 3-day meeting was organized by NCI's Center to Reduce Cancer Health Disparities. This was the first meeting of the CNP grantees, which represent the diverse communities where cancer rates are disproportionately high: Hispanic, African American, Asian American, Pacific Islanders, Native American, and underserved white populations.

The conference goal was to help participants learn about the NCI resources that will enable them to proceed with their projects. Topics that were discussed included NCI's partnership with the Centers for Disease Control and Prevention on early detection, NCI's activities with the Centers for Medicare & Medicaid Services on cancer coverage for Medicare beneficiaries, HPV testing and cervical cancer screening, overviews of NCI's Division of Cancer Control and Population Sciences and Office of Communications, information about career and fellowship



Cancer Center Profile

UNMC Eppley Cancer Center

Director: Dr. Kenneth H. Cowan • 986805 Nebraska Medical Center, Omaha, NE 68198 • Phone: 402-559-4090 • Web site: http://www.unmc.edu/cancercenter/

Background

The UNMC Eppley Cancer Center is the only NCI-designated Cancer Center in Nebraska. The Eppley Institute was established in 1960 as part of the University of Nebraska Medical Center College of Medicine with funds from the Eugene C. Eppley Foundation, the National Institutes of Health, and the University of Nebraska. In 1983, NCI awarded the Institute a Cancer Center Support Grant that has been continually funded since then. In 1999, Dr. Kenneth H. Cowan was named director of the Eppley Institute for Research in Cancer and Allied Diseases and of the UNMC Eppley Cancer Center. Shortly thereafter, the Center was designated an NCI Clinical Cancer Center. Since then, the Cancer Center has conducted almost 400 clinical trials for leukemia and lymphoma, as well as breast, prostate, pancreatic, gastrointestinal, and lung cancers.

Patient/Clinical Care

In the multidisciplinary Peggy D. Cowdery Patient Care Center, part of the Lied Transplant Center, cancer patients are treated by surgical, medical, and radiation oncologists, as well as by supportive care specialists such as genetic counselors, nutritionists, and social workers. At the Lied Transplant Center, patients with cancer and other diseases requiring transplantation benefit from revolutionary treatment strategies in a comfortable, home-like setting. Cooperative Care, a new model of care delivery, enables family members to stay and participate as partners in a patient's care.

Research

The UNMC Eppley Cancer Center is renowned for its basic research programs in chemical carcinogenesis; molecular, cellular, and structural biology; and translational research in new therapies. Research programs focus on cancer genes and molecular regulation, molecular and biochemical etiology, experimental therapeutics, and disease-oriented working groups.

Other Notable Programs

The UNMC Eppley Cancer Center has received funding from NCI to conduct a vaccine clinical trial designed to reduce the risk of breast cancer recurrence following initial treatment, and has received federal funding to establish a Center of Excellence for research in the prevention of breast cancer. In addition, the Center's Nebraska Early Detection and Informatics Technology project is poised to become the first statewide lung-cancer screening program in the United States.

Physicians at the Center have developed a unique protocol using high-dose radiation and chemotherapy to treat patients with advanced prostate cancer. Center researchers have also received $4.2 million from NCI to develop a blood test for early detection of pancreatic cancer and to develop an international Web-based pancreatic cancer registry. As a nationally known program of excellence in leukemia and lymphoma and 1 of only 14 NCI-funded Centers of Excellence in bone marrow transplantation, the UNMC Eppley Cancer Center has received an $8.5 million grant from NCI to study the molecular characteristics of lymphoma. ◆

Featured Meetings and Events

A calendar of scientific meetings and events sponsored by the National Institutes of Health is available at http://calendar.nih.gov/cgi-bin/calendar ◆

The *NCI Cancer Bulletin* is produced by the National Cancer Institute (NCI). NCI, which was established in 1937, leads the national effort to eliminate the suffering and death due to cancer. Through basic, clinical, and population-based biomedical research and training, NCI conducts and supports research that will lead to a future in which we can identify the environmental and genetic causes of cancer, prevent cancer before it starts, identify cancers that do develop at the earliest stage, eliminate cancers through innovative treatment interventions, and biologically control those cancers that we cannot eliminate so they become manageable, chronic diseases.

For more information on cancer, call 1-800-4-CANCER or visit http://www.cancer.gov.

NCI Cancer Bulletin staff can be reached at ncicancerbulletin@mail.nih.gov.