NATIONAL CANCER INSTITUTE

NCI Cancer Bulletin

Eliminating the Suffering and Death Due to Cancer

October 18, 2005
Volume 2 | Number 40

In this issue:

A Publication of the
National Cancer Institute
U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES
National Institutes of Health
NIH Publication No. 05-5498

http://www.cancer.gov

Hormone Therapy and Breast Cancer Risk Following Prophylactic Surgery

Women with mutations in the *BRCA1* or *BRCA2* genes can reduce their risk for breast and ovarian cancer by having their ovaries removed, but then must decide whether to use hormone replacement therapy (HRT) for menopause symptoms triggered by that surgery. Fears that using HRT could compromise their reduced risk of breast cancer may now be diminished, because of results published early online in the *Journal of Clinical Oncology.*

Researchers at 13 cancer centers in North America and Europe identified a prospective cohort of 462 women with *BRCA1* or *BRCA2* gene mutations, 155 of whom had bilateral prophylactic oophorectomy (BPO).

Compared with 307 mutation carriers who kept one or both ovaries, the BPO patients' breast cancer risk was reduced by 60 percent.

This reduced risk reflects what other studies have found, and explains why women with the mutations—as many as 90 percent of whom may develop breast or ovarian cancer if not treated—are advised by clinicians to undergo some form of BPO after completing childbearing.

But the researchers found that, among the women who had BPO, those who did receive short-term HRT had the same breast cancer risk reduction as those who did not.

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Director's Update

Guest Update by Dr. Anna Barker

Integrating Nanotechnology in Cancer Research

During the last few weeks we announced funding for three major components of the National Cancer Institute's (NCI's) Alliance for Nanotechnology in Cancer. These awards, which represent key milestones in NCI's Cancer Nanotechnology Plan, reflect the product of intense community planning and a long-term commitment to employ nanotechnology as a transformational force in cancer research.

Dr. Anna Barker, Deputy Director for Strategic Scientific Initiatives

All told, these components represent a comprehensive, national initiative designed to accelerate the application of nanotechnology's unique capabilities to cancer. We congratulate these investigator teams and their institutions for their vision and leadership. The recent announcements include funding for:

- Centers of Cancer Nanotechnology Excellence that will develop

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(Breast Cancer continued from page 1)
Though recent findings suggest an increased risk of breast and endometrial cancer from HRT—especially estrogen and progesterone used together—no such effect appeared after short-term use in this study, with one-third of the controls and 16 percent of BPO patients followed thus far for at least 5 years. "Questions still remain, however, about longer-term use," said Dr. Sheila Prindiville, of NCI's Center for Cancer Research.

Dr. Timothy R. Rebbeck of the University of Pennsylvania School of Medicine and colleagues wrote that "adoption of effective cancer risk reduction interventions is critical" for this population. They have formed the Prevention and Observation of Surgical Endpoints (PROSE) Study Group to develop and test clinical interventions for women with *BRCA1* or *BRCA2* mutations.

During more than a decade of genetic testing, many thousands of women have been identified as *BRCA1* or *BRCA2* mutation carriers. An earlier PROSE study found bilateral oophorectomy combined with mastectomy to be an effective preventive treatment, but also raised quality-of-life issues over whether women were prepared to accept such a drastic strategy.

Therefore, clinicians are trying to discover alternative ways to reduce cancer risk in this population. They know from previous studies that surgery to remove both ovaries reduces the risk of ovarian cancer by about 90 percent and breast cancer by about half, and in this study by 60 percent.

Yet some premenopausal women decline BPO, fearing the prospect of surgically induced menopause without HRT to mitigate symptoms. Thus, both patient perceptions and clinical findings about the impact of HRT on breast cancer risk are important.

This study demonstrates that short-term HRT does not adversely affect the breast cancer risk reduction from BPO in premenopausal women. There were not enough women on HRT to produce definitive findings on the question of opposing estrogen with progesterone, and Dr. Prindiville noted that "it is important to try to quantify that risk." ◆

By Addison Greenwood

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new, nanotechnology-based diagnostic and treatment tools;

- Training programs that will establish a cadre of scientists with the cross-disciplinary expertise needed to develop the nanotech-based tools of the future; and,
- Investigator teams that will create new "platform" nanotechnologies to enhance discovery and translational research.

A fourth component is the Nanotechnology Characterization Laboratory (NCL) based at NCI-Frederick. In collaboration with the National Institute of Standards and Technology and the U.S. Food and Drug Administration, NCL establishes standard analytical methods and data to assess nanoparticle interactions with biological systems, thereby informing medical product development.

With these awards, we will establish a pathway for cancer nanotechnology career development. The Ruth L. Kirschstein National Research Service Awards training program will support postdoctoral and mid-career training. In addition, our partnership with the National Science Foundation and its highly successful Integrative Graduate Education Research Traineeship Program will provide funding to train graduate-level investigators in multidisciplinary areas such as biological, computational, and materials sciences.

The Alliance for Nanotechnology in Cancer builds on innovative technology platforms previously funded through the Unconventional Innovations Program. An example of an advanced technology, multifunctional nanoparticles capable of targeting vascular cells, drug delivery, and biosensing, will soon enter clinical trials. Dendrimer technologies have been applied in animal cancer models to simultaneously detect early stage tumors, deliver chemotherapeutic agents, and selectively kill targeted cancer cells. Quantum dots and molecular beacons are being used in many basic research laboratories to study dynamic interactions of novel therapeutics with their molecular targets. Nanowires and nanocantilevers are being prototyped for simultaneous detection of genes and proteins as molecular signatures of cancer in serum and tissue samples.

Any discussion of NCI's nanotechnology efforts would be incomplete without an expression of enormous gratitude to Dr. Mauro Ferrari. As one of the foremost experts in bionanotechnology, Dr. Ferrari helped NCI to define a strategy that emphasized teamwork, the exploitation of nanoscale biological properties, and a pathway to bring the benefits of nanotechnology to patients with cancer. Dr. Ferrari has now returned to his post at Ohio State University, but his leadership on this effort was invaluable.

To learn about the latest advances and news in the NCI Alliance for Nanotechnology in Cancer and nanotechnology-related cancer research, please visit our Web site at http://nano.cancer.gov. ◆

Spotlight

Stomach Cancer: Linking Infection, Inflammation, and Disease

Earlier this month two Australian researchers won the Nobel Prize for Physiology or Medicine for discovering a bacterium that can cause gastric inflammation, ulcers, and stomach cancer. The Nobel committee honored Drs. Barry Marshall and Robin Warren for persuading skeptics two decades ago that peptic ulcers are an infectious disease.

The bacterium Helicobacter pylori *infects half the world's population.*

A link between bacteria and ulcers was initially dismissed because in the early 1980s medical dogma held that ulcers were caused by "stress" and poor diet. But the evidence, including an experiment in which Dr. Marshall swallowed the bacteria himself and became ill, was irrefutable.

Today, most peptic ulcers are treated with antibiotics, and the association between the bacterium, *Helicobacter pylori*, and stomach ailments is well documented. Stomach cancer has become a model for researchers investigating connections among infection, inflammation, and cancer.

"Inflammation is being recognized as an important feature of more and more types of cancer, and it is likely a component of the causes," notes Dr. Charles Rabkin of NCI, who has helped identify genetic differences associated with variation in the body's response to *H. pylori* infection.

Although inflammation is a common reaction to *H. pylori* infection, individuals who are genetically predisposed to have severe immune responses are thought to be at higher risk of developing stomach cancer. The virulence of the infecting strains and the stomach environment also play a role in determining the outcome of an infection.

"There's a consensus that, in general, the genetic variation that confers the greatest degree of inflammation is associated with the greatest risk of stomach cancer and its precursors," says Dr. Rabkin. This could help explain why a minority of infected individuals progress to cancer, although half the world's population carries the bacterium.

Dr. Rabkin and many others have identified variants of proteins called cytokines that promote inflammation and are likely to stimulate the disease process. Identifying genes involved in regulating the inflammatory process could reveal molecular targets for intervening in the disease process.

Last year, a new model of stomach cancer challenged the conventional wisdom about the disease process. Using mice infected with a cousin of *H. pylori*, researchers at the University of Massachusetts, Worcester, traced the origins of stomach cancer to stem cells from bone marrow.

The researchers hypothesized that bone marrow stem cells migrated to the damaged areas of the stomach to help repopulate the tissue, but the cells could not develop normally in the presence of inflammation, according to findings in the November 26 *Science*.

"We believe that if carcinogens such as *H. pylori* are not eradicated they will eventually cause the death of stem cells in the stomach, and these will be replaced by bone marrow stem cells," says Dr. Timothy C. Wang, who co-led the study and is now at Columbia University Medical Center.

The big question now, according to Dr. Wang, is "How can one confirm these results in the human model?" In theory, stem cells have the potential to form any tissue of the body, and they have been implicated in some cancers. But the cells themselves are rare and extremely difficult to find in adult tissue.

Dr. JeanMarie Houghton of the University of Massachusetts, who co-led the study, says a goal of future research is to identify the molecular signals that are calling the bone marrow stem cells to the site of inflammation and helping them to remain there.

"The research is a good demonstration of how the continued presence of inflammation and the toxic factors associated with this state harmed cells that were repopulating the stomach lining, leading to their mutation," comments Dr. Rabkin.

Whether the model turns out to be true in humans and in other types of cancer, it offers an alternative way of looking at the origins of cancer, says

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Cancer Research Highlights

Lower Screening Mammography Rates Found Among Women with Diabetes

A large Canadian study found that women with type 2 diabetes were less likely to receive screening mammograms for breast cancer than women without diabetes, according to a report in the October 10 *Archives of Internal Medicine*.

The study, led by Dr. Lorraine L. Lipscombe of the Institute for Clinical Evaluative Sciences at the University of Toronto, examined the utilization of mammography in a population of women in Ontario Province to determine whether the presence of diabetes affects mammogram rates. The retrospective cohort study compared 69,168 women who had diabetes and 663,519 women without diabetes for a minimum of 2 years.

Evidence from previous studies suggested that screening mammography may be especially important among women with type 2 diabetes mellitus due to their increased risk of breast cancer. However, study results showed that only 38.1 percent of the diabetic women received a mammogram during the study period, compared with 47.3 percent of the women without diabetes.

According to the researchers, the study results "did not change after adjustment for age, income, region of residence, comorbidity, frequency of primary care physician visits, specialist care, and having a regular provider of care." The findings support earlier studies that found that various kinds of preventive care, such as mammography, lipid-lowering therapy, arthritis treatment, colon cancer screening, and Pap smears, may be relatively neglected in patients with chronic diseases such as diabetes.

Colorectal Cancer Screening Rates Prove Difficult to Increase

The difficulty of improving the rates of colorectal cancer (CRC) screening was underscored in a study that sought to help health care providers increase the screening effort at a large managed care institution, as reported in the October 10 online edition of *Cancer*.

CRC is the third-leading cause of cancer mortality in adults in the United States. However, the rate of CRC screening is extremely low and has only modestly improved in the past decade.

A randomized controlled trial conducted by researchers at UCLA's Jonsson Comprehensive Cancer Center tried to increase the rate of CRC screening within a managed care organization by working directly with the group's associated provider organizations (POs). Nineteen POs received a quality-improvement (QI) intervention that included start-up materials and support to encourage CRC screening among patients. Another 17 POs served as controls. After supplying the initial materials to the QI group, the research team did not provide any substantial onsite assistance, since the goal of the study was to test an intervention that could be maintained without external support.

During the 2.2 years of the study, only 29 percent of eligible patients within the QI group were up to date according to existing CRC screening guidelines. This screening rate did not differ significantly between the intervention and control PO groups. The authors concluded that, "Although well intentioned, the medical directors, facilitators, and providers with whom we worked were unable to galvanize their organizations to make the changes necessary to have an impact on CRC screening rates."

Study Analyzes Errors in Cancer Diagnosis

A study appearing in the October 10 online edition of *Cancer* examined the causes and effects of errors that occur when testing for cancer. The analysis, funded by the Agency for Healthcare Research and Quality, looked at errors according to six parameters: health care facility, type of cancer (gynecologic or other), cause of error (sampling or interpretation), effect of diagnosis on patients' clinical management and outcome, and severity of any resulting patient harm.

Dr. Stephen Raab of the University of Pittsburgh School of Medicine and colleagues analyzed 17,003 samples from 4 medical institutions in mid-Atlantic and Midwest states. Each sample included discordant, paired results—that is, results where one test was positive and the other negative—from patients who received both histologic and cytologic tests for cancer or precancerous lesions at the same tissue site.

The study showed that error frequencies were correlated with the institution where the sample was collected. Among all four institutions, most of the errors were attributed to cytology, rather than surgical

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sampling or interpretation. Non-gynecologic errors were more common than gynecologic ones.

The researchers found that pathologists disagreed on the severity of patient harm resulting from errors. They calculated, however, that harm could befall a minimum of 127,950 patients per year in the United States because of diagnostic mistakes. "The pathology culture is one of individual diagnostic responsibility and errors are not attributed to poorly designed systems that may be fixed," they wrote. "The standardization and uniform reporting of errors…is a first step in improving safety."

Variation in *COX-2* Gene Assessed in Colorectal Adenoma Patients

The overall structure of the gene *cyclooxygenase 2*, or *COX-2*, may be an important determinant of the risk of colorectal cancer and may influence a patient's response to drugs that inhibit the COX-2 enzyme, according to researchers who conducted a pilot study of variations in the gene. Levels of the COX-2 enzyme often are elevated in colorectal and other cancers.

A large number of variants, or polymorphisms, in the *COX-2* gene have been reported. Using four polymorphisms in the *COX-2* gene, researchers in NCI's Division of Cancer Prevention (DCP) tested associations between the variants and the susceptibility to colorectal cancer and the responsiveness to aspirin and ibuprofen, two of the nonsteroidal anti-inflammatory (NSAIDs) drugs that nonselectively inhibit COX-2.

An interesting finding of the study is that some colorectal adenoma patients carrying certain *COX-2* polymorphisms benefited more from the use of COX-2 inhibitors than did other patients without the polymorphisms. The study, published in the October 17 *British Journal of Cancer*, included more than 700 patients with advanced colorectal adenoma and a matched group of controls. Future studies involving more patients and testing of additional polymorphisms are being planned.

"The results in this pilot study, especially the association with the widely used class of COX-2 inhibitors, are encouraging and if confirmed in future studies, would have significant implications in maximizing response and minimizing toxicity," says Dr. Iqbal Ali, the first author of the study. ◆

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Dr. Houghton, adding: "This can help us shake off beliefs we held previously and may lead to new approaches for treatment."

Response to the theory has been unexpectedly positive, although many researchers are awaiting confirmation by other studies. "We've come a long way since poor Barry Marshall had to swallow a culture of bacteria to prove they cause ulcers," Dr. Houghton says. ◆

By Edward R. Winstead

CCR Grand Rounds

October 25: Dr. Angela Brodie, Professor of Pharmacology and Experimental Therapeutics, Department of Pharmacology, University of Maryland School of Medicine; "Aromatase Inhibitors and Breast Cancer: Concept to Clinic"

November 1: Dr. Sriram Subramaniam, Chief, Biophysics Section, Laboratory of Cell Biology, CCR, NCI; "From Molecules to Tissues: Bridging the Imaging Gap with 3D Electron Microscopy" ◆

FDA Approves Expanded Indications for Exemestane

The Food and Drug Administration has approved expanded indications for the breast cancer drug Aromasin (exemestane), allowing its adjuvant use in postmenopausal women with estrogen-receptor positive tumors.

According to a randomized trial published last December in the *New England Journal of Medicine (NEJM)*, switching from tamoxifen to exemestane for the last 2 to 3 years of the normal 5 years of adjuvant hormonal treatment decreased risk of recurrence by 32 percent. However, overall survival rates between the group switching to exemestane and the group staying on tamoxifen were not significantly different.

Of the 4,742 patients enrolled in the *NEJM* study, 2,362 were randomly assigned to switch to exemestane, and 2,380 continued to receive tamoxifen. After a median follow-up of 31 months, researchers reported 183 recurrences, deaths, or new primary tumors in the opposite breast for the exemestane group and 266 such events in the tamoxifen group.

After the study, the American Society of Clinical Oncologists and the National Comprehensive Cancer Network updated their guidelines to support adjuvant regimens that include exemestane.

Drug maker Pfizer also received similar expanded approval in the European Union. Exemestane was originally approved in the United States for primary treatment of advanced breast cancer in postmenopausal women whose tumors stopped responding to tamoxifen. ◆

Funding Opportunities

Following are newly released NCI research funding opportunities:

Planning Grants for Institutional Clinical and Translational Science Awards

RFA-RM-06-001

Letter of Intent Receipt Date: February 27, 2006

Application Receipt Date: March 27, 2006

This funding opportunity will use the P20 award mechanism. For more information see http://cri.nci.nih.gov/4abst.cfm?initiativeparfa_id=3175. Inquiries: Dr. Bernard Talbot—talbotb@mail.nih.gov

Institutional Clinical and Translational Science Award

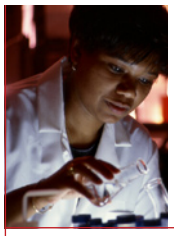
RFA-RM-06-002

Letter of Intent Receipt Date: February 27, 2006

Application Receipt Date: March 27, 2006

This funding opportunity will use the U54 award mechanism with linked K12 and T32 components. For more information see http://cri.nci.nih.gov/4abst.cfm?initiativeparfa_id=3176. Inquiries: Dr. Anthony Hayward—haywarda@mail.nih.gov

For comprehensive information about NCI funding priorities and opportunities, go to http://www.cancer.gov/researchandfunding. ◆



Featured Clinical Trial

Targeted Treatment for Recurrent or Progressive Lung Cancer

Name of the Trial
Phase II Study of Sorafenib in Patients with Recurrent or Progressive Stage IV Non-Small-Cell Lung Cancer (NCI-05-C-0049). See the protocol summary at http://cancer.gov/clinicaltrials/NCI-05-C-0049.

Principal Investigator
Dr. Martin Gutierrez, NCI Center for Cancer Research

Why Is This Trial Important?
Lung cancer is the leading cause of cancer-related death in the United States, and it has often spread (metastasized) by the time it is diagnosed. The likely outcome, or prognosis, for patients with metastatic lung cancer is death. Consequently, new and more effective treatments for metastatic lung cancer are needed.

In this clinical trial, researchers are testing a new drug called sorafenib to see if it can cause tumors to shrink or disappear in patients with metastatic non-small-cell lung cancer (NSCLC) that has recurred or progressed after previous treatment with chemotherapy. Sorafenib inhibits a protein called Raf kinase, which helps promote cell proliferation. Blocking Raf kinase activity may halt the spread of cancer cells.

Sorafenib also inhibits two other proteins named vascular endothelial growth factor receptors 2 and 3 (VEGFR2 and VEGFR3), which help tumors form new blood vessels (a process called angiogenesis). By blocking VEGFR2 and VEGFR3 activity, sorafenib may help cut off the blood supply to tumors and cause them to die.

"Sorafenib is a molecularly targeted oral medication with both antiproliferative and antiangiogenic properties," said Dr. Gutierrez. "It has shown some promising results against NSCLC in an earlier phase I study, and it appears to be well-tolerated. Most of the toxicity that we have seen has been mild and easy to control."

Who Can Join This Trial?
Researchers seek to enroll up to 40 patients aged 18 or over with recurrent or progressive stage IV NSCLC. See the list of eligibility criteria at http://cancer.gov/clinicaltrials/NCI-05-C-0049.

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

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

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

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. ◆

Notes

NCI Funds New Initiative on Energetics and Cancer

The Behavioral Research Program of NCI's Division of Cancer Control and Population Sciences recently announced the funding of the Transdisciplinary Research on Energetics and Cancer (TREC) initiative. A 5-year, $54 million effort, TREC aims to integrate the study of diet, weight, and physical activity and their effects on cancer. The four funded research centers and one coordinating center will encompass projects ranging from the biology and genetics of energy balance to the behavioral, sociocultural, and environmental influences on nutrition, physical activity, weight, and energy balance. The centers will also provide training for new and established scientists to conduct research in this area. For more information, go to http://www.cancercontrol.cancer.gov/TREC.

OLA Hosts Teleconference on Cancer Statistics

NCI's Office of Liaison Activities (OLA) will host the second in its "Understanding NCI" series of toll-free teleconferences on crosscutting issues in cancer research. Cancer advocates, organizations, survivors, family, and friends are encouraged to participate.

Dr. Brenda Edwards of NCI's Surveillance Research Program will present information on NCI's cancer statistics resources. Two cancer advocates will address "Why Statistics Matter for Advocates" on October 19 at 2:30 p.m., EDT. To participate, call 1-800-857-6584; the passcode for this call is 4683#. Playbacks of the teleconference will be available at 1-800-229-6227 until 10:30 p.m. EST on November 19. For more information, go to http://la.cancer.gov/teleconference.html.

Symposium To Highlight Transdisciplinary Tobacco Research

NCI, the National Institute on Drug Abuse, and the National Institute on Alcohol Abuse and Alcoholism are sponsoring an afternoon symposium featuring research from the Transdisciplinary Tobacco Use Research Centers (TTURCs). "Transdisciplinary Tobacco Use Research from the Laboratory to the Population" will be held from 3:00 to 5:00 p.m. on October 25 in the Natcher Conference Center on the NIH campus. For more information, contact Mark Parascandola at 301-451-4587 or paramark@mail.nih.gov. For information on TTURCs, go to http://dccps.nci.nih.gov/tcrb/tturc.

New Link to Find Cancer Center Trials

The Web sites of NCI-designated Cancer Centers are excellent resources for patients looking for clinical trials. NCI's Web site has added a link to make finding those sites easier. Patients can now go to http://www.cancer.gov/clinicaltrials/finding/NCI-cancer-centers. This link can also be found at http://www.cancer.gov/clinicaltrials/findtrials.

Science Writers' Seminar To Focus on Pain

The next NCI Science Writers' Seminar, "Pain and New Ways to Relieve It," will take place on November 2, from 11:00 a.m. to 1:30 p.m., in the Natcher Conference Center on the NIH campus in Bethesda, Md. Sponsored by NCI and the NIH Pain Consortium, the seminar will introduce journalists to some of the latest therapies for pain from cancer and other causes. Leaders in the field of pain management will present their research, and a cancer patient will discuss her experience living with severe chronic pain. The NIH Pain Consortium was established to enhance pain research and promote collaboration among researchers across the many NIH Institutes and Centers that have programs and activities addressing pain.

To register for the seminar, contact the NCI Media Relations Branch at 301-496-6641 or ncipressofficers@mail.nih.gov. The event is open to the public, but preference will be given to journalists. Attendees are strongly encouraged to use Metro. The NIH campus can be easily accessed at the Medical Center stop on Metrorail's Red Line. For NIH transportation, parking, and security information, go to http://www.nih.gov/about/visitorsecurity.htm.

SWOG to Study Lung Cancers Among Women and Nonsmokers

The Southwest Oncology Group (SWOG) has launched a new study to determine why women seem to get a different type of lung cancer—and at an earlier age than men—especially if they have never smoked. The study (S0424) will determine why women are more likely than men to be diagnosed with certain types of lung cancer, as well as what other factors put women at a higher risk of getting lung cancer at an earlier age, often with limited exposure to smoking. The study will also seek to better understand the factors that cause lung cancer in both men and women who do not smoke.

Researchers are seeking 720 women and men (smokers and nonsmokers) across the United States who have been diagnosed with stage I, II, or III non-small-cell lung cancer. For more information, contact SWOG at (210) 677-8808 or protocols@swog.org. ◆

Cancer Center Profile

Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine

Director: Timothy J. Eberlein, MD • 660 S. Euclid Ave., Box 8100, St. Louis, MO 63110 • Phone: 314-747-7222 • Web: http://www.siteman.wustl.edu

Background

The Siteman Cancer Center is the only NCI-designated Comprehensive Cancer Center in Missouri and within a 240-mile radius of St. Louis. Siteman comprises the cancer programs of Washington University School of Medicine and Barnes-Jewish Hospital. More than 350 Washington University physicians and investigators affiliated with Siteman treat nearly 6,000 newly diagnosed cancer patients each year and hold $130 million in annual research and training grants. Satellite Siteman clinics are located in west St. Louis County and adjacent St. Charles County.

Patient Care

Although Siteman treats patients with all types of cancer in 12 multidisciplinary care centers, it has gained national recognition for clinical programs in leukemia and lymphoma as well as breast, gastrointestinal, head and neck, and genitourinary cancers. A patient-centered approach to care is reinforced by programs such as the A.G. Edwards Patient Navigator Service, which provides volunteers who orient patients to the cancer center before their first visit. The Barnard Health and Cancer Information Center served about 22,000 clients in 2004, offering information, support programs, and special events.

Research

Siteman is dedicated to advancing new approaches to cancer prevention, diagnosis, and treatment through research. Research programs include:

- Cancer Genetics
- Cancer and Developmental Biology
- Tumor Immunology
- Hematopoietic Development and Malignancy
- Cellular Proliferation
- Prevention and Control
- Translational and Clinical Research
- Oncologic Imaging

Research in these programs has resulted in federally funded translational initiatives in nanotechnology, chemoprevention, pharmacogenetics, gene therapy, proteomics, imaging, genomics, and leukemia and lymphoma. More than 30 multiproject or collaborative cancer grants are held by Siteman investigators.

State-of-the-art research facilities include Washington University's Genome Sequencing Center and 14 shared resources, including a Good Manufacturing Practice laboratory for the production of cellular and biological products, which is one of the largest such facilities at a U.S. academic medical center.

About 350 clinical trials are under way at Siteman. Washington University's Mallinckrodt Institute of Radiology was a founding member of the Radiation Therapy Oncology Group, and Siteman participates in a variety of other cooperative groups.

Other Notable Programs

As an NCI-designated Comprehensive Cancer Center, Siteman is committed to community outreach, education, and screening. Last year, the cancer center sponsored more than 100 community events. Participation in these events has increased nearly tenfold in the last few years to nearly 30,000 people in 2004. Siteman's Program for the Elimination of Cancer Disparities strives to reduce barriers to cancer education, care, and research for underserved groups. This year, the program received a $1.25 million grant from NCI to support this work. ◆

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.

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